

Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation



P
Tech
B

(THE) BUILDING NEWS

AND ENGINEERING JOURNAL.

V 41 (1881, July-Dec)

BEAUTY AND EXPRESSION.

THE greatest change, perhaps, that has passed over English architecture within the last dozen years is this: that it has given up, in great part, the search for beauty, and has entered, instead, on a search for expression. For a century and more it had copied all the finest styles of the world one after another; and the reason it assigned for copying them was, in the main, the perfection of their form. To find what was most beautiful, and to repeat it everywhere, was the universal desire. It was a foolish desire, but one that still lingers amongst the shallow, the plausible, and the imperfectly educated. It was foolish for many reasons, of which these are a few:—Suppose you have found the most beautiful style—say the Greek—it may well happen that you cannot really repeat it, because you have not the materials to repeat it in. Instead of white marble, you have nothing better than sandstone and limestone, brick and stucco. You cannot repeat it, again, because you have not the sculptors who give life to it—detail. Instead of Phidias and Praxiteles you have the ambitious stonemason who calls himself a carver, and the monumental artists of the New-road. And if you had the materials and the men, you have not the climate and the sky. Instead of sunshine you have fog; instead of pure air you have smoke; instead of the golden tints laid on by time you have the dirt and filth ingrained by a London atmosphere. And further, suppose all these, and twenty other reasons, done away with: suppose it possible to copy the Parthenon and the Erechtheum everywhere, and to see the copies as perfectly as ever the originals were seen, would it even then be wise to put the highest type of beauty everywhere? A crimson sunset is very fine; but who would care to look at it if it happened every night? And suppose, yet further, that to us, as it really may be to the planets around certain coloured stars, crimson were the common light of day; does anyone imagine for a moment that we should think the world more beautiful than it now is? If everything were crimson, we should probably not know that crimson existed: we only recognise it by contrast with things that are not crimson. So it is with beauty. If the highest type of beauty could be everywhere, we should never be conscious of beauty at all. The people who talk of aiming at it everywhere are like a man who should look at the Alps and say, "How magnificent

those mountain-summits are: what a glorious world this would be if it could all be raised to that level!"

Constituted as men are, it is essential to their enjoyment of the highest beauty that it should be somewhat rare and exceptional. If flowers were as persistent as leaves, we should admire them no more than leaves; it is the winter that makes it possible for us to appreciate the spring. Yet the idea that was long held up to modern architects was the ideal of a world all flowers and no leaves; all crimson sunsets and no grey skies; all mountain peaks and no valleys between them; we were to be always on the highest level, and to think nothing in old work worth our imitation which was not on the highest level too. Unlike Homer, we were never to nod. Whether we were building a church, a shop, a theatre, or a dwelling-house, the sublimest models were always before us. Details from the finest Greek temples, and afterwards from the noblest Gothic churches, were considered none too good for the meanest positions. This was high civilisation, this was true refinement, thus to skim the cream off bygone art, and to reject all the rest of it. The architectural world, in fact, tried to live on cream and nothing else, and has ended by finding the diet rather sickening and very unwholesome. In other words, after trying to use the highest types of beauty everywhere, after putting Greek-temple details into London shop-fronts, and Gothic-church details into London houses, it has simply nauseated itself with both Greek and Gothic. Its search for beauty, just at present, is over, and, by way of change, it is devoting itself to a style in which beauty of detail is certainly at the lowest. In the ugliest of styles, however, as in the ugliest of faces, there may be room for expression, and expression seems to be what is aimed at, sometimes with a good deal of success by the abler designers who have lately taken up 16th- and 17th-century types of building.

To describe in words the expression of any particular design is often a very difficult thing, and yet the design may affect the mind in a perfectly definite and characteristic way. The fact is there are an infinity of shades of feeling for which we have no words, although certain architectural compositions, like certain musical ones, may each produce its own shade of feeling with something like certainty. The compositions which do this live in the memory as

having a character, an individuality, a distinctness of their own. We may like them or dislike them, but they act upon us like living powers. They differ from each other and from the things around them; and instead of the dead-level, all-alike world of the high-art-everywhere school, they give us a world of ups and downs, of attractions and repulsions, of better and worse—the sort of world which interests men, and will interest them, until they become something very different from what they ever have been yet. This kind of art-world, however, is no novelty. It was the art-world of every great epoch—nay, of every living style—with one difference. Just now men, tired of pursuing nothing but beauty, have, for the moment, renounced beauty; but, then, beauty and expression were followed together. The highest beauty was kept for the highest things; humbler types of beauty fitly found a place in humbler subjects, while character, individuality, expression, were to be seen in all things, from the noblest to the meanest. To-day is a day of penance for past mistakes; but the time will come when beauty, in its own place, and expression in every place, will once more be united. Till then, we are sure to have two classes of people who will find it difficult to tolerate each other: the class who have given up beauty for expression, and the class who do not like expression when they see it. They will quarrel more fiercely over other arts than over ours; but even architecture, as our readers may observe, comes in now and then for its share in the dispute.

CONTRACT CERTIFICATES.

QUESTIONS are continually arising as to the duties and liabilities of architects in certifying or refusing to certify for amounts claimed by builders under contract, and the correspondence in our own pages from time to time has borne witness to a certain misunderstanding between builders and architects as to the power of the latter in granting or withholding certificates. It is a very common thing to hear of a builder being aggrieved by the architect refusing or withholding a certificate, and attempts are often made by the builder to obtain, through a court of law, the money alleged to be due, or a measure-and-value price; but such conduct on the part of the builder proceeds from a very imperfect view of his obligations under the contract.

When it is expressly stipulated, as it is in most contracts between builder and employer, that payment shall be made after the architect has certified such an amount to be due, the certificate is a "condition precedent" to the establishment of a claim; that is to say, in plain English, the absence of the certificate is an answer to an action at law, and prevents the contractor recovering, as it was stipulated no payment should be made without one. The case of "*Morgan v. Birnie*" is the leading decision which has established this point, and in another case ("*Milner v. Field*") it has been held that even if the certificate is withheld by fraud, the builder cannot recover if it is pleaded a certificate has not been given, though the builder can bring a special action for damages in such a contingency. Though this rule and its confirmation by the decisions we have referred to are in the abstract perfectly just, it would not be difficult to imagine a case in which the builder failed to obtain a fair consideration from the architect, where some slight provocation or trivial matter, having nothing whatever to do with the granting of a particular certificate, was made an excuse for refusing to give the contractor what he may be fairly entitled to. Differences of this kind often arise, as our practical readers will know. A contractor may have a claim for "extras" which has become a question of dispute between him and the architect, and the latter, by refusing to give a final certificate for the balance, exercises a kind of coercion prejudicial to the contractor's interest; or, the certificate is given for an amount less than the net balance payable in respect of works executed, and thus in effect, it compels the builder—if a man of small means—to relax his efforts to obtain the money to which he may be honestly entitled to. We do not entertain so low an estimate of the profession as to believe such a course is frequently taken, though we know undue pressure is often put on the builder in this way, and a kind of extortion is exercised which places the architect rather in the position of a despot than a judge. The builder has, however, his remedy in the event of his being able to establish by evidence, negligence, misconduct, or fraud on the part of the architect. If he can show that the certificate has been withheld by any of these causes he is entitled to the Court's protection. If he can prove the architect has fraudulently withheld a certificate he has a remedy against the architect, as in the case of "*Ludbrooke v. Barrett*," where the judgment showed that when the certificate is withheld fraudulently and in collusion with the employer, the builder can sue the architect for damages. In another instance ("*Batterbury v. Vyse*") it was shown that the architect had approved the work, but that he refused to certify in consequence of collusion with and by procurement of the defendant, and the Court held this was a good cause for action against the employer. In another decision ("*Pawley v. Turnbull*"), certificates had not been fairly made, and the evidence showed that the architect "acted improperly and unfairly in the exercise of the powers conferred upon him by the contract," and the plaintiff recovered from the defendant the full contract price and a sum for extra work. In like manner, if the certificates showed more money due to the contractor than he was fairly entitled to, the employer would be able to bring an action against the architect. The last decision ought to be a governing principle. If an architect plainly violates his duty, and has shown unfairness in the discharge of that duty, even though no case of actual fraud have been established, the rule of equity we have stated may be taken to be that which will be followed in the Courts.

As we have seen also, the effect of a certificate is equally binding on the employer as well as the builder, as was clearly

proved in the case of "*Laidlaw v. The Hastings Pier Company*."

A very important question connected with the subject is the position the architect or engineer occupies under ordinary conditions of contract. Recent decisions make it doubtful what exactly is the law on the point. We may refer here to the very important case of "*Stevenson v. Watson*," the facts of which are simply these. The defendant, the architect, supplied plans, specifications, and bills of quantities for a public hall, and the builder, the plaintiff, undertook to build the same, under the ordinary conditions of contract, the architect having the power to order any additions or deductions, the amounts of which were to be ascertained by him in the same manner as the quantities were measured, and at the same prices. There was another clause in which the contractor and the directors bound themselves to leave all questions or matters of dispute to the architect, whose decision was to be final and binding upon all parties; and the contractor was to be paid on the certificate of the architect. The quantities were found to be deficient in brickwork and stonework, and the builder requested the architect to measure at various times the omissions and additions which were made, but without avail, and the builder had these carefully measured himself and tested by competent surveyors. A claim was made amounting to £1,616 odd, of which £500 or £600 were for errors and deficiency in the quantities and the rest balance on the contract. The architect certified for a balance of only £251 odd, and refused to give any explanation to the plaintiff, or to furnish him with any data upon which this certificate was based. Stevenson then brought the action for £1,364 odd, and the claim alleged the defendant did not use due care and skill in ascertaining the amounts to be paid under the contract, that he refused to ascertain the amount of the additions to and deductions from the contracts, and refused to give any explanation to the contractors or to hear his objections to the certificate. Lord Chief Justice Coleridge, in giving his decision, said the architect was in the position of an arbitrator, and, therefore, not liable for want of care or skill. In brief, it was to the effect that a builder could not bring an action against the architect for not using care and skill in ascertaining the amounts to be paid under a contract which provided that the builder was to be paid on the certificate of the architect, and that all matters of dispute were to be left to his decision. The judge clearly regarded the architect under such conditions as an arbitrator, his functions called for the exercise of judgment, therefore the architect cannot be called upon by one of the parties to reconsider his certificate or to give reasons for it. The allegation that he knowingly or negligently certified for a less sum was not a cause for action, as there was no charge of fraud imputed. The decision is certainly not quite satisfactory, as pointed out by those who have commented on the case,—it certainly sets aside the principle of equity we have just mentioned; while with regard to the quantities, till this case, it was generally assumed the quantity surveyor was responsible for want of correctness in them. Moreover, the Court decided the case with the understanding that there would be an appeal in any event against their decision. The point, however, which most concerns us here, is the conclusion arrived at as to the architect's position. It has been contended, with some show of reason, that the architect is rather in the position of a valuer than an arbitrator; his function is to measure up and price the work as an agent of the builder. In another and still more important appeal ("*Laidlaw v. Hastings Pier Company*"), this question was discussed. In that case it

whether they were conclusive as to the facts ascertained in them, and the opinion of one of the judges was that the engineer in that case was not an arbitrator, but rather an agent of the defendants clothed with certain functions to be exercised in cases provided for by the deed. Differences of opinion arose on the bench. Lord Coleridge concurred in the decision of "*Goodyear v. Mayor of Weymouth*" that the engineer was an absolute judge as to extras and additions; but Mr. Justice Grove pointed out the control exercised by the defendant's in the provision to the effect that the contractors shall not plead any acts, orders, or directions of the engineer unless they shall produce special instructions signed by the engineer and countersigned by the chairman of the company, and that no extra work shall be paid for unless executed under such countersigned instructions. Mr. Justice Quain corroborated this view; and thought that the certificates given from time to time were merely provisional, and not conclusive. They were in fact "progress certificates" to enable the contractor to go on with the work, and not conclusive if the work contained in them was never done. Mr. Justice Archibald thought otherwise: the engineer, he considered, was in the position of a valuer, that he was to decide on extras upon the ground of his own skill and knowledge of those matters.

These references are sufficient to show the differences of opinion, even among lawyers, upon the question of the finality and conclusive power of certificates. The decision of the case of "*Laidlaw v. the Hastings Pier Company*" is pretty well known. The defendants were bound by the final certificate, and we may fairly take this decision as indicating which of the above opinions is deemed law. In another instance, where the architect was to certify the amount to be paid for work and extras, it was held that the certificate that a certain sum was due precluded the employers from raising the question. Again, it has been settled that if the final certificate takes no account of penalties, and advances have been made after the date of completion, it is evidence of the time having been extended, and the penalties cannot be deducted. Progress certificates, or those made from time to time to keep the builder in funds, are no doubt merely provisional, and the architect is not bound by them; but care and skill ought to be exercised in adjusting the amounts which may be advanced with safety in every case. On the whole, it seems pretty clearly established that the architect's certificate under carefully drawn-up contracts is a very binding and conclusive instrument on both parties to a contract, but one, nevertheless, requiring a great deal of discretion on the part of those who grant it.

PARTY-WALLS AND FENCES.

QUESTIONS touching the rights of tenants in respect of fences and party-walls are of such constant occurrence, that it may be useful to refer to a few principles which have been laid down and acted upon in courts of law in relation thereto. Of course, cases which come within the jurisdiction of the Metropolitan Buildings Act are pretty clearly defined by the provisions of that Act; but the law, as there laid down, is of limited operation, and does not apply generally. The rights and liabilities of tenants in common with respect to party fences walls, are subjects of constant litigation and misunderstanding. A and B are separated by a party-wall, and A desires to pull down his portion of the wall; but, in so doing, he disturbs the rights of B. Is A. liable for such disturbance, or has B. any remedy? Or, a party-wall is built at the joint expense of two parties, each contribut-

ing his share of land. One of these parties injures the other's portion of the wall. Is he liable? Another very common instance is the following:—A builder of two houses grants one. Does he, by such grant, give to either party the power to cut the wall in half? Again, how is the ownership of a wall, bank, or hedge to be established between two proprietors? These are a few of the questions which are continually cropping up and requiring solution, and most surveyors have, at various times in their practice, experienced doubts about the liability of vendors or vendees to maintain boundary fences, and the liability to repair between landlord and tenant. In most of the cases we have supposed, some easement has been acquired, or the common user of the wall, bank, or hedge belonging to different owners is *prima facie* evidence of its belonging to the owners of the adjoining lands, as tenants in common. When the extent of land originally belonging to each owner can be ascertained, each party becomes the owner of that portion of the wall or bank which stands upon his own land, and he has a remedy for any injury done to it by his neighbour. It oftener happens that the precise circumstances are not known, or have been forgotten, and, in such case, the presumption of the law is, that a tenancy in common exists, and that the wall or bank belongs to the two proprietors in equal moieties. Thus, if a builder of two houses grants off one, it is reasonably supposed that he grants the whole wall in undivided moieties, and that neither party has a right of cutting the wall in two. If half a party-wall, on the other hand, belongs exclusively to one proprietor, and the other half to another, either owner can pull down the part of wall standing on his own land, although sufficient support may not be left for the adjoining portion; and such a right can only be prevented in circumstances from which a grant of an easement conferring a right of support may be implied. If A. and B. are adjoining owners of premises, and if A. required to form a cellar, he would, according to this principle, be entitled to underpin or disturb the foundation-wall of B.'s house, after giving B. notice of his intention. It would be the duty of B. to insure the safety of his own premises by underpinning the walls to the same depth. In the case of *Trower v. Chadwick*, it was held that the mere circumstance of two walls being in juxtaposition does not give a right of support, nor is a person liable, in pulling down his wall, for not giving notice of his intention to the owner of the adjoining wall. One of the owners in severalty of a party-wall cannot pull it down, however, when there are cross-rights of easement, without being liable for disturbing the rights of the next owner.

As regards the easement of support, from recent decisions, it would appear that special circumstances must be adduced, giving the right of support, as for example, when two walls are built so that the removal of one will cause the injury to the other, and both at one time belonged to the same owner. In such a case, the legal presumption is that the owner, in granting away the house on one side, reserved to himself a right of support for his adjoining house, and, therefore, conferred on his grantee a similar right as an easement. (See *Suffield v. Brown*.) The legal textbooks give little decided information upon the moot point as to what constituted such an easement; mere lapse of time does not always give it, and it appears, from the case of *Solomon v. Vintners' Co.*, that the enjoyment of support must have been open, and as of right. In all instances this right must be founded upon prescription or grant, express or implied. We need not further go into the question, but refer the reader to the case just decided by the House of Lords, and commented upon in our last issue. Fre-

quently, questions arise as to the ownership of a wall, hedge, or bank; in all such cases acts of ownership must be proved. Thus, if a wall separates two properties, and it has been the habit of both to fasten anything to it, or to alter or add to its height in any manner, it may be safely affirmed there is *prima facie* evidence of its being common property. A more important question is, whether a person building has any right to allow his eaves to project over his neighbour's property, so that the rain-water is discharged from his roof upon it? However unfair it may seem, the right of building so as to overhang adjoining property, or of discharging rain-water thereon, may be acquired in the same manner by user; it is, in fact, the old right of *servitus projiciendi*, and other servitudes of a like character may be acquired, by which people often make themselves obnoxious to their neighbours. For example, how often the owner of a house can compel his neighbour to receive all the water from his roof or flat, for which greater provision of pipes has to be made by him. Or we hear of a man's party-wall being made use of to support an erection of some kind. Such rights, of course, must be acquired by prescription. It is often thought that if the dominant owner added to the height, or altered his wall in any manner, the right is destroyed, but it has been ruled otherwise. He can still let his rain-water discharge on the premises of his neighbour, so long, at least, as he does nothing to increase the burden.

The repair of party-walls is another cause of disagreement. A party or fence-wall between two properties becomes ruinous, and one of the tenants in common calls upon co-tenant to aid in the repair; but the law does not imply any obligation on the part of one tenant in common towards the other, and it appears, from cases decided, that a tenant in common cannot maintain an action against another for cutting trees or clipping hedges, nor for pulling down a wall with intent to rebuild it, so long as there is no misuse of the property, or no waste has been committed.

In measuring estates, the boundaries between fields are often the cause of much difference of opinion, as our own pages have shown. The law as to fences is, unfortunately, not very clearly understood, and the custom of surveyors in measuring seems to vary very much in different parts of the country. Thus, in one direction given in a textbook upon land surveying it is stated:—"If the ditch be inside the boundary fence, it usually belongs to the estate, and *vice versa*, although this is not universally the case." As to the breadth of ditch, we are told in some places five links from the hedge posts or roots of the quick are allowed, but this varies as much as ten links. Hunt, in his "Law of Boundaries," says:—"The idea which prevails very commonly in the country, that the owner of a boundary-fence, consisting of a bank with a ditch on the outside, is entitled to 4ft. of width for the base of the bank, and 4ft. for the ditch, is obviously an error. Such a doctrine would enable the owner of the ditch to cut into his neighbour's land till he obtained the requisite width for his ditch." In "*Vowles v. Miller*," the rule as to ditching was clearly laid down, the upshot of which shows that no rule about 4ft. or 8ft. has anything to do with it. No man can cut a ditch into his neighbour's soil, but he may cut it as wide as he likes on his ownland. The party who makes an inclosure digs his ditch on his own ground, and erects the bank in the inside. According to this theory, which is the only reasonable one, the boundary-line is coincident with the outer edge of the ditch, and hence, when two estates are separated by a hedged ditch, the legal presumption is, that both ditch and hedge belong to the owner of the land on which the hedge is

planted, though, of course, evidence may be brought to prove the contrary. Sometimes, there is only an old bank remaining between two properties, without a trace of a ditch, or there may be an old hedge with a ditch on each side, and the question of ownership may become a disputed point. In these cases ownership may be proved by acts of one party, as repairing the bank, clipping the hedge, or cleansing the ditch. If both owners can prove such acts, a tenancy in common is established. It would lessen much inconvenience and doubt if these general principles were kept in view, and if surveyors agreed among themselves upon the width to be allowed for ditches, quickset hedges, repairs, &c. Where there is no agreement between owners, the party who makes the fence must make it entirely on his own land. They regulate these matters better in the United States, for, by the statutes now in force, adjoining owners have to make and maintain a fair proportion of the fence between them, and each party is liable to contribute to its erection or reparation.

THE SPECIAL LOAN EXHIBITION — SPANISH AND PORTUGUESE ORNAMENTAL ART AT SOUTH KENSINGTON.

CHIEFLY owing to the exertions of Mr. J. C. Robinson, who was instrumental in enriching the South Kensington collection with many fine specimens of the various arts of Spain, and of Mr. Francis Cook (Visconde de Monserrat in Portugal), a fairly representative collection, as far as circumstances would allow, of works of Peninsular art has been got together in the right-hand hall at South Kensington, usually devoted to loans of china, glass and objects of *virtu*. In addition to the examples furnished by the South Kensington Museum itself, the description of which occupies no less than 96 out of 208 pages of the Catalogue, a fact showing how well the Peninsula was scoured for the benefit of the Museum, there are splendid contributions, many of the very highest interest and value, by her Majesty, the Kings of Portugal and Spain, the Duc D'Aumale, cathedral, conventual, and municipal bodies of Spain and Portugal, and a large proportion of the choicest collectors in Spain, France, and England. The Catalogue seems well prepared; but for reference it is a pity that in the larger collections numbers were not annexed to the articles, as was done ordinarily. It is true that each object has a cutting from the catalogue placed in front, but for some reason the numbers are cut off. Round the room are gorgeous specimens of textile fabrics and embroidery, many of the church vestments being of rare beauty and sumptuousness. The most remarkable specimen of this kind is No. 69, Mantle of the Infante Don Philip of Castille, brother of Alphonso X., richly woven in gold and silk. It is all the more curious for having a Cufic inscription, written from right to left and *vice versa*, running round the edge. This and the biretta, or cap, of the same Prince, embroidered in silk in various medallions with eagles and castles, were taken from the tomb of the Infante in Villacazar de Sirga. They are sent by the National Archaeological Museum at Madrid. The actual banner used at autos-da-fe is exhibited. Though not strictly within the conditions of the exhibition, some fine manuscripts are shown, dating from the 10th century to the 18th. Most interesting, and very remarkable for their comparative accuracy, are several beautifully-finished atlases—M. Spitzer's is the best.

There is nothing of greater consequence, or showing more dexterity of workmanship,

than the metal-work generally. Before the French invasion, probably no nation in Europe possessed such superabundance of church and other plate. From the Cathedral of Leon alone they took away 10,000lb. of old silver. It took ten camp-waggons to carry away the spoil from the Escorial in 1510. As it is, few countries could exhibit more important examples of their productions. The National Museum of Madrid has been lucky enough to secure a part of the Visigothic treasure found at Guarrazar near Toledo, the greater part of which is a conspicuous object in the Hôtel Cluny Museum at Paris. This specimen (No. 35) formed the arms of a processional cross, of gold and precious stones, of a distinct Byzantine type, showing, however, a great falling off from the earlier work. This, and many other works, show well how little really original art Spain has at any time produced, notwithstanding the great technical skill of the people. Ecclesiastical vessels abound. No. 130 is a very large chalice, as we often find in the earliest examples. It is very plain—in fact, a bowl on a low stand, the knob being ornamented with gold filagree and jewels. The date is fixed by an inscription saying that it was offered by Dulcia Regina (wife of Sancho the First), and so of the thirteenth century. It is not always easy to fix a certain date by the style in the Peninsula, for the workmen retained old types far longer than in England, France, or Italy—another proof of their want of inventive instinct. Nos. 103, 108, and 366 are all interesting chalices, of nearly identical shape and style, but the latter is supposed to be more than 100 years older than the others. They are of a similar shape to No. 130, but not so large. No. 367, from the collection of M. F. Spitzer, is a good instance of the common admixture of Gothic and Renaissance ornament. One of the grandest examples of the goldsmith's craft in the collection is a large monstrance, silver-gilt and jewelled, belonging to the Academy of Fine Arts, Lisbon. The open-work Gothic canopy is elaborate in the extreme. The middle portion seems to have been strengthened, a hundred years or more later, by two bold, but too heavy, Renaissance brackets. The date inscribed is 1104. The same owners show a first-rate specimen of late 17th-century work, a chalice, No. 112. The monstrance belonging to the Duc D'Aumale, which was formerly in the Cathedral of Braga, is unsurpassable for the richness and intricacy of its parts, shrine, and canopy work, enriched with small buttresses, pinnacles, and figures. His ewer and salver, of Portuguese work, are also very fine. There are innumerable jewels and enamelled ornaments, many of which, though found in Spanish or Portuguese churches and collections, were doubtless importations from other countries. A fine onyx of Philip the Second is a notable instance. Amongst the splendid domestic plate for which Spain has long been noted, nothing surpasses the ewers and plateaux of the 16th century, such as Nos. 362 and 363, the property of Mr. F. Spitzer, or No. 257, exhibited by Baron Seillière, and another by Sir R. Wallace. There are so many fine things of this kind that it is invidious to particularise. There is a profusion of finely-wrought spoons, jewellery, and personal ornaments. Of course the collection is strong in iron and steel work. From the Royal Armoury of Madrid, through the kindness of the King of Spain, we have a sight of a fine suit of half-armour, formerly worn by King Philip the Third, and two suits made in Pampeluna for the same Prince when young. His Majesty also exhibits a pair of stirrups made for the Emperor Charles the Fifth, by Alonso Micergillo, in the year 1535. They are simply marvellous for their chasing, engraving, and damascening. It would

require a volume properly to describe the riches of this kind—swords, maces, daggers, guns especially, and shields—which are to be seen in this exhibition. Very rare and very beautiful are the two Hispano-Moresco shields from the Royal Armoury. No. 20 is of the beginning of the 16th century, No. 21 is of the 15th. Each is of leather, elaborately embroidered in silk and silver, the latter with a religious inscription in Arabic characters.

Spanish and Portuguese ivories, except of early date, are not usually of a high class, and so in the present collection few of the ordinary type are exhibited. Of the more precious kinds we have several admirable specimens; foremost among them, and in fact equal in interest to most of the choicest ivory carvings in Europe, is No. 41—an ivory crucifix, presented to the Church of St. Isidoro of Leon, in the year 1063 A.D. The figure is placed, as in early Limoges enamels, upon a background—in this case, carved at the edges with a fringe of figures of grotesque dragons pursuing men. It, perhaps, may represent the state of torment in Hades, before the resurrection of Christ, which is represented in a small panel above the head of the Crucified. On the back the Evangelistic signs are represented at the four corners of the cross, the Holy Lamb, very stiff and conventional, standing in the middle. The intermediate space is filled by interlacing foliage, in the midst of which are fights of centaurs and other figures admirably designed and executed. It is difficult to imagine that an artist capable of inventing and carrying out such fine ornamental work could not have modelled the principal figure better. It seems most likely that he took the literal view of Isaiah's words "without form and comeliness," and so made the Saviour as ugly as he could. This view is supported by the extremely hideous bronze crucifixes belonging to Mr. Cook, &c. The nails originally were indicated by four inlaid spots—as the eyes are. The three large iron nails, one of which has broken the right hand, are comparatively modern. No. 42 is also a fine early piece—not altogether original—the back having been made up of various old fragments. It is of the 9th century. The figures representing the Beatitudes being arranged under semi-circular arches in pairs. There are several lovely circular boxes of the Hispano-Moresco period. One of the very best (No. 322) belongs to M. le Baron Davillier. Mr. M. F. Spitzer, among his other wonderful possessions, shows two very large ivory statues nearly 2ft. high, partly coloured, very stiff, and not without something of grotesqueness; but still the most important figures of the date (about 1320-30) that we have seen. The only other ivories worth mentioning are some coffers with metal mounts and ornaments in gold and colour upon the plain surface.

Of wood-carving and inlaying there are many interesting specimens. No. 315, a tabernacle in boxwood, of the latter part of the 15th or beginning of the 16th century, could not easily be equalled. In very minute figures the Jesse-tree is introduced as part of the decoration. This is a cabinet gem; but there are also many examples of a more substantial kind. The cabinets from Goa, in imitation of the finest Indian inlaying, are admirable. Mr. M. E. Odier's coffer of wood, covered with thin plates of copper, done by the Spanish Moors for the Christians, is well worthy of notice. No. 45, a pulpit of the 15th or early 16th century, is noticeable for its combination of Gothic and Renaissance detail. In pottery we do not learn much more than we already know from examples that have been long familiar to us. The finest early piece is No. 52, shown by the National Archaeological Museum at Madrid. It is a large wine-jar, jarron, or tinaja, in the style of Granada, very delightful in tone

and colour, light blue with light metallic lustres, though, alas! much injured by age. There are also fine pieces of lustre ware of different dates, all good in their way. Lady Charlotte Schreiber is the principal exhibitor of Spanish porcelain. She is to be congratulated as possessing two or three of the finest plaques, in imitation of Wedgwood, that have ever been produced out of England. In conclusion, we would draw attention to the painted-wood and terra-cotta figures, some of which were embellished by such good painters as Alonso Cano. The necessary painting of sculpture has always been a matter of great difficulty, seldom successfully met in our time, except, perhaps, in some of the lovely work of our dear, lost friend, William Burges.

CEMENT TESTING.*

By DR. W. MICHAELIS, of Berlin.

SINCE the criterion adopted in judging of the quality of Portland cement is the degree of cohesive strength which it attains mixed with 3 parts by weight of sand, and immersed in water for a definite period, and since in the testing of cement two other bodies enter into combination with it, the result naturally depends, apart from the nature of the cement, on the one hand on the quality of each of these bodies (viz. sand and water), and on the other on the method employed in the preparation of the briquettes for testing. It is evident that the finer the sand the greater will be the amount of surface exposed to the binding action of the cement; the latter will, therefore, be the more diffused, the result being loss of strength. The endeavour to obtain, even with the poorest quality of cement, the minimum strength stipulated in Germany—10 kilos. per square centimetre (142lb. per square inch) after 28 days—has led to the adoption of a sand as coarse in the grain as possible,—viz., such as is obtained by means of two sieves, containing 60 and 120 meshes per square centimetre (400 and 800 per square inch) respectively. Compared with the ordinary quality, this might more appropriately be named quartz gravel; it is obtained with difficulty, and is much more expensive, weight for weight, than the cement to be tested with it. In view of the fact that 3 parts of it must be used to 1 of cement, this may appear worthy of consideration.

Since the salts of carbonic and sulphuric acids, as known for a considerable period to professional men, exert, even in very small quantities, a material influence on the setting and hardening of quick-setting cements, and since the water employed in preparing the mortar for testing contains very variable quantities of these salts, it is inadmissible, especially in the case of thorough examinations, to leave the quality of the water entirely out of account. Not only, however, in scientific investigations, but also in the ordinary course of testing, this circumstance should be kept in view, since the same cement prepared with hard and soft water shows a variation which is by no means inconsiderable. Although the method of preparation of tests promises to become in the future a uniform one, it may nevertheless be of general interest to record, in a tabulated form, the variations which may be produced by different treatment in the preparation of the briquettes.

The following series of tests which were instituted at the time of the first official inquiry into the subject of cement testing in Germany, and which have now been brought to a definite conclusion, were occasioned by the above considerations.

I. In the first place, it was necessary to establish the difference in strength between

* Communicated by the Author.

a cement mortar of 1:3 and one of 1:5. (We may remark at the outset that only clean sand was used in all these experiments.)

(a) With the employment of a sand passing through a sieve of 60 meshes per square centimetre (400 per square inch), and retained upon one of 120 meshes per square centimetre (800 per square inch), but with the spheroidal grain of ordinary sand.

(b) With a similar sand, the grain of which lay between sieves of 60 and 240 meshes per square centimetre (400 and 1,600 per square inch), i.e., 50 per cent. between the 60 and the 120 and 50 per cent. between the 120 and the 240.

(c) With a sharp, angular-grained sand, such as does not exist in nature, and which is obtained by crushing quartz. The size of grain was that between the 60 and 120 mesh sieves.

The preparation of the briquettes was purposely carried out in precisely similar manner.

Every number furnishes the average of 20 single determinations.

Description of the sand.	Cement.	Sand.	Age.	Strength per sq. inch.		Water per 100 parts dry substance.	
				Hardened under water.			
				Tested wet.	Tested dry.		
(a) Sand between 400 and 800 meshes per sq. inch.	1	3	7 days	121	411	13	
			28	171			
			90	202			
			270	225			
	1	5	7 days	73	281	12.5	
			28	103			
			90	123			
			270	152			
	1	3	7 days	112	391	13	
			28	147			
90			174				
270			211				
(b) Sand between 400 and 1,600 meshes per sq. inch.	1	5	7 days	64	290	13	
			28	100			
			90	122			
			270	136			
	1	3	7 days	122	200	13	
			28	168			
			90	170			
			270	109			
	(c) Sand (crushed) between 400 and 800 meshes.	1	5	7 days	70		12.5
				28	109		
90				109			
270				109			

The briquettes were prepared in the following manner: 500 grammes (17.6oz.) of cement, and 1,500 grammes (52.9oz.) of sand were thoroughly mixed in a dry state, passed through a sieve containing 400 meshes per square inch, and again mixed. 240 grammes (8.4oz.) of water were then added, and the mortar thus formed was well worked up until it was rendered thoroughly homogeneous. The moulds were at once filled with this mortar by means of a few light blows with a wooden mallet. The superfluous mortar was then removed, and the surface rendered smooth by means of an ordinary straight knife.

The quantity of water added was such that the mortar formed was in every case of similar consistency.

Those briquettes which were broken in a dry state, were removed from the water eight days before testing.

It follows from the results obtained from these examinations that:—

1. The difference in strength proceeding from the employment of a sand between 400 and 800 meshes, and one between 400 and 1,600 meshes, is so slight as to be scarcely worthy of notice. It is quite immaterial which of these sands is used; the latter (400 to 1,600) is preferable on account of the price being only half that of the other.

2. It is unnecessary that the sand be of a

sharp, angular character; it is sufficient that it be clean.

3. In the case of mixtures of cement and sand the tensile strength (as also the crushing strength) of dry briquettes is about 50 per cent. higher than that exhibited by moist briquettes. It may be remarked that in the case of neat cement the reverse occurs, in consequence of disintegration (decomposition of the hydrosilicate of lime) through desiccation. The sand employed in all of the above examinations consisted principally of quartz; a small portion may have been composed of felspar.

II. The following series of tests were carried out with a view to determining the influence exerted by the quality of the water on the strength.

Whilst observing a strictly similar treatment as regards other conditions, there were used in the preparation of these tests:—

(a) Distilled water.

(b) Spring water.

Every number is the mean of 20 single determinations.

The sand employed was of a mixed grain, viz., one of which 25 per cent. passed through a sieve with 4,000 meshes per sq. in., 45 to 50 per cent. through one with 1,300 meshes per sq. in., and 25 to 30 per cent. through one with 144 meshes per sq. in., i.e., such a class of sand as is constantly met with in nature.

The method employed was that described above, two proportions of water being used, because it had been invariably proved that with a sand of this quality the proportion of 12 of water to 100 of the dry material afforded more favourable results than that of 10 parts of water to 100 of the dry material.

Cement.	Sand.	Water.	Age.	Tensile strength in lbs. per square inch.
1	3	12 Spring Water	7 days	118
1	3	12 Distilled Water	28 ..	160
1	3	10 Spring Water	7 ..	110
1	3	10 Distilled Water	28 ..	155
1	3	10 Spring Water	7 ..	106
1	3	10 Distilled Water	28 ..	146
1	3	10 Distilled Water	7 ..	96
1	3	10 Distilled Water	28 ..	135

It will be remarked from this table that:—

1. Hard water gives on an average 6 per cent. higher results.

2. If the proportion of water be too small, the strength of the mortar is unfavourably influenced thereby.

III. In the following series of tests for establishing the influence of the method pursued in the preparation of the briquettes, the questions treated of under I. and II. were introduced to the extent of using three qualities of sand of different size of grain, and also different kinds of hard water.

The sands were:—

(a) That between 400 and 800 meshes.

(b) That between 400 and 1,600 meshes.

(c) The mixed grained employed in II.

The water used was:—

1. Spring water as in II.

2. A considerably harder quality of water coming from calcareous soil.

The methods employed were:—

a That described under I.

3 That which is now customary in Germany, viz., 500 grammes (17.6oz.) of cement and 1,500 grammes (52.9oz.) of standard sand are thoroughly mixed, 200 grammes (7.05lb.) of water are added, and the mass is worked up with a trowel until it presents an appearance of perfect homogeneity. With this mortar the moulds are at once filled and heaped up. It is then beaten in with an iron trowel of 150 to 200 grammes (5 to 7oz.) weight, at first lightly and afterwards more heavily until it becomes somewhat elastic; the superfluous mortar is then scraped off with a knife, and the surface levelled by means of the same, as under a. (See "Regulations for the

Uniform Delivery and Testing of Portland Cement.")

The briquettes were prepared by two persons, and each employed for the first time the method familiar to the other.

Each number under a and b is the mean of 5 tests, in the average column therefore of 10.

Cement.	Sand.	Kind of sand.	Water per 100 dry substance.	Age.	Tensile strain, lbs per sq. in.			Method of preparation.
					a	b	Average.	
			Spring-water.	days				
1	3	a	12	7	185	189	187	a
1	3	"	12	28	196	207	201.5	
1	3	"	12	7	172	142	157	
1	3	"	12	28	242	232	237	b
1	3	"	12	7	195	204	199.5	
1	3	"	10	25	205	215	210	
1	3	"	10	7	180	183	181.5	a
1	3	"	10	28	284	251	267.5	
1	3	b	12	7	175	181	179.5	a
1	3	"	12	28	204	202	203	
1	3	"	12	7	184	166	175	
1	3	"	12	28	255	232	243.5	a
1	3	"	10	7	183	205	194	
1	3	"	10	28	228	228	228	
1	3	"	10	7	199	207	203	b
1	3	"	10	28	258	254	255	
1	3	c	12	7	130	130	130	a
1	3	"	12	28	177	186	181.5	
1	3	"	12	7	148	155	151.5	
1	3	"	12	28	203	200	201.5	b
1	3	"	10	7	128	103	110.5	
1	3	"	10	28	170	161	165.5	
1	3	"	10	7	158	154	156	a
1	3	"	10	28	171	212	191.5	
			harder water.					
1	3	a	10	7	202	216	209	a
1	3	"	10	28	230	235	232.5	
1	3	"	10	7	221	216	218.5	
1	3	"	10	28	208	203	205.5	b
1	3	"	12	7	146	150	148	
1	3	"	12	28	182	192	187		a

The cement used for all of these examinations was "Stern" cement.

This comparative investigation proves that:—

1. The standard method gives the highest results, because in it the mortar is beaten more compactly into the moulds.

2. For coarse sand, such as a and b, 10 parts of water to 100 of the dry substance is the most favourable proportion.

3. With mixed-grained sand, 12 parts of water furnish more favourable figures; therefore, different sizes of grain require different proportions of water, which they likewise require in order to produce mortar of similar consistency.

4. The harder the water, the higher the resulting strength.

The explanation of this fact is very probably as follows:—By the separation of the alkali during the process of hardening, the carbonate of lime existing in the hard water is precipitated. This latter body is known, after lengthy separation, to become extremely compact and solid, and possesses in this condition high cementitious qualities, which, connecting themselves with those of the cement, must produce a higher effect. It is also well known that the sulphuric acid salts (e.g., gypsum), even in small quantities, exert a favourable action on the hardening process.

5. Ten kilogrammes per square centimetre (142lb. per square inch) after 28 days, by the method and with the quartz-sand prescribed by the German regulations, is a strength which any third-rate Portland cement may attain, and even Roman cement, which is known to give at least 50 per cent. lower results than Portland cement, may furnish such a result by this treatment.

6. By open structure of the mortar the increase in strength is small compared with that of the more compact mortar, showing that in the case of the loose mortar only the finest particles of cement adhering to the surface of the grains of sand come into action (on this account showing good results at seven days), but that through the coarser particles, situated at too great a distance,

the hardening process is impeded as compared with the more favourably, because more compactly, prepared mortar.

7. The mixed grained sand compared with the coarse sand (*a* and *b*) under otherwise similar conditions, gives 30 per cent. lower strength, and therefore the results obtained with the quartz-sand in general show far too high results, and run the risk of affording a false basis for the practical employment of cement.

DR. WALDSTEIN ON GREEK SCULPTURE.

LECTURE VII.

THE seventh and last of this course of lectures was a demonstration at the British Museum, illustrating the previous lecture at the King's College, Strand. Before proceeding Dr. Waldstein said he wished to direct the attention of the class to an interesting fragment of a marble shield, representing an Amazon battle. There could hardly be any doubt that it was a very sketchy reproduction of the shield of the Athené Parthenon by Pheidias. This so-called Strangford shield was of great interest, especially because of the two figures, one an aged bald-headed Greek, the other an armed warrior, probably the portraits of Pheidias and Pericles, which we hear were represented on the shield of Athené, and gave rise to one of the numerous accusations brought by the political opponents of Pericles against Pheidias. He begged the class to follow him into another room, where he described to them two statues of athletes binding the victors' hand round their brows (*diadoumenos*). The one was from Vaison, in France, the other formerly belonged to the Farnese collection. Authorities differed as to which of the two might be considered illustrative of the art Polykleitos, though they believed that the Vaison statue resembled most the extant Polykleitan Doryphoros, and represented the characteristics of that artist's canon, and he had described it in the previous lecture. It was, however, a considerably modified Roman copy.

He would now recall the description he had given of the Age of Pheidias, as that age manifested itself in the representative artists and in the conception and execution of their works, and of the corresponding transition to the succeeding periods. These changes in the character of the works of sculpture were most readily brought out in works of decoration, especially in sculpture in relief. In fact, he held that this class of plastic art was not pure sculpture, but stood on the boundary between sculpture and painting; and so the stricter laws of plastic art governing single figures in the round, did not apply with such firmness to this class of work. The transition from the spirit of the age of Hellenic Unity to that of the Peloponnesian Wars, from the simple broad and monumental style of Pheidias, to the more individual, mobile, and pictorial style of the succeeding periods, was well illustrated by the reliefs from the Temple of Apollo Epikourios, at Phigalia (Modern Bassæ), which we know was built by Iktinos towards the close of the 4th century B.C. The reliefs represented a Centaur battle and an Amazon battle. He directed their attention to the life and movement displayed in the attitude of the figures, as well as in the details, especially the flying drapery. It could not be denied that it was excellent work; yet, with all the comparative rest and dignity in the figures on the Parthenon, he maintained that had a fuller impression of life than was seen in these violently-moving figures. The longer we studied the Parthenon figures the more would it grow upon us, while the striking impression of the work before them would lose in strength with familiarity. The lecturer returned to the Elgin room, where he gave a full description of the east of the statue of Hermes with the infant Dionysos, recently excavated by the Germans at Olympia. The work by Praxiteles corresponded exactly to the description given of it by Pausanias, and it was found below ground on the very spot in the Temple of Hera where the ancient traveller saw it. In this work they would find the characteristics of the reflective, clerical and "romantic" mood which they had noticed in the illustrations of the works which have been identified as of Praxiteles. And this mood was carried out in the composition and in the execu-

tion of this admirable work. He had occasionally used the word "decline" for this period, but this did not mean to imply anything like subjective disapproval. On the contrary, he could not deny that works of this second Attic School immediately and strongly appealed to our feelings—perhaps because our age is more like the age of Praxiteles in many of its features. There was even no doubt an advance in the art of modelling, especially in the indication of texture, which they would notice in the blocky treatment of the hair, as contrasted with the smooth and elastic modelling of the nude, and in the rough fibrous surface of the drapery suspended to the tree. They would notice a similar style of modelling and of general conception in the beautiful statue of Demeter of Cnidus in another room, one of the finest works in the Museum, which had been added to the collection by Mr. C. J. Newton. Dr. Waldstein then proceeded to the room containing the sculptures from the Mausoleum of Halicarnassus, and after an historical sketch of this monument he proceeded to point out the characteristics of the art of Skopas, as shown in these remains. Finally, he dwelt upon the art of the Roman period, and in illustration of the difference between this art and the pure Greek work, he compared the Hermes (formerly of the Farnese collection) in the Græco-Roman room, with the Hermes of Praxiteles which they had just examined. This Græco-Roman Hermes was an adaptation of the type laid down by Praxiteles; but a certain affectation in the attitude, as well as a somewhat mercantile technique, as compared to the purely artistic modelling of the Hermes, must be ascribed to the style of Roman workmanship, where art becomes an *article de luxe*, and not an immediate expression of the deep inner wants and aspirations of an essentially artistic people such as the Greeks. He would finally beg them to examine some of the Roman busts, which were of high excellence. The feeling for individual personal life was highly developed in the Romans, and here they did good work. It is a common phenomenon that in periods when ideal art was at a low ebb the portrait still maintained its full vigour. He might merely mention the works of Bernini and his school, and refer to much sculpture and painting in our time.

Dr. Waldstein writes to correct a misstatement in our report of his lecture of the 21st June, saying:—"I alluded to a difference of opinion, with regard to the classification of the sculptor Polykleitos, between Mr. Murray and myself, especially because I had recommended the students to read his book. But it was as far from my words as it was from my intention to attribute 'a perversion of historical facts' to that archaeologist."

EXCAVATIONS AT CARNAC.*

THIS volume is the result of explorations in the neighbourhood of Carnac in Brittany. The author, the late Mr. James Miln, whose death occurred while the book was being printed, published some "Archæological Researches" in that locality in 1877, and the present work is a continuation of the same undertaking, and describes the author's researches among the alignments of menhirs at Kermario. The mounds at the Bossenno called Caesar's Camp were excavated, and the results of the work were embodied in the first book. The excavations amongst the alignments of Kermario were first prompted by a discovery of a Roman brick, and the author proceeds to describe in order the exploration of each field, these being illustrated by a general plan of the alignments and the remarkable Roman and Celtic remains found among them. The "the field of menhirs" as it is called, is the first part described, and the maps and plan of the early constructions engraved give a fair idea of the rude primitive stones exposed to view. The author illustrates by lithographic plates the objects found during the excavations on the floors of one of these erections, which consist of coarse pottery, Gallo-Roman and Celtic ware. The most important "find" is the upper part of a bowl in black Gallo-Roman lustrous ware, besides fragments of a spindle-whorl in red paste, ornamented pottery of rude character, horses' teeth, implements in

quartz, arrow-heads, &c. The illustrations which follow, of fragments of pottery of Celtic character, the menhirs and the remains found among them, are interesting, and impart to the reader a pretty correct idea of the discoveries, many of which are remarkable.

In the seventh alignment a fireplace was discovered, rudely constructed of stones, laid dry in a sort of moat. Flint-chips, charcoal, ashes, fragments of Celtic pottery and implements were found in clearing out the moat. We cannot devote space to follow the author into the detailed particulars of these discoveries; but we gather that between Kermario and Kerloquet there is a line of defensive works erected by the Celt anterior to the Roman invasion; these were occupied partly by the Romans on their arrival, who constructed more substantial works in certain positions. Among the Celtic works the long talus is placed, and the author points out that the "Romans must have been cognisant of the alignments of Carnac, and had no scruples in utilising them." It would be tedious and unprofitable to give at any length the conclusions of Mr. Miln without a map, reference to which is constantly made. Speaking of the alignments consisting of ten rows of undressed stones called menhirs, the author describes them as composed of a close-grained granite of greyish colour, which changes into red when subjected to a strong fire, indicating the presence of iron. The menhirs have the cubic and quadrangular forms of cleavage natural to granitic rocks, and the stones partake of the character of those of the district. Alluding to the age of the alignments, the author instances the proof of their being older than the walls, as some of the menhirs belonging to the alignments are built into the walls which are obviously of early Roman origin. Further evidence in favour of this opinion is adduced from the peculiar weather-markings and grooves to be seen in one of the menhirs of the 10th alignment, an overthrown monolith, which markings are estimated to be produced by an exposure to the atmosphere for centuries, and show conclusively the position it had formerly occupied and stood in to have become so grooved by the action of the atmosphere. The author concludes the alignments must have been erected as sepulchral monuments. Ashes, charcoal, flint-chips, pottery, &c., have been found at the base of the menhirs as in the case of dolmens. Into the elaborate question of the correlation existing between the alignments, cromlechs, and dolmens we cannot enter; suffice to say the conclusion arrived at by Mr. Miln is that these rude constructions are the mutilated remains of an immense necropolis, the construction of which must have extended over a long period. The work is well illustrated, and cannot fail to enlist the attention of antiquaries.

LAND-SURVEYING IN PENNSYLVANIA.

IMPROVEMENTS in the present methods of land-surveying carried on in the United States have recently been made the subject of a convention of engineers and surveyors in Pennsylvania. A Committee of the "Engineers' Club," of Philadelphia, was appointed to promote the subject, and questions were issued in circulars, to which numerous replies were received, suggesting the most important points for discussion. The principal of these replies had reference to the magnetic variation and its causes; the location of a true meridian line in each county; fixing corners and marking lines; location of lines independent of the needle; location of street lines; triangulation; examination and fees of surveyors; periodical tests of instruments; erection of permanent monuments; metric system; creation of a state board of engineers, &c. The communications are chiefly confined to these questions, and we find a few suggestions of value, such as the establishment of a system of triangles in each township. The author of this proposal, Mr. George Platt, county surveyor, Erie, suggests that a base line of 500 ft. or more be carefully measured on level ground in each township, and that at its ends permanent trigonometrical points be set up securely. At a point which will form an equilateral triangle or nearly with this base line, another point will be established, and the angles at base very accurately measured so as to reduce any error. In this manner the other two sides can be ascertained, and the triangle may be used to afford bases for

* Excavations at Carnac, Brittany. By JAMES MILN. Edinburgh: David Douglas.

other triangles. The angle of the base line with the true meridian ought to be found, which would govern the bearings of the different triangles in each township. The periodical testings of chains and compasses, and the examination of surveyors, were generally regarded as necessary. Opinions were unanimous upon the unreliability of the needle for correct work, on account of yearly and diurnal variations, local attraction, &c., and various plans of establishing a true meridian are hinted. Mr. Kaufman alludes to the broad belts of iron ore which manifest strong local attractions and render the needle very unreliable in places, and to the badly-centred and sluggish needles used by surveyors. In chain work it appears matters are worse; and it is conducted in a very slovenly manner. The chainmen are furnished usually by the landowners, and are often labourers: the work is done by turns by neighbours who happen to be present to see the lines run along their own land, and as soon as their tracts are passed, they disappear, and others take their place. Little effort is made to keep the chain straight or taut, or to carry it level over hills and valleys, and the accounts of the "pins" are seldom tested. A survey of the State in blocks of one mile square, the intersections being marked with proper monuments, was proposed as one of the alternative schemes. It may be mentioned a statute requiring surveyors to compare their compasses with an established meridian line, and adjust their chains by a standard measure, was passed in 1850, but does not seem to have been generally complied with.

The proposed Act to provide for the better regulation of surveys in Pennsylvania is too formidable a document to transcribe. There are 15 sections; a board of State surveyors is proposed to examine candidates for the practice of land-surveying in this commonwealth, and issue licences to those deemed competent; the board is also to establish meridian lines, examine and approve instruments, &c., and establish rules and regulations to insure accurate work. All lines are to be run to the true meridian, and the magnetic bearing noted: the use of the magnetic needle to be avoided as far as possible, and the angles of intersection of all lines given from the vernier, and all measurements in surveys shall be made with improved steel measuring chains, lines or rods, or such other accurate methods, as may be allowed by the board, to be tested by the standard United States measure, and shall be reduced to horizontal measurement; in marking angles in surveys of property, or of roads, landmarks of stone are to be used not less than 24 in. long with one end squared 5 in. by 5 in. Lines of township to be marked also by stones, not less than 3 ft. long with end squared 8 in. by 8 in., set in ground so as to project 6 in. above the surface, &c. The other sections allude to the duties of county surveyors, their qualifications, &c., and these regulations are to begin from the 1st of January, 1882. Such are in general the recommendations which were made at the convention, and an Act somewhat more condensed has been prepared and submitted to the Legislature by the executive committee of the convention and has been under consideration. The proposed regulations will place land-surveying on a better footing, and will make it unlawful for any person to practise the profession until he shall have passed an examination before the State Board; those only being excepted from the operation of this provision, who shall have been engaged in his profession as surveyor for 15 or more years at the time of the passing of the Act, and who may receive a license without a technical examination. The Government Survey of the United Kingdom has rendered a similar Act almost unnecessary among surveyors in England, Scotland, and Ireland; yet the day is not far distant when English land-surveyors, among others, will deem it to their advantage to possess a diploma, or to require some kind of test of proficiency from their members.

THE CITY GUILDHALL.

AT the annual meeting of the London and Middlesex Archeological Society, on the 22nd of June, Mr. Horace Jones, the City architect, read a paper upon the Guildhall, in whose council-chamber the members were then assembled. Built a few years after Westminster Hall, the Guildhall bore, he said, in some of its features a resemblance to its contemporary; it was much smaller, although in proportion more

lofty and better adapted for hearing in than the Hall. The Guildhall was second only to that edifice in the civic buildings of England. It was built for three purposes—(1) chiefly for the assembly of the guilds and meetings of citizens for election of mayors, sheriffs, and burgesses in parliament, or for discussions; (2) as a court of justice for trials of the highest kind at the Hustings Court, as well as trivial offences and the recovery of small debts; and (3) as a banqueting hall. The first Guildhall of which he had been able to find mention was referred to in 1212. The second Guildhall and its chapel, according to the Corporation rolls, was in building from 1326 to 1379, and a portion of the crypt of this building still existed, under part of the present hall, but was much defaced by fire. The only entrance to that Guildhall was from Aldermanbury. The present, the third Guildhall, was begun to be built in 1411 by Thomas Knowles, then mayor, but as finished was very different from the building in which they were met together. They had probably entered by the south porch, which consists of two divisions formed by an arch and columns, crossing in the centre and vaulted. The wall on either side is divided into small compartments, with tracery and quatrefoils. The groined roof with the stone ribs springing from the sides are intersected in the centre with sculptured bosses, having various devices and the arms and bearings of Edward the Confessor. Above the porch is a commodious chamber, approached by an external staircase, still possessing the remnants of panel tracery and canopied niches. A well proportioned and wide archway leads from the porch into the hall itself. This apartment, 152 ft. long, and averaging 49 ft. 6 in. wide, is divided into eight bays by seven buttresses on the north side and five on the south. At the corners are four massive turrets, with circular or spiral staircases in each, communicating between the hall, its crypt, and its roof. Between each buttress is a lofty window filled with stained glass, representing various scenes of civic history, including the Restoration of the City Charter, 1688; the Reception of the Five Kings by Sir Henry Picard; the Dream of Rahere, minstrel to king Henry VII. and founder of Bartholomew's Hospital; the Death of Wat Tyler, &c. The clustered shafts, dividing each bay, internally project 2 ft. on each side, and their height to springing of arch-ribs is 3 ft. The height from the present pavement to the underside of ridge is 8 ft.; the collar of beam between the queen-posts is 29 ft. long, and was cut out of timber 2 ft. 8 in. square. The east window, which is nearly the width of hall, is filled with stained-glass executed by Messrs. Clayton and Bell, and presented as a grateful offering by the Lancashire Operatives in memory of aid offered during the cotton famine; the west window has a memorial to the Prince Consort. The *coup d'œil* of the hall, with its stained-glass, its monuments to Nelson, Wellington, the Earl of Chatham, and his illustrious son William Pitt, and Beekford, the quaint wooden effigies so dear to *Punch* at the west end, and the massive open roof of oak, presents a grand and dignified appearance, and which need not fear comparison with any similar structure. This roof, it is well known, is a modern one, and there is reason to suppose, from descriptions of the effects of the Great Fire of 1666, which injured this building, that the original roof was not dissimilar to the present one; others suppose that it either had or was intended to have, stone ribs and vaulting, as at Mayfield Hall, Sussex, and other well known if not numerous buildings of the same period. The crypt is one of the most ancient and perhaps the finest example of the kind now existing in London. It, however, only extends under the eastern portion of the hall. It is divided into three aisles of equal width by two rows of piers, which are clusters of four small pillars with plain capitals, from which the arches and groins spread over the roof. The bosses at the intersection of the arches are, many of them, very large and bear shields of the arms of Edward the Confessor, of the City, and some well carved roses. In close contiguity to the Guildhall, on the north side, stands the Court of Exchequer, built soon after the Hall, in the 3rd year of Henry VI. The Court of Common Council held its meetings till 1614, when a new room, now the Aldermen's room, was erected at a cost of £1,740. A flat ceiling now covers the Exchequer Court, which was formerly united, and the chief windows are stopped up; all that

remains, indeed, of its decorative features are two niches of figures at one end and a curiously ornamented square-headed doorway near the entrance.

ARTIFICIAL VENTILATION.

THERE are many who believe ventilation should be effected by an artificial process, in which mechanical appliances, such as rotating fans, ought to be employed in impelling air into buildings. In a recent paper read before the American Society of Engineers, the author endeavours to show that no system is so independent of accidental natural conditions as that of impelling air by direct means with a fan wherever it may be required. The fan adopted in the United States Capitol is referred to as being the type of most of those used in America. This consists of fan-blades or vanes placed upon the face of a disc, and the fan thus made is placed in front of a circular opening in the wall of building, "the wall forming one side of the zone of blades, in opposition to the outer edge or face of the disc. In this construction no case whatever is required for the fan, which receives its air through the central circular opening in the wall, and delivers its air at all points of the periphery into a large but close room, from which room ducts for conveying air branch in any desired direction." This kind of fan was taken from a type described by a French author, M. Combes, in *Aéragé des Mines*, though slightly altered. The most efficient number of blades is found to be about 16, and the fans are generally driven by an engine directly connected, or by a belt and pulley from an independent engine. In arranging for ventilating machinery of this kind, the author gives the following rule: For a hall occupied by occasional sessions of one and a half hour, 10 ft. may be taken as the total quantity of air needed per minute, while for an assembly hall for long sessions, 30 ft. may be taken as a maximum. The sectional area of duct near the fan is got by dividing this figure by 600 (the desirable rate of flow of a forced current in a duct per minute). This rule, stated without algebraic symbols, gives the diameter of a fan which receives its air on one side only, as 0.073 times the square root of the number of feet of air to be moved each minute. The inlet or air-duct to a fan should, for the supply of air, be 1.4 times the area of outlet, and the areas of distributing ducts should be increased to compensate for resistance of air in small passages: the area of each branch in fact will gradually increase or become trumpet-shaped, expanding from the fan inwards. It is necessary also that these air-ducts be smoothly formed, have all the angles rounded, and be unobstructed; the outlets should also be extended so that the velocity of discharge be not greater than 2 feet per second near the surface. The direction of the discharge or efflux should be upwards. The ducts for removal ought to be also of sufficient size and of equal dimensions, and it is justly pointed out that the labour of impelling air is lessened by the ascensional currents of air in the building due to the difference of temperature, so that greater power is needed to impel the necessary amount of air in warm weather. In the design of the main education-shaft some care has to be taken to avoid down-currents and to prevent eddies. The points of junction of the ducts with this main shaft must be properly formed, so as to assist in the ascending current and not leave spaces for return currents. Into the details of boilers and heating surfaces we need not enter here, though the loss or transmission of heat by windows and exposed walls in every case must be taken into the calculation. The volume of air to be admitted per minute ought to depend not entirely on the size of the room, but on the amount of heating surface necessary to warm it, and a certain area of exposed outer wall or window surface. Mr. Briggs, in the paper we have referred to, enters into various steam-heating arrangements, such as coils, and much of what he says may be accepted as a contribution to the subject. Architects, and those who plan buildings, have much to answer for in not providing suitable ducts and chambers for heating apparatus and distributing flues in order to render efficient the plans of the engineer. Mr. Briggs' remarks are accompanied by illus-

trations of the fan used by him, with a table giving the diameter, revolution per minute, quantity of air delivered, horse-power required to deliver air at certain pressure, and sectional area of delivery duct. The idea of a ventilating tower receiving its air from a relatively pure level is revived, and a sketch is shown of one with a fan and auxiliary-coil chamber with underground ducts. As to height, the purest air, it is asserted, is to be found from 6 to 40 ft., and the most impure, 70 ft. to 90 ft. above level of ground—a statement rather at variance with the opinion of many who have proposed to ventilate large buildings by drawing air from considerable elevations. We believe, however, that over any great city, such as London, the stratum of air above the chimney-level is the most impure, and air brought down from such a level must be largely impregnated with smoke and gaseous exhalations. Every one knows what a dense cloud or haze settles over a large city on a still day, and any tower, to be of service, ought to pierce this stratum of the atmosphere.

SOCIETY FOR THE PROTECTION OF ANCIENT BUILDINGS.

THE fourth annual meeting of this Society was held on Friday at Westminster Palace Hotel. The American Minister, the Hon. J. Russell Lowell, occupied the chair, and in opening the proceedings alluded to the deep interest which his fellow country people felt in the ancient buildings of Europe and especially of England, and added, that while he sympathised in the main with the objects of the Society in so far as they uttered their protests against obliteration executed in the name of restoration, he could not allow that an old building should be allowed to tumble down rather than that it should be repaired, as he understood the opponents of the Society alleged was the opinion of some extreme men.

Mr. William Morris, M.A., hon. sec., read the annual report, in which the Committee, while expressing their belief that the principles of the Society were being more and more accepted, but confessed that "ignorance and thoughtlessness are so busy, and so entirely unchecked by any more direct influence than that opinion of cultivated men of which they knew little or for which they care little, that the destruction of the art and history of our ancient monuments is still going on with terrible swiftness, both in this country and elsewhere; and unless those who really care about the preservation of these treasures bestir themselves, and sacrifice some time and money to furthering a distinct agitation against restoration, it will not be long before there will be no ancient building which can be looked on by men of sense and knowledge without suspicion and discomfort; and very few which will be able to sustain a claim to be considered as ancient buildings at all." The report proceeded to enumerate the cases in which protests, generally unavailing, had been uttered against works of alteration of old buildings, these including the Magdalene Bridge, Oxford, proposed to be widened; Wimborne Minster, about to be repaired at a cost of £3,000; Oakwell Manor House, of which the committee made a careful survey for the owner; Stratford-on-Avon, where the opposition to the intended rebuilding of the tower and spire had caused Mr. Butterfield to decline to act as architect; Ashburham House, Westminster Cloisters, to save which a special committee had been formed, and the Town Hall of Genignano and the Bigallo, Florence. The operations of the Society were hampered by the smallness of its funds. The Hon. Percy Wyndham, M.P., moved the adoption of the report, and in doing so defended the Society from the charge often brought against it, that it preferred to have a building reduced to ruins rather than see it restored. The chief of the demolition of the City churches appeared at first sight to be one of the strongest that could be put for destruction, but a recent report to Parliament had proved that the funds realised by the sale of the sites of churches, for the erection thereon of business premises, had not resulted in that increase of churches elsewhere or the augmentations of poor livings that was anticipated. Mr. R. Stewart Poole, of the British Museum, in seconding the resolution, referred to the progressive destruction of ancient Arab monuments in the neighbourhood of Cairo, and Miss Amelia B. Edwards entered minutely

into this topic, and stated that the injury to the monuments of Egypt was partly due to the carelessness of the Government and theupidity of the natives, but chiefly to the English speaking tourist, who bribed the people to sell relics and fragments, scratched his ignoble name on every available surface, and incited the guides to blacken and injure the tombs with torches, bonfires, and magnesium lights. Miss Edwards suggested that the Society should correspond with Professor Masperou, the successor to M. Mariette Bey, as to the best means of checking these acts of destruction. Professor Sheldon Amos having also spoken on the wanton defacement of Egyptian monuments, the report was adopted. Mr. George Howard, M.P., moved the first resolution, and appealed for wider and greater pecuniary support to the Society, which he should like to see constituted a Court of Appeal in all matters of restoration. Mr. C. Kegan Paul, in seconding the resolution, remarked that the Society occupied the position of an *avvocato del diavolo* to structural restoration, inasmuch as it adopted an attitude of opposition to any projected repair or rebuilding till it should be shown by the proposers that the work was necessary and would not injure the building. The injury done to Wimborne Minster in the restoration of 20 years since, and to numberless other edifices before and since, showed the utility of such a society as this. Mr. W. Morris having spoken at considerable length on the manner in which the town and colleges of Oxford were being transformed and robbed of interest by the restorer and the utilitarian, the resolution was carried, and a vote of thanks to the Chairman, moved by Lord Houghton, closed the proceedings.

ST. PAUL'S ECCLESIOLOGICAL SOCIETY.

THE members of this Society visited on Saturday afternoon three parochial churches on the Metropolitan boundary of Essex. That of *East Ham* was the first church seen, and within it a paper written by Mr. G. H. Birch was read, in the author's absence, by Mr. A. Paxon, hon. sec. of the Society. The church is a small one, chiefly of the Transitional Norman period; it consisted of aisleless nave, western tower opening to nave by a Late Norman arch, chancel also Norman, and apsidal sacristium. Several of the windows are widely splayed lancets, cut through the thick walls, but one or two are modern Decorated windows or plain casements. On internal north wall of chancel is a richly-treated Norman arched, having intersecting arches decorated with the chevron, and traces of similar work exist on the south side. The walls of chancel and apse retain traces of mural decoration of the 14th and 15th centuries. The church is a typical specimen of an unrestored building. The chancel and nave are filled with high, square pews, covered by dingy green baize. The Norman arched below the pew ledge is painted and grained, in imitation of some wood known only to the grainer; in the chancel, close to pulpit, is a very large enclosure, comfortably cushioned and provided with a modern stove of uncompromisingly ugly pattern; in the apse is a large Jacobean monument to Edmund Nevill, 7th titular Earl of Westmoreland, inclosed by a large railing, which prevents the altar from occupying its proper place; the tower arch is blocked by organ-gallery, the chancel arch is replaced by a beam, stating that "this church was repaired and beautified, A.D. 1816," beside which are hung the Creeds and Commandments; the walls appear to need structural repairs as well as thorough cleansing. Mr. Birch, in his paper, severely commented on these matters, remarking that the present condition of the church ought to delight the Society for the Protection of Ancient Buildings, but reminded him of the text, "How dreadful is this place." The vicar, the Rev. S. R. Reynolds, acknowledged that the church was in a bad state, but the parishioners had refused to sanction plans for restoration prepared by Mr. Butterfield at the instance of the lay rector, who was a clerk in holy orders, the Rev. R. F. Wilson. The members next paid a hurried visit to the large church of *Bark up*, which has the peculiarity of having two north aisles to nave, as well as a south aisle, the arcades being of Late Perpendicular character. The nave and chancel have elaborate plastered ceilings of Jacobean character. Here Mr. Hugh Romieu Gough, F.R.I.B.A., read a

paper in which he traced the history of the great Benedictine Abbey which formerly stood to the north of the church; of this building, whose abbess was one of the four who were Baronesses by right of station and claimed precedence over all others, the only remains were the foundations of the eastern end of Lady-chapel, excavated a few years since by Mr. J. King, of Barking. Attention was called to the 15th century Gatchouse tower at the entrance to the churchyard, the upper story of which was formerly a chapel of the Holy Ghost. *Rainham Church* was the last place visited. It is a very small unrestored building, almost entirely in the Transitional Norman and Early English styles. It comprises low thirteenth-century west-tower, with shingled dwarf spire, a nave separated from shallow aisles by massive square piers, having scalloped capitals and moulded angle shafts, and a chancel, furnished with pews (in one of which is a richly carved stall elbow) and low forms. The east-end was walled up, apparently in 1768, but the reveals of a circular window and several lancet lights show on the exterior the former beauty of this thirteenth-century east front. A stove-pipe pierces the white-washed vault over chancel; the floors have been altered to a uniform level, and the whole church is covered with one roof, blocking up peculiar ranges of oviform clerestories in the nave. Mr. Gough read a paper in the church, which he said was the only one dedicated to SS. Giles and Helen; its founder, Richard de Lucy, Lord of Dixe, and Governor of Falaise, died in 1179. He called attention to the noteworthy features of the church, including the hagiocope and remains of rood-screen near chancel arch, the areaded work in nave, and a so-called leper's window in chancel. Mr. H. W. King, secretary to Essex Archaeological Society, said he had never heard a more satisfactory explanation of these low side-windows than that propounded by Mr. J. J. Cole, who quoted John de Peckham, a writer of the early portion of the fourteenth century, as authority for supposing that they were used for ringing a handbell to announce to the parishioners the elevation of the host. In churches on the Continent, built round by houses, similar side-windows existed high up in the chancel walls.

CITY CHURCH AND CHURCHYARD PROTECTION SOCIETY.

THE second annual meeting of this Society was held on Thursday, the 23rd inst., at the Egyptian Hall, Mansion House. The report stated that since the founding of the Society no City churches had been destroyed, but it was to be feared that a more drastic scheme might be prepared on the publication of the Census returns. At the beginning of the Parliamentary session notices were served on the rector and vestry clerk of St. Mary at Hill, again threatening the church with destruction and the churchyard with desecration; but attention being called to the matter, a saving clause was inserted in the Bill. A detailed report had been made as to the condition of each of the City churchyards by the hon. secretary, Mr. H. Wright, and those which were not found in a satisfactory condition formed the subject of correspondence between the Society and the responsible authorities. The report concluded by remarking that the City churches have peculiar and special claims upon the world and the Church, and the success that had been so rapidly attained by this Society, was chiefly owing to the widespread interest in these edifices, most of them the work of one remarkable man at an eventful epoch in the growth of modern England. The report was adopted on the motion of Messrs. H. C. Richards and C. Kegan Paul, and a second resolution moved by the Rev. Canon Venables (Lincoln), and seconded by the Rev. Canon Shuttleworth (St. Paul's) expressing satisfaction at the success of the Society's efforts, was unanimously adopted, as was also a resolution pledging the meeting to support the council in carrying out the Society's objects.

ACCURATE JOINTING IN IRONWORK.

THE value of accurately fitting the joints of buildings has been pointed out by all authorities on construction. In stonework and terra-cotta laying, too much attention cannot be given to the bed-joints, so that no inequalities

of surface exist; and all builders know the importance of bedding the stones of columns and piers evenly to prevent fracture or "flashing at the joints." All surfaces should be fitted with accuracy. "Where iron comes in contact with stone or concrete," says Mr. Matheson, "the inequalities of surface may be made good with lead, iron cement, Portland cement, or bitumenised felt; wood, if joined to iron, will adapt itself to the harder material; but iron and iron will not in certain positions fit properly unless the surfaces are faced in the lathe or planing-machine." As an example he instances a tier of iron columns supporting floors. Although these may have been carefully designed the strength is often reduced one-half by bad fitting. A heavy load causes undue strain to take place, and the tier of columns is weakened, or the pressure, instead of being transmitted in the line of axis, comes on one side, causing dangerous strains of a bending nature. In other instances, the floors sink, or excessive strain comes upon certain parts. Machine processes are now so cheaply performed that, as Mr. Matheson says, the saving in first cost by the neglect of much precaution is only trifling.

THE SCIENCE AND ART OF SANITARY PLUMBING.—IV.

TRAPS AND TRAP VENTILATION.

THE Society of Arts room was again crowded on Tuesday evening by an interested audience, on the occasion of Mr. S. Stevens Hellyer's fourth lecture on plumbing. The special subject was the siphonage and ventilation of traps, and was illustrated by numerous practical experiments, as well as by diagrams. Mr. Noble Smith occupied the chair.

The lecturer remarked that there were many traps which befuddled themselves besides the \odot and bell traps already examined and condemned in his third lecture; but before passing on to consider self-cleansing traps, he must refer to some of the former class used outside the house in connection with drains. The first of these stoneware traps he would notice was the Mansergh-trap, which although it had only been in use a few years, had an extensive sale, and was much liked by many. He condemned it, first, because it was non-cleansing; and, secondly, because it did not leave the end of waste-pipes (discharging into it) open to the air. The illustrations on the wall would show all practical men that this flat-bottomed, trunk-shaped trap did not cleanse itself. The body of it was shaped like a box with a partition across it dividing into two unequal compartments for holding water in each. An opening was made in the middle or upper part of this partition for the discharge to pass from the inlet compartment to the outlet compartment. A dwarfed partition was taken down from the top of the trap to screen the outlet and to prevent the drain-air from escaping. A round, bent pipe, called the "inlet," was found in the side of the inner compartments for receiving the end of a waste-pipe, and this pipe was dipped into the "standing water" of the trap. The outlet of trap, a round pipe, was at the opposite angle. Provision was made for ventilating the drain with which the trap was connected. A large opening over centre of top of trap was made for receiving surface-drainage, and also for allowing any gases generated in the trap to escape through the grating, instead of passing through the inlet to the sink or lavatory-waste into house. A trap of such construction was by necessity dirt-holding; it must become a "collecting box," for there were no less than eight corners for filth to accumulate in, and no amount of water sent through such a trap could be made to scour the parts fouled. The bottom was flat, the sides were vertical, the partition dividing the two compartments was upright, and the area of the surface water of trap was several times greater than its inlet or outlet; so that the standing water of the trap, with its decomposing matter, could not get changed by any single nor by many flushes of water sent through its inlet. The bad air from this contaminated body of water, if it did not escape through a waste-pipe into house, would at times get in through a window or door. Again, the arrangement of inlet was bad in principle; for it water-locked the discharging end of waste-pipe, instead of allowing it to be exposed to the atmosphere. Another evil in

connection with this trap was that the waste-pipe discharging into such a trap, being trapped at its remotest end from sink, exposed the house to any bad air or decomposing matter left in such a waste-pipe. This trap was not, therefore, of a right kind to receive water from sinks, lavatories, or urinals, as such water, remaining in the trap, would become offensive. The lecturer here exhibited drawings of a trap which he designed some years since for receiving waste-pipes, and intercepting them from the drain. This trap had three dips to prevent drain-air from reaching the ends of waste-pipes discharging into the waste-receiving compartment, and like the Mansergh trap it had two separate bodies of water. It was specially constructed for receiving waste-pipes from baths and lavatories when fixed on bedroom floors and for protecting them from the drains. It had, he claimed, two important advantages over the Mansergh traps: 1st, it left the end of any waste-pipe discharging into it open to the atmosphere; 2nd, the bottom of the trap was rounded, and its configuration made it easier to cleanse. But this trap was not self-cleansing, or as much so as he wished it to be—i.e., an ordinary flush or flushes of water sent through it would not cleanse it. When a trap could not be thoroughly cleansed, and the whole of the water standing in it changed by a good flush of water sent through its waste-pipe it ought never to be used; and so, though he held a patent for it, Mr. Hellyer said he condemned it. He had also illustrated the well-known gully-trap, because it was now being used for receiving waste-pipes from sinks, &c. It might be a good trap for catching detritus, and therefore just the one for use in yards and streets for surface-drainage; but as traps for receiving the discharge from waste-pipes were not wanted for "catching" anything, it should not be employed for sink, urinal, and lavatory wastes. It formed a catch-pit for filth, and ordinary flushes would not cleanse it. He would now consider the much-used drain-siphon for trapping off sewers. This being a round-pipe trap, would be self-cleansing, if it had no manhole and was provided with means for a waterfall into it. But no pressure of water was (or only very rarely) brought to bear upon the standing water of the trap, and consequently it never became perfectly changed by a flush of water sent into the drain. Then the manhole formed a collecting place for filth, and soon needed cleansing. Another defect in this siphon-trap was its want of ventilation. When foul matter was discharged into a trap, with a water-flush after it, it should pass through it, leaving no substance behind. He hoped to prove that certain traps which he had called "self-cleansing" did this; but before doing so, he would lay down the principles on which they should be constructed, and the conditions on which they should be fixed. (1) The trap should be free from all angles, corners, and places where filth could accumulate. (2) A free way should be made for the discharges to pass through the trap without breaking their form; i.e., the trap should be like a round pipe, so made or bent as to form a water seal. (3) The body of the trap for fitting in horizontal pipes or drains should be smaller than its inlet, so as to hold as small a quantity of water as possible, consistent with the position in which it would be placed and the work it would have to do—to admit of easy changing every time a flush of water was sent through it. (4) The minimum-sized trap should be used consistent with circumstances, but governed somewhat by the size of the waste-pipe or drain on which it was fixed, and the flush of water likely to be sent into it. (5) The water-way into a trap for fixing the flat-bottomed vessels with gratings over its mouth should be larger than its body part, or than the waste-pipe with which its outlet might be connected, so as to be able to send efficient water flushes through the trap to cleanse it, and also to cleanse its waste-pipe. When the trap was smaller than the waste-pipe, no good flushes could be sent through such piping to cleanse it. (6) The inlet or mouth of the trap should always be so arranged that the flushes should fall upon the standing water of the trap with a vertical pressure, so as to drive everything foreign out of the trap and to entirely change its previous contents. (7) The inlet side of all traps fixed upon drains outside the house should be open to the atmosphere in some way, so that any bad air

rising from foul matter decomposing in the trap or coming through it from the drain or sewer might readily pass into the open air, or be largely diluted with fresh air before passing into any waste-pipe, soil-pipe, or drain discharging into such traps. In cold countries, where the water standing in the trap would be liable to freeze in severe frosts, the mouth of trap should be sealed over, and the foot ventilation or air-induct should be taken into the waste or soil-pipe, or drain, some little distance away from the standing water of the trap, to prevent the cold air currents from playing upon it and freezing it. In this country in sheltered places there was little risk, and if the trap (for dis-connecting) was kept well down into the ground in exposed places, there was no danger from frosts.

Ocular demonstrations that round pipes were self-cleansing were now given on the platform, and occupied a long time; Mr. Hellyer being frequently interrupted by suggestions for making the experiments more complete and fair, or questions as to the modes of working. The lecturer explained that in order to show the working of the insides he had had the traps made in glass. Having coloured the water in his round-pipe trap by putting blue water into it, he passed a small flush of clean water into the trap from the basin, when the whole of the blue-water was washed out and the trap left clean—a result greeted with loud applause. Next, indiarubber cut into small pieces was put into the trap, and was completely flushed out by the discharge from the handbasin; plumber's soil and gravel were next put into the trap, and equally well removed by a flush of water. A glass \odot trap was then used, and after several flushings remained half-full of plumber's soil. But these round-pipe traps, the lecturer added, had a defect in that they were siphoning traps, especially where long vertical legs were attached to the outlets. Unless such siphonage could be prevented, such traps were not only useless but dangerous. By another series of experiments it was shown how in practice traps were often siphoned and thus unsealed. A model bath and lavatory basin were fitted up on a stand, and by discharging a small quantity of water from the bath the lavatory on the floor beneath was unsiphoned. By discharging a basinful of water in this lavatory the trap to bath above was similarly unsiphoned. Experiments with the \odot -trap and Bower-trap showed that though these were not unsiphoned with anything like the ease that the other traps had been, they were by no means proof against the action of discharges through the pipes on which they were fixed. Like siphon traps, they required ventilation. In these \odot and Bower-traps the water was much agitated while flushes were passing through the piping, and water was to some extent siphoned out of them by any discharges, although not, perhaps, enough to unseat them. Next, the stop-cock was opened so as to ventilate the main waste-pipe at top and bottom, and, by letting a little water through the bath-trap, it was unsiphoned, notwithstanding that the main waste was well ventilated. He thought he need hardly say to practical plumbers that unless siphonage could be perfectly remedied, round-pipe or self-cleansing pipes were worse than useless, for while they would impede the cleansing force of the discharges through the waste pipes, they would be no protection to the house. If absolute safety was needed, the Eclipse, the Bower, and even the \odot -trap must be ventilated.

He wished now to show, by one or two severe tests, that trap-siphonage was prevented by trap-ventilation. They would see that an air-pipe was taken out of the lowest trap and continued above the highest, branching into the main waste or air-pipe. Into this ascending air-pipe, from the lower trap, the branch air-pipe from the upper trap was taken, so that each trap was ventilated. He now opened the stop-cocks (which were shut during the former experiments) and gave the traps ventilation, when the waste was left undisturbed, or if disturbed, it was only very slightly in either trap, notwithstanding that full and rapid flushes were sent through the waste-piping. This was exemplified both with the bath and basin flush, and it was then shown that if the ventilating-pipe on the top of the main waste-pipe was shut off by turning the stop-cock, the result was just the same; so long as the ventilating pipe to the trap remained open, neither the working nor the idle trap were unsealed by good discharges sent

through the waste-pipe. A good deal of ignorance prevailed on this question of ventilation. Many simply ventilated the main waste or soil-pipe, but not the individual traps. They insisted on the soil-pipe being carried up full size to the open air, and, in some cases, were willing to give it foot ventilation, but were then satisfied. The lecturer had been amused, a short time since, by reading remarks on the "bends" of a ventilating-pipe to soil-pipe, written by a gentleman who was called on to report on some plumbing. He found two or three bends in a fin. ventilating pipe, and he wrote that the pipe should have been carried up "straight." If the gentleman had had more experience, he would have known that bends in pipes of full bore would make but trifling difference, and not enough to notice in a report. Mr. Pridgeon Teale, of Leeds, had rendered good service by his book "Dangers to Health"; but though he showed valuable improvements on old plumbing practice, his methods were not perfect. Some of his diagrams exhibited traps which would be readily unsiphoned. In a series of experiments the lecturer made a month since with a tier of lavatories discharging into a common waste-pipe, he found that if they were only ventilated by an open top to the waste, a painful of water discharged through any one basin partially unsealed them, and another flush unsealed all of them. The traps were then ventilated by taking a 1½ in. pipe from the outgo of lowest trap, continuing it up and connecting it with the air-pipe of the main waste above the highest trap, and branching 1½ in. air-pipes from the other traps into it on its way up. Three heavy flushes caused visible agitation in the other traps; but they only lost 1-16 in. of water, and the trap flushed was left fully charged. The experiments had been repeated, Mr. Hellyer said, with large pipes and traps, the results being precisely the same. Another arrangement of bath and lavatory wastes was shown in diagrams, and described as very commonly adopted. A bath was fixed on the chamber floor with 1½ in. waste-pipe from it to discharge in the open air. The waste-pipe from lavatory on ground floor was branched into the bath-waste, and though he had on diagram shown an air-pipe to top of waste, many people were satisfied with an opening to air at the discharging end. With both the air end and discharge end of waste open, the lavatory trap was not only siphoned out by the emptying of a bath of waste, but 130 ft. lineal of air was drawn through it into the waste-piping, as registered by an anemometer. Another test was made similar to the last, but with a Bower-trap instead of the 1½ in. "patent east-lead trap;" when the bath was emptied, the ball in lavatory-trap lost its seat, and 110 ft. lineal of air was shown by the anemometer as having passed through the Bower trap, which still, however, returned about ½ in. of water as a seal. An air-pipe on the Bower-trap prevented any action upon it by discharges through the waste-pipe. Another arrangement experimented upon was a stack of 2 in. waste-pipes with a bath and two glass slop-sinks upon it. There were no fewer than four traps placed upon the middle floor (or upper slop-sink) trap; a 2 in. "patent east-lead trap" was fixed under the bath and each of the two sinks, with 2 in. lead branches into the main waste-pipe. A 2 in. ascending pipe was taken off the top of the outgo of the lowest trap, and continued up and branched into the main air-pipe above the highest trap with branches from each trap connected with it on its way up. This ventilating-pipe was shut off when not needed by a stop-cock. The first experiment was made without trap-ventilation. The bath-cock was opened and the bath discharged; but before one-fourth of the contents had passed through the waste-pipe, all the traps to slop-sinks were unsiphoned, and ½ in. of water was drawn out of the first of those on the upper sink. The experiment was repeated, opening the ventilating-pipes, and though 60 gallons of water passed through the waste in 2½ minutes not one of the traps was unsealed.

A detailed explanation was given of the course of siphonage—i.e., the displacement of water in traps by discharges sent through a pipe on which such traps were fixed. Trap-siphonage was chiefly caused by the atmospheric pressure being greater on one side of the trap than on the other. When a body of water was sent through a soil or waste-pipe it interfered

with the pressure of air on the standing water in the outlet of the trap fixed on such pipes. The pressure of air being removed from the outlets the water was forced down on inlet side of the traps, and rising on the outlet side, it escapes through the branch-wastes, unsealing the traps, and allowing all to pass through them. To prevent the standing water from being displaced, the weight of air should be equipoised on both sides of seal, and this was readily done by fixing a ventilating-pipe on the outlet of the trap.

He had now, he thought, brought the trap question to its present point by easy stages (1) by showing that traps under sanitary fittings were necessary; (2) that the traps largely used for such purposes were unsanitary—i.e., non-cleansing; (3) that traps could be made sanitary—i.e., self-cleansing; (4) that self-cleansing traps, when fixed in certain positions, were easily unsiphoned, and so did more mischief than good; (5) they had found out how to remedy the evil of siphonage. All that remained to be done was to look at a few characteristic traps which were self-cleansing. The siphon or round-pipe trap, whether made of earthenware or lead, was self-cleansing, and although he wished plumbers to cease making O-traps, he did not want to prevent them from making traps. If his hearers could not bend lead pipes into siphon traps by hand, they could knock them up from sheet lead in two halves and solder them together. Mr. Hellyer also showed his V-dip east-lead trap, which he said was self-cleansing, and not so easily siphoned as the round pipe traps. Of outside traps were shown Buchan's stoneware trap for disconnecting pipes from drains and drains from sewers. This trap was self-cleansing. The cleansing-power was aided by its water-drop, and by having a vertical opening to the atmosphere right over the inlet, any sewer air passing through the standing water of trap could readily get away or be largely diluted with fresh air. In the lecturer's ventilating drain-siphon and sewer interceptor the principle was the same as in Buchan's. It had a greater water-drop, and the body of trap was much smaller than the inlet and the outlet. "Weaver's drain-ventilating trap," next shown, was a great improvement on the manhole drain-siphon; but the want of a vertical fall on the standing water prevented it from being so self-cleansing as it should be. The "Croydon siphon trap" had been largely used of late. It was infinitely superior to the old siphon, but was not absolutely self-cleansing, as the body of the trap was too large for the standing water to be washed out by a flush. In conclusion, the lecturer said many of these and other traps would be on view at the forthcoming Sanitary Exhibition at South Kensington.

PRACTICAL NOTES ON PLUMBING.—III.*

By P. J. DAVIES, H.M., A.S.P., &c.

JOINT-MAKING (continued).—SHAVING.

SHARPENING the shave-hook has been before referred to. Some plumbers throw this tool about as at Q, Fig. 1, or into their bag with hammers, chisels, files, &c. I wish to impress upon the young plumber's mind the necessity of keeping it free from notches by proper protection and care. Shaving may be learnt in a few days. You should practice on a piece of pipe to see how round and true you can shave it; shave it clean and even, not too deep, round the edge, see E.F., Fig. 6. Having all your work prepared, fix the joint together, as at section Fig. 5, which is a round joint to be made either upright or underhanded. You see at K that the male fits, but a little recess is left for the solder to get into. Many plumbers close this; they cannot do a worse thing, as it is very useful in joint-making. At Figs. 7 and 8, you see a full-sized 1 in. joint; this is how the joints should appear when finished; Fig. 7 is a short, and Fig. 8 a long joint. On examining the full-sized section, Fig. 5, you will notice the dotted lines H I, shows the outer line of the solder on the long joint, and F N, the outer line of the small joint. The small joint does not take the amount of solder of the large joint, and on further examining same across the centre of joint at D, you will perceive an equal thickness of solder, therefore the joints are equally strong

across the actual joint. There is one advantage with the long joint—it is easier to make, because you have a larger quantity of solder to play with, which retains the heat, and also a larger cloth; its length also renders it less liable to show imperfections as to roundness, &c. The large joint should be first practised upon, and then try to reduce same, keeping in mind that the centre thickness of solder is the principal point to watch. This substance of solder is generally about twice the substance of the lead at that point, not merely for strength, but for other purposes to be explained. Every plumber should know that solder is much stronger than lead, taking it bulk for bulk; still this thickness cannot be made the rule, inasmuch as some waters are chalybeate or impregnated with iron, &c., which readily attack the metals composing the solder; in such cases you must use discretion as to the substance of metal around your joint.

COLLARS.

Suppose you have your joint upright, as at Fig. 9, you will require something to catch your metal (solder); then, if you have a piece of sheet-lead handy, cut a collar, which is generally made by cutting it round or otherwise with a hole in the centre the size of the pipe; if too large, pack some newspaper between the collar and pipe. Well soil same and tie a piece of string round your pipe, as at A, Fig. 9, which will support the collar and prevent the solder running through; to support the outside part of the collar, tie your compasses as shown at M N, and the ends of the compasses will act as props, but if no compasses to hand two pieces of stick tied across the pipe, or an iron chisel or screw-driver driven into the wall, &c., will answer. The collar should be put on as shown at F G, as level as possible, as it is much better for parting your solder round the bottom. When fixed as at D E, the solder drops down and sets round the bottom, and is at times very difficult to remove without the iron, as it cools much quicker when in a small body.

Before you begin to wipe your joint stop the ends of your pipes to prevent draughts. "The metal's hot—bung it!" is the cry. During this time you should select your cloth. In this case, for a 1 in. upright joint, the size is 2½ in. by 2½ in. The metal's here: you give your cloth to the mate, who will get the face side warm by holding it over the metal-pot (or, if you can trust him, he will get your cloth for you and bring it ready warm). Take a felt, that is a piece of old carpet, 9 in. long or so to hold your ladle with, then take your ladle full of solder and set to splashing your metal on the joint with the splash-stick as shown at H, I, J, K, L, Fig. 9, taking care not to burn the pipe with the solder, that is, by splashing too much in one place; look sharp and get up your heat by getting on as much solder as you want, and as near the shape as possible. Keep it alive by working it up with the splash-stick. If it drops down push it up again with the stick, warm it up with fresh metal, keep at it until you have the joint to look as at I, J, K, L; now take another ladle of hot metal and splash it up the soiling about and round B. To get a little more heat on your lead, keep splashing and patting it up to the proper shape with your splash-stick. It is just hot enough; now take your cloth, well hot on the face side, in the left hand, and with a sharp sweep wipe quickly and clean round the top and back part of the left-hand side of your joint, then the bottom, next the centre, change hands and do the other side, that is, round I K, and finish by wiping down from B to H, and from H to K L, and your joint is done. Whilst hot, part your metal so that it will leave the pipe. You do not require an iron for this; keep practising at this until you can do it without. Pray don't use irons if you can do it without: you will do better hereafter. The time required to make this joint is about one and a-half minutes, that is getting up your heat and wiping included. The wiping alone should not exceed 20 seconds.

OVERCASTING.

Before we leave this kind of joint-making, let me say that in London you will not require to overcast your joints, as was the custom in the time of the old architect Vitruvius, 100 years before Christ, but when in the country you may, that is to say, when your solder has to be used very coarse. This is done as follows:—Suppose your solder to be four of lead and one

of tin, the solder would set quickly and be very porous; then you will want an iron to warm or liven up your solder. The same iron will do your overcasting, as follows: Having shaped your joint, well touch the same; take the handle part of the ball of the iron and rub it from bottom to top of the joint, just to glaze the joint, then bring it down again the same way; this gives the glaze or ribbed line, which should not exceed half an inch wide, G, Fig. 10. Next do H,

University College, and we find active preparations are being made in allotting spaces to exhibitors. The exhibition will be on a very extensive scale, the Committee having at their disposal the east and west quadrants, or annexes, of the Albert Hall, inclosing the Horticultural Society's Garden, besides the long eastern arcade leading to the eastern quadrant and the western gallery. Entering from the centre of Exhibition-road,

part. We find spaces have been allotted to some large firms. Messrs. Rosser and Russell, A. Smith and Stevens, Strode and Co., Crossley Bros., Bellman and Ivey, C. Drake and Co., Eureka Concrete Co., T. J. Constantine, A. Walker, Hobbs, Hart, and Co., T. Potter and Sons, R. W. Winfield and Co., F. Edwards and Son, Verity Bros., J. Weeks and Co., Musgrave and Co., occupy conspicuous stalls. The Universal Ventilating, Sanitary, and Engineering Co., Comyns, Ching, and Co., C. Kite and Co., J. Haworth, Ritchie, and Co., the Silber Light Co., have also stalls. Filtering apparatus, lighting and ventilating contrivances will be found in this quadrant. The corresponding western quadrant has been set out for medical exhibits of all kinds, and the exhibitors in this department are very numerous, though in both sections we find a few spaces still to let for single articles. In the sanitary section we must not forget to mention a long space in the east arcade set apart for exhibits of journeymen plumbers, which will attract some attention. A part of the western arcade is to be devoted also to a variety of medical and sanitary exhibits, such as extract of meat, disinfecting fluids, prepared milk, the Aylesbury Dairy Co., the Sanitas Co., and we understand it is in contemplation to show an electric railway in operation at the end of this arcade. Another of the plans shows the western gallery, which is devoted chiefly to medical objects. Those who require space should lose no time in applying for it. The exhibition opens on July 16th, and will remain open till August 13th. The plans are drawn to a large scale, and show the allotments, the names of exhibitors and the spaces unoccupied, and are signed by the chairman, John Eric Erichsen, F.R.S., president of the Royal College of Surgeons; and the secretary, Mr. Mark H. Judge, curator of the Parkes Museum of Hygiene. The superintendents are Messrs. J. Douglas Dick and E. Smithson, from whom all information as to space may be obtained.

CHIPS.

Mr. W. Mattien Williams, F.R.A.S., F.C.S., author of "The Fuel of the Sun," "Through Norway with a Knapsack," &c., has been appointed to the management of the Royal Polytechnic Institution, and commences his duties forthwith.

The *Rock* states that a considerable portion of the superstructure of the shrine of St. Frideswide at Oxford has been lately found thrown carelessly into a well in the rear of one of the Canons' houses at Christ Church. It is hoped that a further search will bring the rest of this most interesting structure to light.

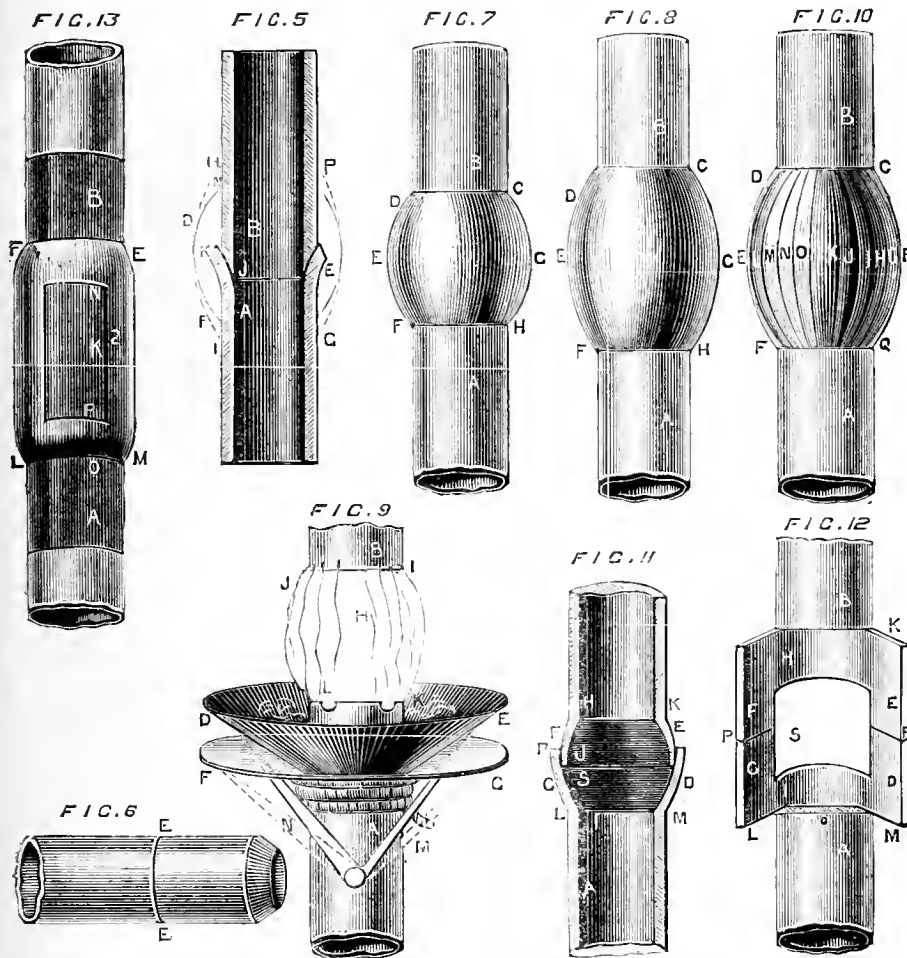
Mr. F. J. Price, for some years leading assistant in the construction department of Mr. J. T. Chappell, 149, Lupus-street, Pimlico, S.W., has been elected to the office of Inspector of Works to the Plymouth Corporation.

At the Midsummer Quarter Sessions for Glamorganshire, held on Monday, the committee of lunatic-asylum visitors were instructed to procure a plan for the erection, in sections, of an asylum on the recently acquired Parc Gwyllt estate, to accommodate 700 patients. It was also agreed to enlarge the chapel at the present asylum from plans prepared by Mr. Alexander Bassett, C.E., county surveyor, from 240 to 300 sittings. The estimated cost was £500.

On Wednesday the Prince and Princess of Wales attended the opening of a sick asylum which the Guardians of St. Marylebone have erected in Backham-street, Notting-hill. The new building will accommodate 700 persons. The architect is Mr. H. Saxon Snell.

Mount Zion Chapel, Illogworth, is to be reopened on Sunday next, after repewing in pitch-pole, the substitution of a restrum for pulpit, and the execution of decorations, reglazing, and painting. Messrs. Leeming and Leeming, of Halifax, are the architects. Mr. J. Farnell is the contractor for joinery, and Mr. Carr, of Halifax, for decorations.

The local board of Old Swindon recently elected a Mr. Dickenson as surveyor, but at a recent meeting of the board it was reported that he had been attacked by mental illness. As Mr. Dickenson had discharged his duties satisfactorily, the generous offer of a member of the board, Mr. W. E. Morris, was accepted that he should undertake the duties, the salary to be paid to the wife and family of Mr. Dickenson. That officer has not recovered, and his resignation has been formally tendered and accepted, Mr. Morris continuing to perform the duties of surveyor while negotiations are going on with the local board of New Swindon for an amalgamation of the authorities.



taking care to let the outer line cut the glaze of G; next do IJ: begin at the other side and bring round as at L, M, N, O, and finish at K, or if you want it to look even all round, begin at one place and go all round until you come to where you began, keeping an eye to your ribbed lines.

INTERNAL "JOINT-WIPING."

In some cases when upright or underhanded joints it will be found impracticable to wipe round the back of the pipe; for instance, suppose you want to wipe a 4in. joint round a pipe which was lying within half an inch of a ceiling or wall, it would be impossible for you to get your hand round. In this case, prepare your joint as at Figs. 11 and 12, so that you may wipe half from the inside as at S, Fig. 12, which is done by cutting the pipe in front and opening same, of course you must wipe your solder flush with the pipe, III shows the soiling, and E, F, G, D, the lead laid open, PP the centre of the joint or lead; having wiped the inside, either close the opening with the lead E, F, G, D, or, as is much the best, let a fresh piece in and wipe it there, as shown at NKP, Fig. 13. When practical, use a short mandrel. When fixing the door put NKP, Fig. 13, be sure to have the water-way free from rough edges.

INTERNATIONAL MEDICAL AND SANITARY EXHIBITION.

AN exhibition of medical and sanitary appliances is to be opened shortly at South Kensington, under the auspices of the Exhibition Committee of the Parkes Museum of Hygiene,

the visitor finds a rather tortuous passage brings him to the eastern arcade, a very long corridor, about 600ft. in length and about 20ft. in width, skirting on one side the Horticultural Society's Gardens. Along the wall of this corridor numerous sanitary exhibits will be ranged, and we find, from the large plans issued by the Committee, the names of several well-known firms. Paint companies, such as the "Sanitary," the "Albissima," the "Silicate," have spaces near the entrance end; and we observe that Fred. Walton and Co., the Stone Drainage Company, G. Barnard, Shanks and Co., Thames Bank Iron Company, Willeck and Co., of Leeds, Joseph Cliff and Sons, J. E. Ellison, Banner Brothers, W. P. Buchan, R. Boyle and Son, G. Jennings, Tylor and Sons, Stiff and Sons, H. Doulton, Macfarlane and Co., W. Tonks, J. Warner and Sons, Haywood, Tyler and Co., Ilhee and Ilhorn have stalls among many other firms. From the end of this arcade extends the eastern quadrant, and here we find the large hall at the junction has been allotted to various exhibitors, among them to Howard and Sons, the Wilson Engineering Company, W. Ramsay, C. W. Durham, Crossley Brothers, F. W. Clark. The quadrant, or curved annex, forms an admirable building for the display of appliances of a sanitary kind, and being about 300ft. in length by 22ft. wide, there will be ample space for two lines of exhibits, one occupying the black-wall side and the other the window arcade, with a wide corridor between for the public. We find the allotment in this part is for sanitary objects, though every sort of manufacture or improved appliances and furnishing will be exhibited. Stoves and gas apparatus, ventilating arrangements, lavatories, and art metal-work will be very largely represented in this

CONTENTS.

Beauty and Expression	1
Contract Certificates	1
Party-walls and Piers	2
The Special Loan Exhibition—Spanish and Portuguese Ornamental Art at South Kensington	3
Cement Festing	4
Dr. Waldstein on Greek Sculpture.—VII.	6
Excavations at Carac	6
Land-Surveying in Pennsylvania	6
The City Guildhall	7
Artificial Ventilation	7
Society for the Protection of Ancient Buildings ..	8
St. Paul's Ecological Society	8
City Church and Churchyard Protection Society ..	8
Accurate Joining in Ironwork	8
The Science and Art of Sanitary Plumbing.—IV. ..	9
Practical Notes on Plumbing.—III.	10
International Medical and Sanitary Exhibition ..	11
Chips	11
Our Lithographic Illustrations	12
The Illinois Plumbing Law	12
Action of Frost on Gas-Pipes	12
Our Commonplace Column	20
University College Awards	20
Charitable and Parochial Establishments	20
Prehistoric Ruins in Arizona	29
The Mechanical Engineer's Office Book	30
A Chimneyless Lamp	30
Building Intelligence	31
Architectural and Archeological Societies	32
To Correspondents	32
Correspondence	32
Intercommunication	34
Parliamentary Notes	35
Legal Intelligence	35
Statutes, Memorials, &c.	35
Stained Glass	35
Water Supply and Sanitary Matters	35
Our Office Table	36
Meetings for the Ensuing Week	36
Tenders	36

ILLUSTRATIONS.

PROPOSED QUADRANGLE, MAGDALEN COLLEGE, OXFORD.—
SOUTH HILL, BROMLEY.—HOUSES IN HARRINGTON-GAR-
DENS.—ST. CHAD'S CHURCH, HOPWAS.—COFFEE TAVERN
AND HOSTELRY AT NEWARK ON TRENT.

OUR LITHOGRAPHIC ILLUSTRATIONS.

PROPOSED NEW QUADRANGLE, MAGDALEN COLLEGE,
OXFORD.

THE drawing published shows the street facade of a proposed new quadrangle for Magdalen College, Oxford. It was submitted by Mr. Basil Champneys in a competition to which Messrs. Street, Bodley and Garner, and Wilkinson were also invited. Messrs. Bodley and Garner, whose designs were illustrated in the BUILDING NEWS for Dec. 24, 1880, were selected to carry out the work.

SOUTH HILL, BROMLEY.

SOUTH HILL, BROMLEY, by Messrs. Ernest George and Peto, is a compact little house just erected for Mr. Gainsford Bruce. The ground-floor is of red brick, and the upper story of weather-tiling upon quartering, banded and felted. The dining-room has an angle with settles, and the walls are panelled to the ceiling. The hall is panelled to the height of the doors, and the drawing-room has a panelled dais and an enriched ceiling in low relief. The bedrooms are all on the one floor, except an attic and a box-room above. The stables, with dove-cot, adjoin the offices. The weather-tiled gables are well grouped, and the house has a home-like, pleasant aspect. The contract for the house (without the stable) was taken by Mr. B. Payne, of Bromley.

HOUSES IN HARRINGTON-GARDENS, KENSINGTON.

Our illustration shows two pairs of houses by Messrs. Ernest George and Peto, now being built. The larger pair have the advantage of a corner site, the roads and gardens allowing the four elevations to be seen, three walls to each house enjoying windows. The houses are square in plan, avoiding the passage-like strip that generally accommodates a town house. The reception-rooms are entered from a square panelled hall in the centre of the house, well lighted and with a fireplace. The drawing-room is on the ground-floor, occupying the length of the principal front. On the same floor is the library and dining-room, with scervy by the back stairs, and small dinner-lift. There is also a larger lift for coats, luggage, &c., to the top of the house. By the entrance lobby is a good cloak-room and lavatory. In this larger pair of houses the billiard-room is in the principal gable of the roof, with lofty-arched ceiling, and the main stairs go to this room, which is

quite separate from the attics or servants quarters, approached from the back stairs. Externally the houses are of red brick, with brick mouldings, pilasters, &c., and the roofs are of red tile, while the window openings have casements with lead lights. These houses are to cost £18,000 the pair. The pair of smaller houses, costing £11,000, are somewhat similar in arrangement, but here the billiard-rooms are in the basement floor. They have, however, their own flight of stairs, connecting them with the principal rooms. In one house, which is building for Mr. Arthur Peto, there is an ingle-nook to the dining-room. This room is panelled to the ceiling.

SAINT CHAD'S CHURCH, HOPWAS, STAFFORDSHIRE.

THE above church, which has been built mainly by the exertions of the Vicar of Tamworth, the Rev. W. MacGregor, is situated on a beautifully wooded and elevated site just off the high road from Tamworth to Lichfield, about three miles from the former town. As will be seen from the drawings, a somewhat novel treatment, at least in church-building, has been adopted in the construction of the nave walls, which, from the level of the window-sills, are of timber-framing filled in with brickwork, the panels outside being cemented and left rough. The whole of the timber used inside and outside of the church is of oak; both the outside framing and internal fittings being left without having had anything put on them. The walls outside underneath the framing, &c., are of red local bricks; Codsall red stone being used for all dressings. The internal walls of the church are lined with warm-coloured buff bricks. The roofs are covered with brown Staffordshire tiles, and the spirelet is shingled. The work was carried out in a satisfactory manner by Mr. John Dakin, of Lichfield, from plans, &c., prepared by Mr. Douglas, of Chester.

COFFEE-TAVERN AND HOSTELRY, NEWARK-ON-TRENT.

THE coffee-tavern and hostelry shown in our illustration is to be built and endowed by Viscountess Ossington, for the benefit of the town of Newark, and will be carried out from the designs of Messrs. Ernest George and Peto. The building is arcaded along the principal front in the manner of many old houses in Newark. The arcade will form a pleasant shelter in hot or wet weather, and tables can be placed here for those who like outdoor refreshment in the "café" manner. There is also a large garden on the river-side of the tavern, overlooking the Trent, and its bridge (formerly a part of the town ramparts). This garden has an entrance from the bar, and here refreshments will be served, while music will be provided in summer evenings, after the custom of the pleasant German "Bier Garten." Along one side of this garden is an alley for American bowls. The ground-floor is occupied by a large bar, adjoining which, on the same floor, are the kitchen and offices. A smaller bar, separate but served from the same counter, forms a room for boys, a feature found very necessary, both for the comfort of the men and boys. There is also a small manager's parlour adjoining the bar. A separate entrance and staircase leads to a large assembly-room on the first floor, a room that will be used for concerts, lectures, and various large meetings, as well as for the farmers' ordinary on market-days. On this first-floor are also a reading-room and a club-room, for the meetings of the various friendly societies. The second floor is formed in the spacious roof, where is provided a large billiard-room for two tables. "Cubicles," or dormitories, for twelve lodgers, as well as for the rooms for the manager and servants. A bath-room is provided for the use of the cubicles, and lavatories, &c., conveniently for billiard-room, assembly-room, and the yard. There is also a ladies' cloak-room. Externally the building is treated with an arcing of red brick, and above these arches the mullioned bay-windows project. There are wide-spreading eaves and moulded cornices above, against which these bay-windows stop. Above are long mullioned windows, over which the gables are tiled in with oak framing and panelling, giving a rich effect. The tenders will be opened in a few days for this work.

A new police-station is in course of erection at Siltley, near Birmingham, from the designs of Mr. Luit, County Surveyor of Warwickshire.

THE ILLINOIS PLUMBING LAW.

THE Chicago Times gives the text of the law regulating the inspection of tenement and lodging-houses, recently passed by both branches of the Legislature of Illinois. We quote it substantially entire: "Any architect or architects, builder or builders of, or other person or persons interested in, any projected tenement, lodging-house, or other places of habitation, in any incorporated city of 50,000 inhabitants, shall submit plans and specifications of any such buildings to the Health Commissioner, for his approval or rejection, as to the proposed plans for the ventilation of rooms, light and air-shafts, windows, ventilation of water-closets, drainage, and plumbing.

"Any plumber or other person or persons interested in the contract for the plumbing work of such buildings, shall receive a written certificate from the Health Commissioner before commencing work on the said building or buildings, and shall proceed according to the plans, specifications, and instructions approved by the Health Commissioner.

"Any plumber, or other person or persons interested in the plumbing work, after the completion of said plumbing work and before any of the said plumbing work is covered up, shall notify, in writing, the Health Commissioner that said building is ready for inspection; and it shall be unlawful for any plumber or other person to cover up or in any way conceal such plumbing work, until the Health Commissioner approves the same."

The violation of the Act on the part of architects is punishable by fines of 100 dols. to 200 dols.; and on the part of any plumber by fines of the same amount for the first offence, and of 10 dols. additional for each day that, after the first conviction, he refuses to comply with the provisions of the Act.

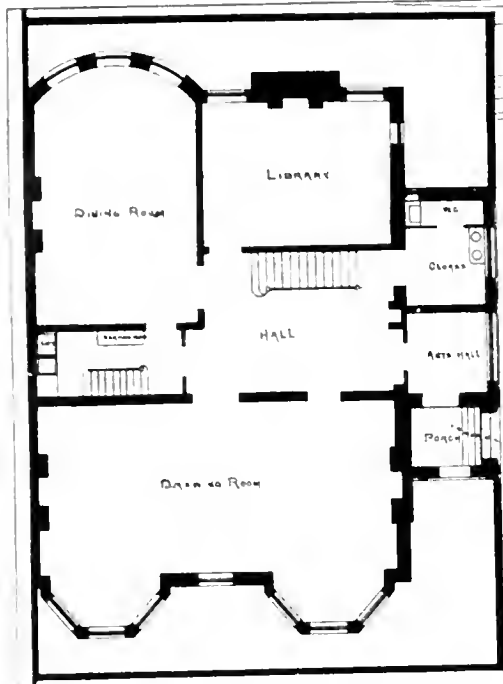
The Act concludes as follows, expressing the conviction of the legislation as to the importance of the law: "[Emergency.] Inasmuch as the health of the people is endangered, an emergency exists requiring this Act to take effect immediately, therefore, this Act shall take effect and be in force from and after its passage."

ACTION OF FROST ON GAS-PIPES.

THE winter of 1879-80 will long be remembered throughout Central Europe as one of comparatively great and long-continued cold. The *Journal für Gasbeleuchtung*, 1880, contains an article on the "Action of Frost on Gas and Water-Pipes," being the experience of the engineer at the Karlsruhe Gas-works. At these works there are six gas-holders, the three largest of which are provided with small boilers for heating the water. In the present instance, however, this was insufficient to keep the tanks free from ice, which began to form in the interior of the small holders, while the water on the outside was several degrees above freezing. This certainly is a very unusual occurrence, for the circulation of the heated water from the outside, together with the higher temperature of the gas, would seem to be sufficient to prevent the formation of ice. The difficulty at Karlsruhe was obviated by passing a pipe into the holder and blowing steam in, which after two days removed the ice. A plan commonly employed in other works, is to place in the tank outside of the holder a steam-pipe from 1½ in. to 2 in. in diameter. This is arranged parallel with and about 2 in. below the surface of the water. The steam produces a circulation of the water around the tank and keeps everything free from ice during the coldest weather. The holder cups are kept clear by passing into them a small steam-pipe provided with joints which allow a rising and falling with the holder.

The article referred to also states that 4-8 per cent. of the gas-meters fixed in private houses were stopped by the frost, but were made to work again by the addition of glycerine or alcohol.

The choking of service-pipes with naphthaline is one of the difficulties generally experienced in the distribution of illuminating gas. At Karlsruhe it was easily removed by means of the force-pump. This treatment is not always effective however, and in many cases it is necessary to use a little methyl alcohol or some other solvent to remove it entirely from the services.

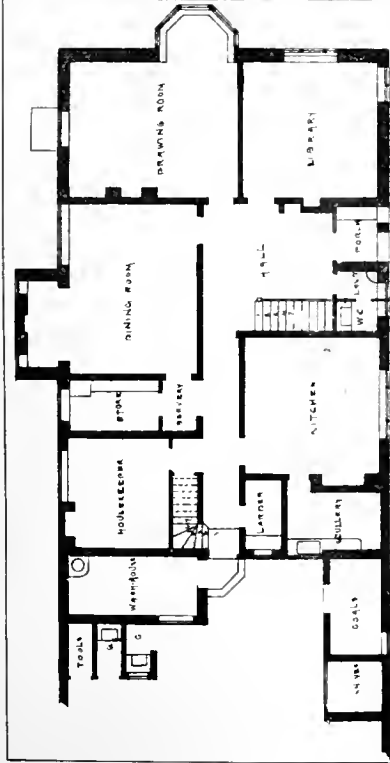


HOUSES IN HARRINGTON GARDENS, S.W.
for R. PHARDING & E. V. MORGAN Esqrs.
ERNEST GEORGE & PETO, Archts.

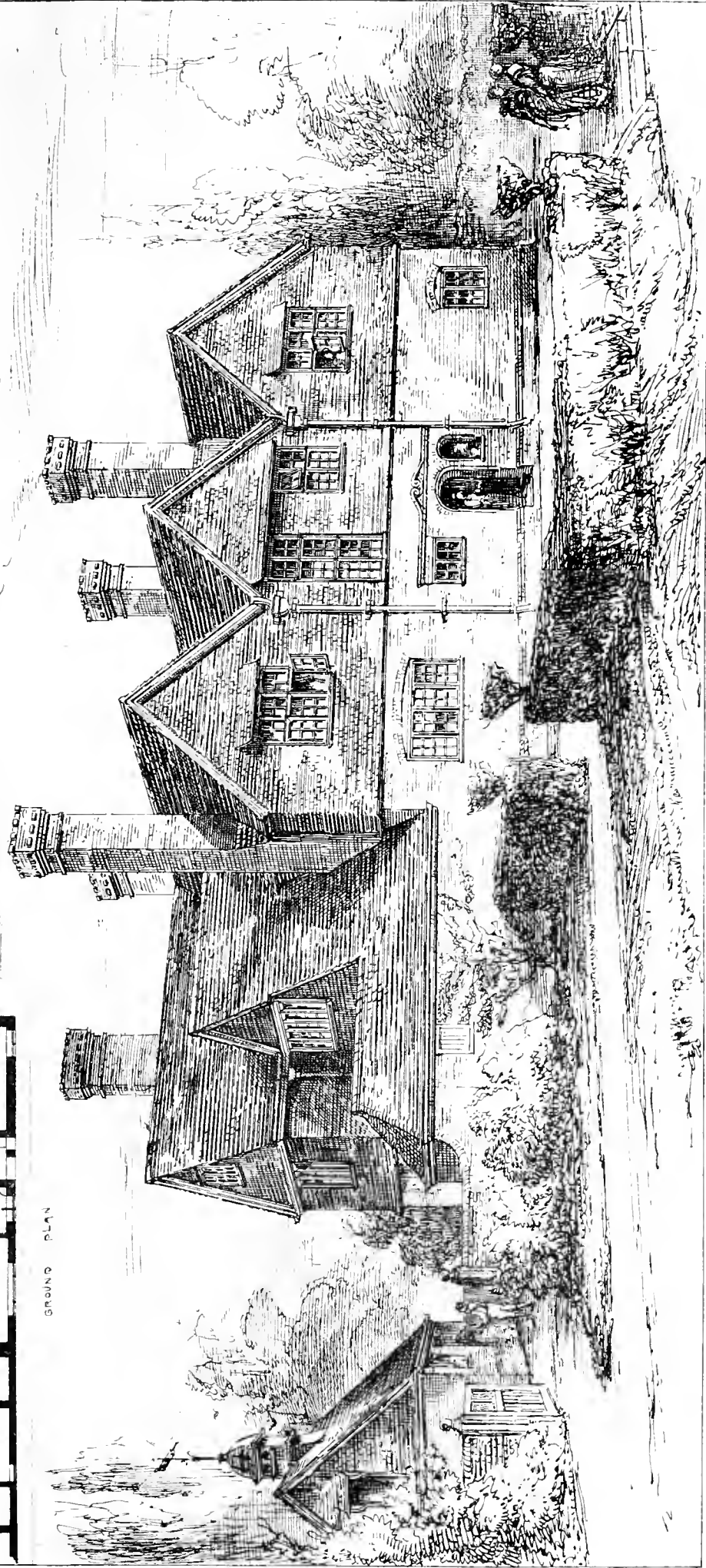


PROPOSED QUADRANGLE MAGDALEN COLLEGE OXFORD Basil Champneys Architect



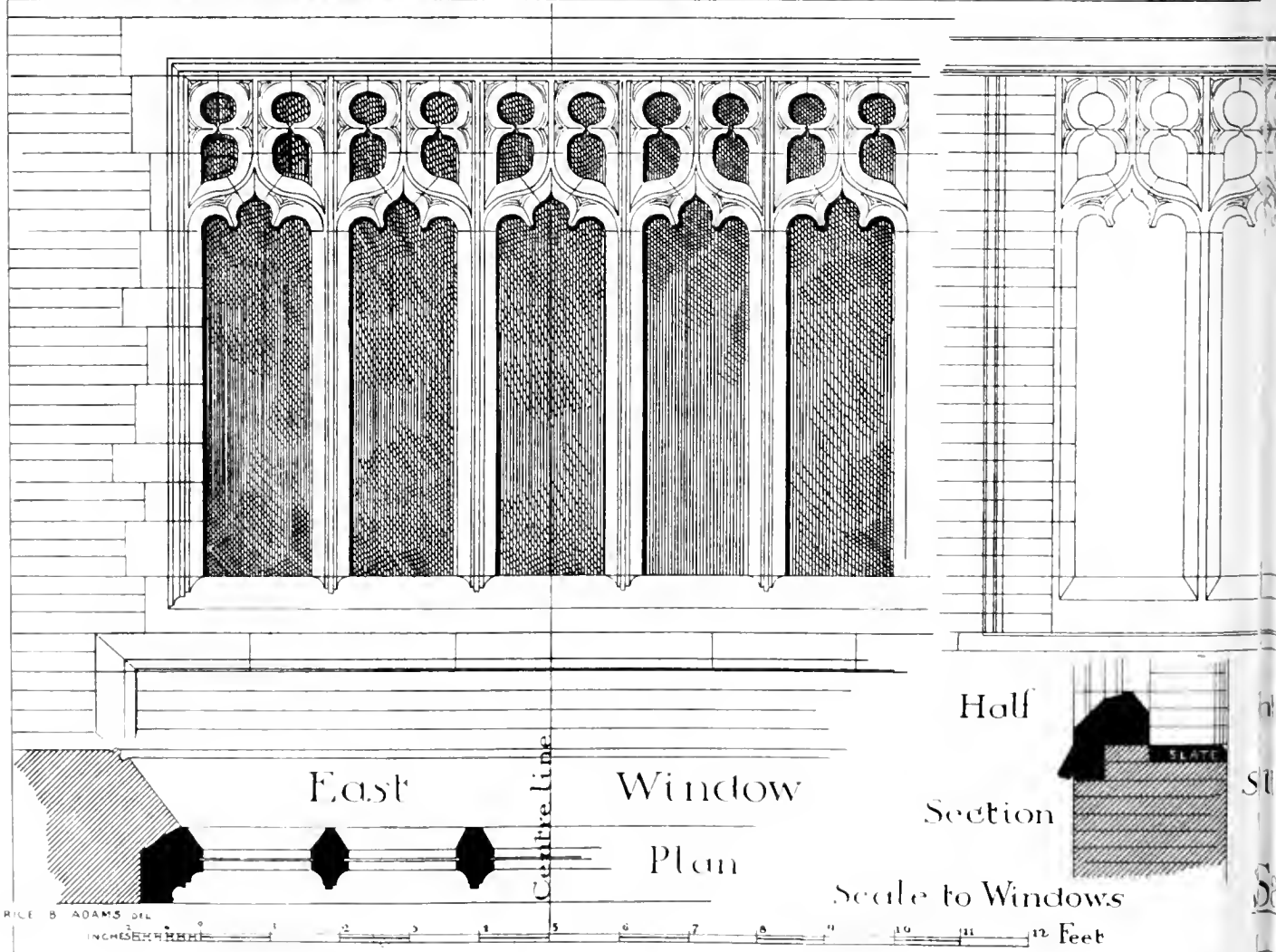
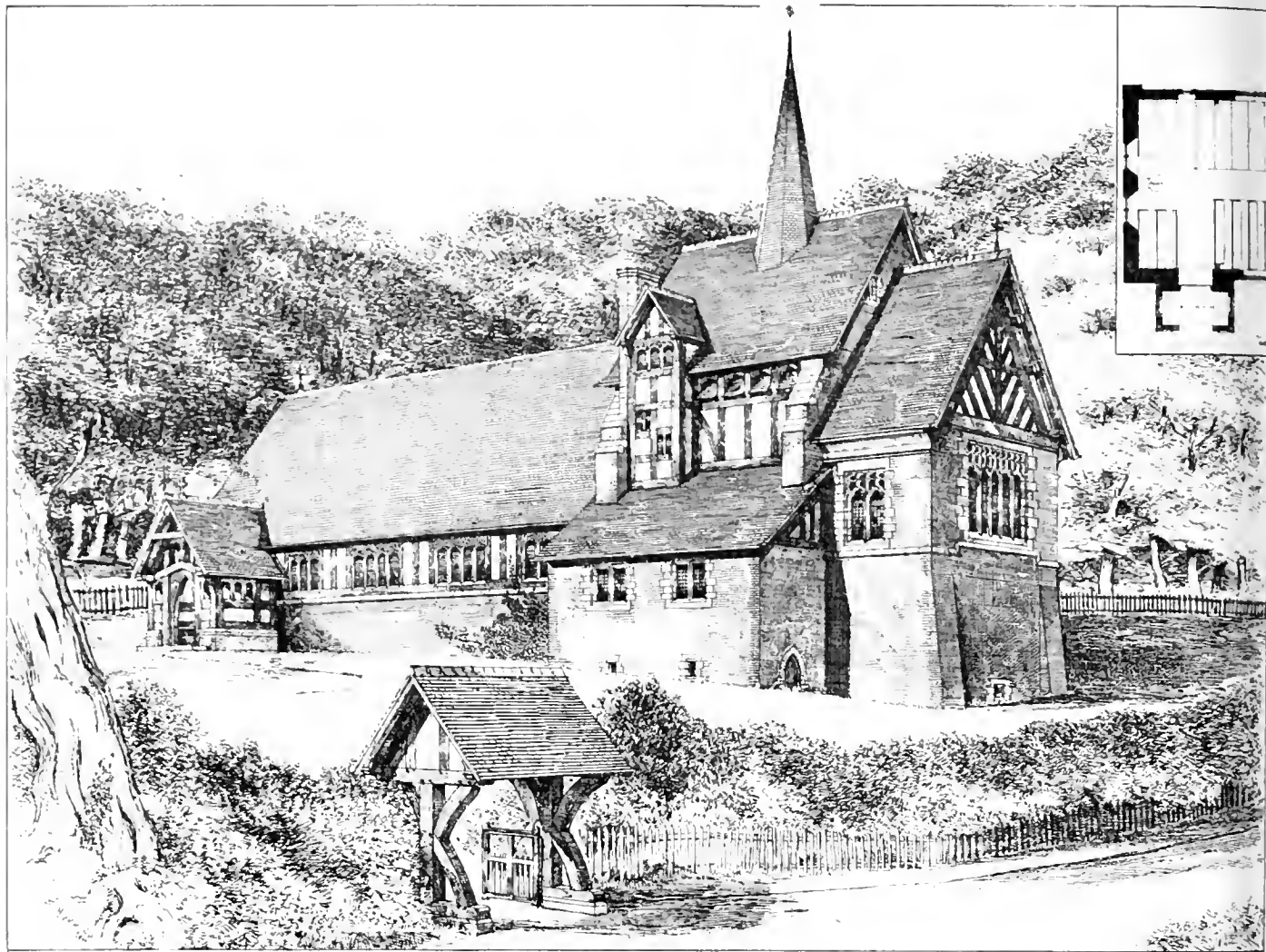


GROUND PLAN

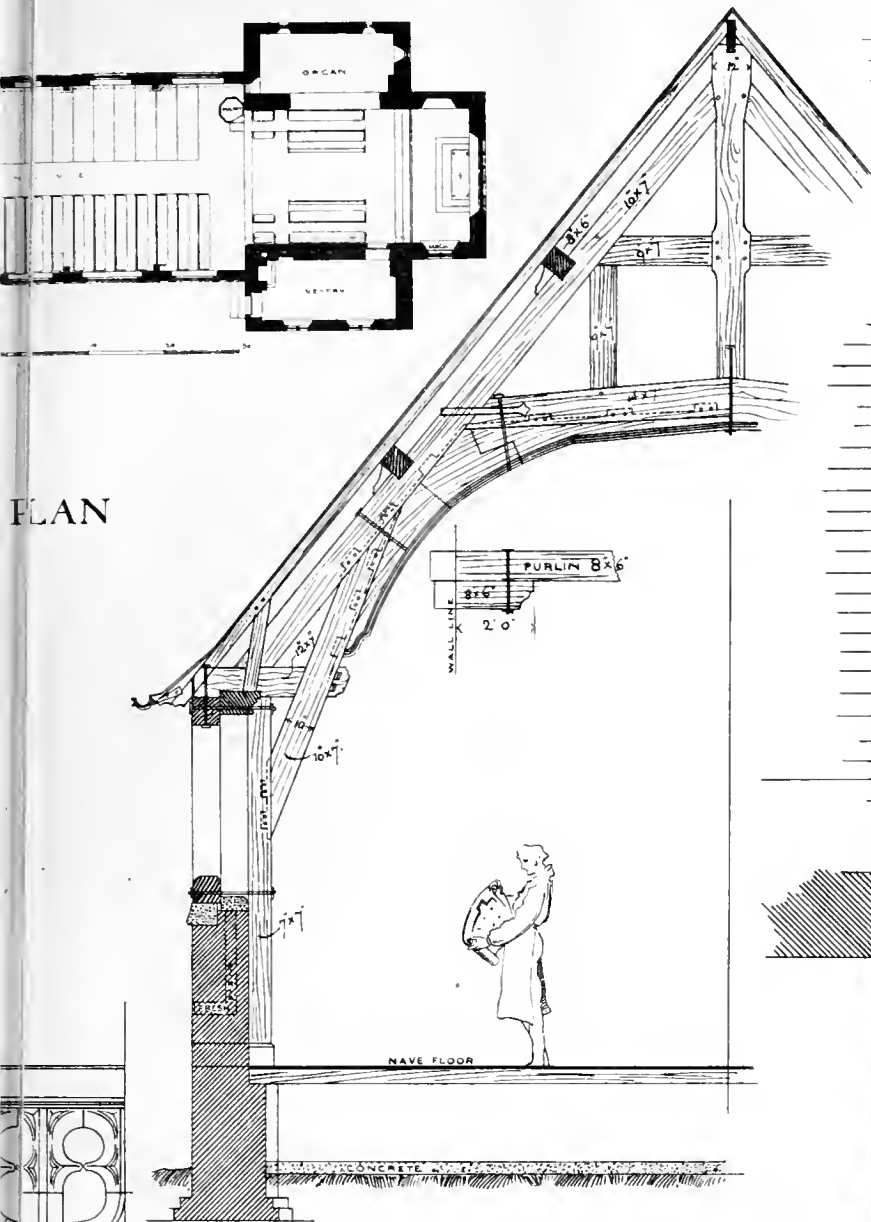


SOUTH HILL, BROMLEY,
for GAINSFORD BRUCE Esq
ERNEST GEORGE & PETO ARCHTS





PLAN

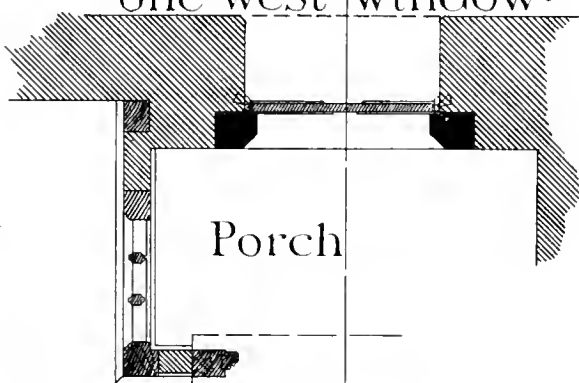


Half elevation of NAVE ROOF

SCALE TO PORCH AND NAVE ROOF



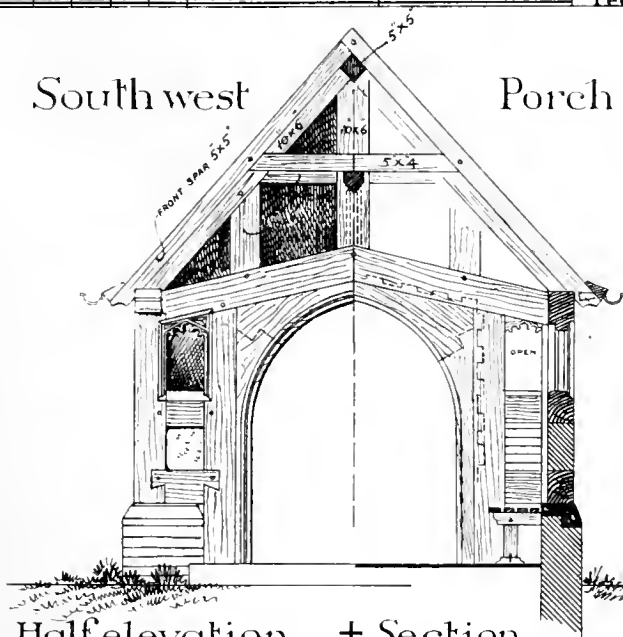
one west window.



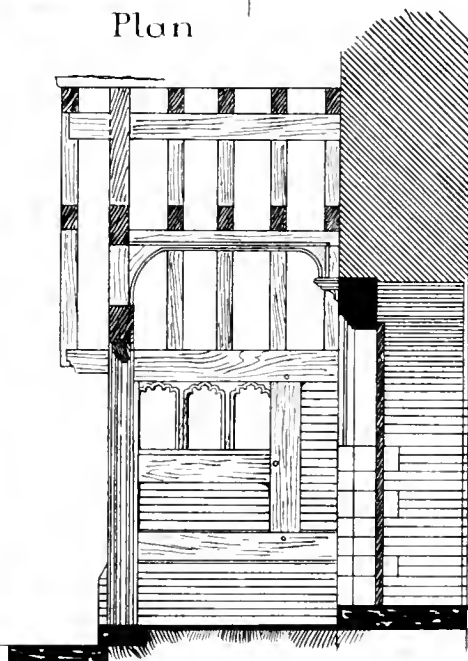
Plan

South west

Porch



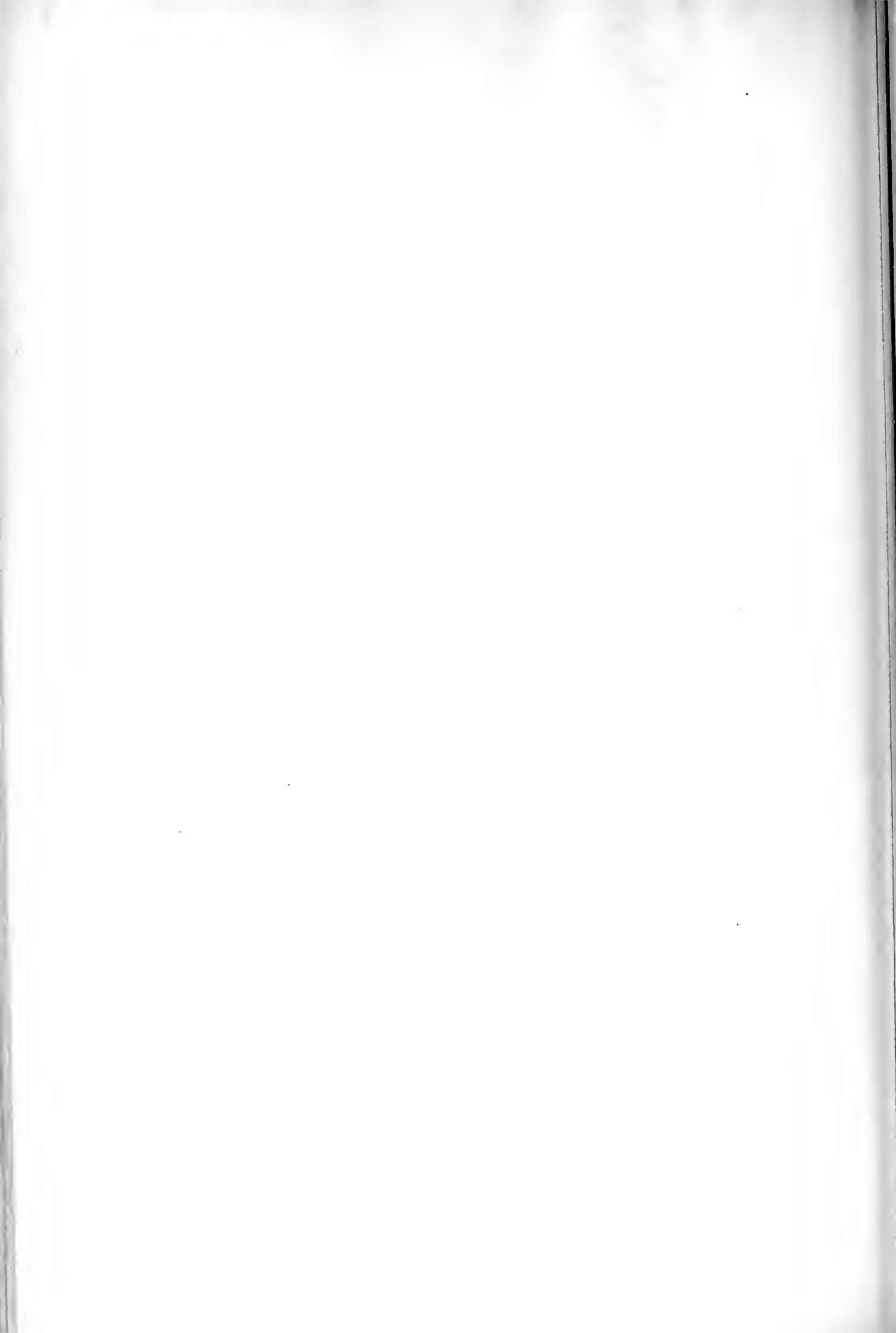
Half elevation + Section

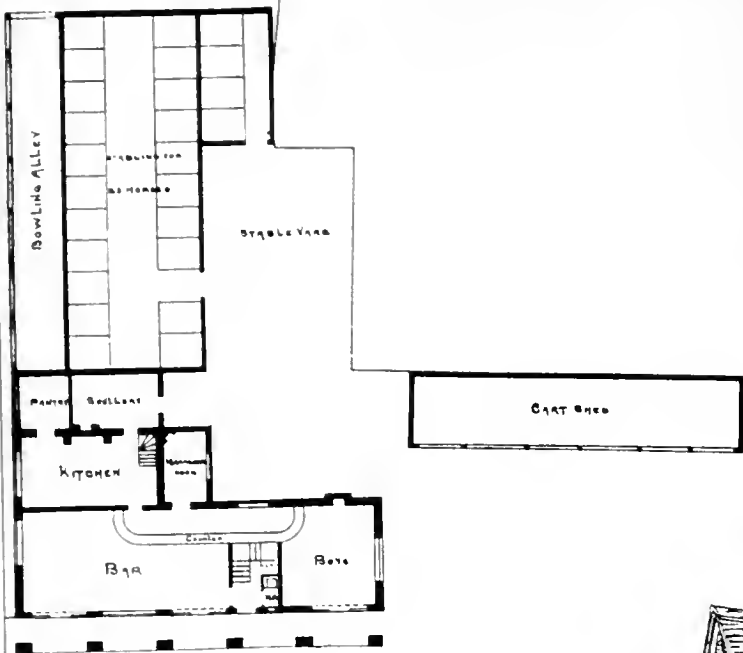


Longitudinal Section

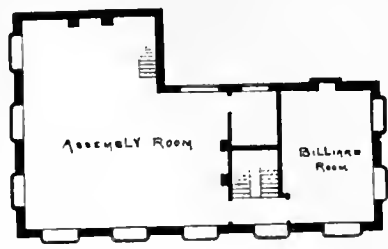
Saint Chad's Church · HOPWAS · STAFFORDSHIRE *

JOHN DOUGLAS. ARCHITECT





GROUND PLAN



FIRST FLOOR PLAN



S. JUL. 1. 1881.

COFFEE TAVERN & HOSTELRY.
..... NEWARK ON TRENT
for THE VISCOUNTESS OSSINGTON.
..... ERNEST GEORGE & PETO, Arch^{ts}



Photo Lithographed & Printed by James Akerman, 6, Queen Square W.C.

OUR COMMONPLACE COLUMN.

ORNAMENT.

MANY definitions of ornament have appeared, more or less correct, into which it would be unnecessary to enter, although a really scientific definition of the term would be a gain. Many people, and artists among them, fall into the idea of thinking ornament to be any addition to an object which merely enriches or embellishes it. Thus, they would call the most unmeaning detail or enrichment applied to an iron girder "ornament" as much as if it was really appropriate. Real ornament ought to add to the meaning and intention of the work to which it is implied, and impart effect and beauty to it, and perhaps Pugin's definition may be taken as a fairly good one. In his "Glossary of Ecclesiastical Ornament" he says: "Ornament, in the true and proper meaning of the word, signifies the embellishment of that which is, in itself, useful in an appropriate manner. Yet, by a perversion of the term, it is frequently applied to mere enrichment which deserves no other name than that of unmeaning detail, dictated by no rule but that of individual fancy and caprice. Every ornament, to deserve the name, must possess an appropriate meaning, and be introduced with an intelligent purpose and on reasonable grounds." So far as it goes, this explanation of the term is perfectly correct, though not quite satisfactory as a philosophical definition. The words "appropriate meaning," for instance, may be differently taken and expressed, so with regard to "intelligent purpose," which might be extended to a great many meanings by different minds. We think Fergusson's division of ornament into *constructive* and *decorative* a very useful one in architecture, as it serves to show that all ornament may, more or less directly, spring out of construction. Thus, a capital, a bracket, a cornice, are contrivances which arise out of the actual construction; and they became ornamental in an eminent degree as they give expression to the construction; but when they appear to fall short of or to exceed this function, they become unnecessary, coarse, and showy. Mouldings, frets, foliage, and such-like features, belong to the second class, though even these may be said to be only further removed from the actual construction. Indeed, it may be generally held that the less apparent the connection such features have to the construction, the less are they real ornament. In fact, we should say that *true* ornament is to be regarded as an organic outgrowth of the work of art inseparably bound up with the construction and functions of utility, and conceivable only by the artist as the perfection of his detail. When we come to analyse ornament, or to consider of what elements it consists, we find a few prevailing characteristics in it which admit of generalisation. We find, for example, in a Greek fret, or guilloche, honeysuckle, or egg-and-tongue ornament, a repetition of given lines, curves, or points, together with a certain variation, forming a pleasant sequence to the eye. It is possible to discover a general law of harmony in such a series in which simple elements are so mixed as to become rhythmical; a certain form is caught up and repeated at intervals, and in general we discover an alternation of harmonies and contrasts. Wornum, in his "Analysis of Ornament," alludes to contrast, repetition, and series as the leading elements. The history of ornament forms a very important indication of the progress of civilisation, and a very full bibliographical list will be found in the "Arch. Dictionary." It is not necessary here to describe the characteristics of the various styles of ornament, which are well-known; we may, however, give the names of a few of the leading works on the subject. On antique and classic ornament the following may be consulted:—Beauvallet and Normand's "Fragments d'Ornement dans le style Antique"; Penrose's "Ornaments of the Parthenon"; Villiamy's "Examples of Ornamental Sculpture"; Jenkin's and Hosking's "Selection of Architectural and other Ornaments, Greek, Roman, and Italian"; Cottingham's "Collection of Architectural Ornaments from Stuart's 'Athens, &c.'"; Gaudon's "Collection of Antique and Modern Ornament"; Redman's "Ornaments from the Antique"; Whitwick's "Selection of Vases, Chairs, &c., from the Vatican." Of Early and Mediæval ornaments the student may consult Colling's "Gothic Ornaments" and "Art Foliage," published in the

BUILDING NEWS; Pugin's "Glossary of Ecclesiastical Ornament," "Gothic Ornaments"; Zach's "Ornements d'Architecture du Moyen Age d'Angleterre et de France"; Waring's "Arts Connected with Architecture from 13th to 15th century in Central Italy"; Cottingham's "Drawings of Gothic Ornament"; Fergusson's "Celtic Ornamental Art"; Shaw's "Handbook of Mediæval"; Owen Jones's "Alhambra" and "Grammar of Ornament"; Le Conte's "Ornements Gothiques Renaissance." Of Renaissance and Italian, Late English and French, see Salandris's "Architectural and Ornamental Specimens of Italian Ornaments"; Adams's "Polychromatic Ornaments of Italy"; Baldus's "Recueil d'Ornements d'après les Maîtres des XV. au XVIII. Siècles"; Shaw's "Details of Elizabethan Architecture"; Wornum's "Catalogue of Ornamental Casts, Renaissance at S. Kensington Museum"; Mr. Audsley's "Japanese Ornament." We may refer also to the illustrations of ornament given in the BUILDING NEWS from time to time: See Davis's "Illustrations of Early Classic, Greek, Assyrian, and Egyptian ornament," in Vol. for 1868, XV., p. 604, and XVI., p. 99, XVIII., p. 228; the same author's illustrations of "Greek and Etruscan," in Vol. XIX., p. 470; also Burges's "Conventional Ornament of 13th Century," Vol. IV.; Davis's "Indian Ornament," Vol. XVIII., p. 480; of Mexican Art, Vol. XXIV., p. 445; papers by Colling, Statham, and Hulme on Principles, and many recent papers and contributions in recent volumes. G. H. G.

OXIDATION.

THIS very destructive process ought to be thoroughly understood by those engaged in building—at least, as it affects building materials. The oxidation of iron is now found to be principally owing to the carbonic acid in the atmosphere, and not the oxygen or aqueous vapour in it. The caustic alkalis are found to prevent the oxidation of iron. A humid atmosphere charged with acids is most destructive to iron, especially wrought iron; but oxidation is often accelerated by contact with other substances containing acid, and by galvanic action assisted by humidity in the air, as in the case of iron in contact with lead. Wrought iron is much more rapidly affected than cast iron. Steel oxidises more quickly than wrought iron, according to M. Mallet, and the degree of durability depends probably on the proportion of carbon. But though cast iron does not rust rapidly in air or salt water, it becomes soft and porous, and converted into a sort of plumbago. Paints are of little use where iron is exposed to damp or rain; Dr. Angus Smith's application of gas-tar or asphalt has been found advantageous for iron exposed to the action of acids; but a zinc coating is better for iron immersed in seawater, although the coating must be entire and perfect. The action of seawater on metals is decided, especially when the iron is exposed to the alternate influence of air and sea, as in the case of iron piles exposed to the rise and fall of the tide. See Craze Calvert's papers in BUILDING NEWS, Vol. XII, 312. Lead paints set up a galvanic action between the paint and iron, and are, therefore, more injurious than oxide of iron paints and bituminous paints. There are certain well-known methods of coating iron with bronze or copper, as in Turner and Allen's process. Barff's treatment by superheated steam, has also been described in the BUILDING NEWS, but seems better adapted for small articles than large structures of iron, as the articles have to be subjected to heat in a chamber raised to a high temperature, say, of 500° Fahr., and then steam be admitted into it and the articles kept immersed for 5 to 7 hours. Iron heated and covered with a coating of asphalt or mineral bitumen has been known to last a number of years, and various coatings of indiarubber, naphtha, varnish, paraffin, &c., have been found of use. Zinc-covered or galvanised pipes have been found to corrode when used as water-pipes. In setting iron in stone Portland cement has been found better than lead; and sulphur has been used in preference to it. We refer the reader to Mr. G. R. Burnell's remarks on this subject, to "Notes on Building Construction," and to Mr. Matheson's "Works in Iron."

OVEN.

THE construction of ovens, although a matter of everyday building, is not very generally understood. For baking purposes ovens

are generally built of brick; the dimensions of an oven are usually about 4ft. by 3ft. inside, either round or square, and from 18in. to 24in. high. It ought to be lined with fire-brick. The flue is towards the front, and serves to carry away the smoke of the wood fuel that is burnt, or the steam from the bread. A specification for a brick oven for a dwelling-house is given in the BUILDING NEWS, Vol. VI., p. 765; see also the Intercommunication Columns of this journal, Vol. XXX., p. 410, and Vol. XXXI., p. 485. A dresser for making bread, a kneading-trough, and a flour-chest, should be placed at a convenient part of the bakery.

UNIVERSITY COLLEGE AWARDS.

THE following are the awards in the architectural section of this college:—

Construction, Second Series. Donaldson Silver Medal. A. W. Glasson of London. Prize. T. R. Clemence, of London. Second Class. G. Havill of London. Third Class. A. Gillespie of Blackheath, H. W. Teed of London, Charles Turner of London. First Series. Prize. H. C. Clarke of London. Certificate 2. F. A. Gerrish of London. Second Class. F. C. Nichols of London, G. C. Nichols of London. Third Class. John Briggs of London, E. Crisp of London, H. W. Parkinson of London. —Fine Arts, Second Series. Donaldson Silver Medal. A. B. Cottam of Watford. Prize. A. W. Glasson of London. Second Class. C. J. Tait of London, K. Tatsuno of Japan. —Modern Practice. Prize. A. Ashbridge of London. Second Class. C. H. Bedells of Crouch End, W. J. Lander of London, C. E. Pertwee of London. A. B. Pite of London. Third Class. J. D. Butler of London, W. Grellier of London, W. A. Pite of London.

The students in the first and second series were this year examined separately. Several of them passed creditably on both occasions, but, following the precedent of other years, the council of the College have only granted to such students a certificate or prize for the more important of the two examinations.

The award of the Donaldson medal was made by Professor Lewis. That of the other prizes was made by other architects familiar with examinations, at the request of Mr. T. Roger Smith.

CHARITABLE AND PAROCHIAL ESTABLISHMENTS.*

BUILDINGS erected for parochial purposes, such as workhouses and infirmaries, have generally been so hampered by restrictions and regulations of an official character, that few architects have cared to publish examples of this class of buildings. Mr. H. Saxon Snell, F.R.I.B.A., has just brought out a selection of executed and unexecuted designs of buildings, meant to solve the question of how best to arrange buildings for the accommodation of the poorer classes, and as this is the first work of the kind devoted exclusively to the subject, it will probably be found of service to architects engaged in the planning of buildings of this class. The designs illustrated are exclusively the author's. They must be taken not as embodying the most perfect principles of construction, but rather as some approach to the solution of the problem. The great difficulty with architects intrusted with public buildings of this kind, as pointed out by Mr. Snell, is the disinclination of committees to contemplate any but immediate wants, the consequence of which is that when old buildings have to be dealt with a piece-meal scheme has to be adopted, instead of one contemplating ultimate remodelling on an approved plan.

In turning over the designs we meet with a variety of plans, from infirm-wards, added to St. Marylebone workhouse when workhouse construction was little understood, to designs for infirmaries based on the more recent principles of the Local Government Board. Of course there is little new or original in the arrangements, as every workhouse infirmary or ward is more or less a copy of another. St. Luke's workhouse for chronic and infirm paupers is arranged with the wards placed in the axis of the main building lengthwise. There are two male infirm wards for 42 beds, and two female infirm wards for 36 beds on the ground-floor plan; these are separated by the administrative block in centre, and by the staircases, lavatories, &c., in each wing. The chief peculiarity in the wards is the projection

* Charitable and Parochial Establishments. By H. SAXON SNELL, F.R.I.B.A., &c. London: B. T. Batsford, High Holborn.

of bay windows on one side; there are four of these to each ward, the beds being arranged transversely in rows. The advantage of this plan is that the wards combine the cheerfulness of day-rooms. There is a connecting corridor between the wards on each floor, and the bath-rooms are carried up as ventilating towers. St. Olave's Union Infirmary, erected in 1879, is another illustration, though it is chiefly an enlargement, and presents little of interest; St. George's Union Infirmary, Fulham-road, opened in 1878, is more perfect in the plan, especially of the sick-wards, which are arranged as pavilions, with recreation grounds between. The narrow spaces between the pavilions, and the planning of the conveniences, are certainly defects in an otherwise good plan. A bird's-eye view, plans, and sections of the Holborn Union Infirmary follow, a work we have already described and illustrated in the BUILDING NEWS, after which the newly-erected building for St. Marylebone Infirmary, Notting-hill (opened by the Prince and Princess of Wales on Wednesday last), is given. The wards are arranged as long blocks or pavilions, each of which has a centre block connecting each pair of wards with a day-room, nurses' rooms, stairs, and lifts. We do not like the architectural treatment of this infirmary so well as the one in the Fulham-road; the pyramidal-shaped roofs, springing from the summits of the end latrine blocks, have a very awkward effect. No less than four plates of plans and sections are given of this work. The other illustrations include a design for an infirmary with circular wards on Professor Marshall's principle, with the corridors thereto radiating from the administrative centre building, and the author quotes largely from the Professor's pamphlet, in which the advantages of this system are pointed out, and endorses the opinions expressed. Alterations and additions, a convalescent home for children at Norbiton, plans for casual wards, and designs for Kensington district schools, for an industrial school, a dispensary and proposed lunatic-wards at Hendon Union, baths and wash-houses are among the other illustrations, which are all photolithographs to a good scale. Perhaps the most useful portion of Mr. Snell's work is that treating on the data of cost and the extracts from Local Government Board Memoranda and other official documents relating to construction, which architects often require in preparing their plans. Details are also given of the combined casement and lifting sash for sick-wards, as adopted in most of these buildings, and also of the author's "Thermohydric fireplace."

PREHISTORIC RUINS IN ARIZONA.

DR. R. T. BURR, M.D. (U.S.A.), while exploring White River Canon, situated in the Chiricahui Mountains, in South-eastern Arizona, about 55 miles south of Camp Bowie, and 25 or 30 miles north of the Mexican line, has discovered the remains of an ancient settlement. The ruins are located in the forks of two branches of White River, or where Henley's Branch joins the main stream from the south. The land is at present a military reservation. They are less than 100 yards from either branch of the stream, on a ridge 40 or 50 feet above the river-bed. The land is rather rocky, but in many places there is excellent alluvial soil along the streams. In the vicinity of the ruins are at least 1,000 acres susceptible of irrigation. The canon has now a growth of pine, oak, juniper, some walnut, and a few sycamores. The surrounding mountains are well covered with pine and oak. It is impossible to tell what changes have taken place since these ruins were occupied. They must have been considerable, as the water supply in the dry season is now limited, the river ceasing to run, and only holding water in a few places.

Rucker's Spring is a large basin of water that contains as much at one season as at another. The water is strongly impregnated with sulphur.

The remains occur in groups, some consisting of from two, four to five squares or circles, showing that at the time they were built defence was not a primary object. Isolated in the heart of the mountains, this community would be first exposed to the hostiles, and probably fall a prey to the Apache invasion from the north.

The other two isolated groups are small, the nearest having three or four squares and no

circles; the second, on the east of Rucker's Branch, having five or six squares from 10ft. to 20ft. by 20ft. or 30ft. The ruins described seem to be the most important ones. Dr. Burr took a sketch of the ground-plan of the ruins. He traced out the walls of the main building as well as he could, the only guide he had being the upright stones placed singly from 6in. to 12in. apart. No remains of a wall exist save these stones that are placed on end and partly buried in the ground. Walls or lines are, with one exception, due north and south, and east and west. Dr. Burr tested this by means of a compass, and, making allowance for variations of the needle, they are certainly wonderfully correct. The walls, if they were walls, must have been made of adobe, and the heavy rainfalls of the canon, about 30 inches this year, would have destroyed all traces, as this building was erected on the incline of the ridge, while the circles are on the level ground. The large circles, all about 30 feet in diameter, have the walls much better preserved than the squares. The mounds are from 12 inches to 2 feet higher than the surrounding land, and, in some cases, spread out some 4 to 10 feet. The walls seem to have been made of adobe and stones.

Near the centre of most of the mounds is quite a depression, caused by the washing down of the walls. There are no evidences of special construction in the centre. The materials could be obtained in abundance in the immediate vicinity. On the ground Dr. Burr found an abundance of pottery in small pieces, some of it glassy, one piece ornamented in colours, many bits carved or marked.

These mountains have long been the stronghold of the Apaches. The Indian scouts have a tradition that this canon has evil men living in it. There are no recent signs of occupation by Apaches.

Dr. Burr seems to think that the quadrangles and the circles were to be attributed to different peoples and different dates. The circles, seemingly more recent, may have been built by the Apaches in ages past, or by people less advanced in civilisation than the first inhabitants. The small circles, about 3 feet in diameter, were ovens. They have a floor of flat stones well fitted, around which a wall is built up 8in. to 12in. There is no indication of a covering. Dr. Burr found here a stone mortar weighing about 100lb. The cavity is 4in. in diameter, and as many deep, perfectly round. It is conveniently located near the four ovens. On the hillside he also found another mortar that had been turned over, and two broken metates.

Near the mouth of the canon, and distant from camp about 6 miles, are some ruins not examined with care. They consist principally of quadrangles of small size, 15ft. by 20ft., and but few together. One group was at some distance from permanent water. There is a small ravine close by that now affords water in the wet season. This last group was on a high hill, and no agricultural ground was near, the ravine having precipitous banks. Other ruins are scattered along the banks of White River after it reaches the open plain outside the canon; but where they are placed no water is to be found in the dry season, it being at least two to five miles to the nearest permanent supply.

THE MECHANICAL ENGINEER'S OFFICE BOOK.*

MR. NELSON FOLEY, of Cardiff, late assistant-manager, Palmer's engine works, Jarrow, is the author of a very convenient form of office-book for mechanical engineers, the principal feature of which is the employment of diagrams for facilitating calculations. The application of diagrams for this purpose has become recognised of late years, and the use made of graphical modes of computation promises before long to revolutionise most of our textbooks. To the practical man, the diagrammatic form of table has decided advantages: he is enabled to obtain the result at once without the trouble of working out a difficult formula, and he can vary his known quantities without having to repeat a troublesome calculation every time. There is less risk of error also in using a diagram. Mr.

* The Mechanical Engineer's Office Book: Boiler Construction. By NELSON FOLEY, late Assistant manager Palmer's Engine Works, Jarrow. London: Crosby Lockwood and Co.

Foley has extended the usefulness of co-ordinate curves, and claims to be the first to design combined curves and to apply other devices to enable four or more quantities to be used. By the diagrams given, the designer of a boiler can easily see what thickness of plate will give the required percentage of strength at joint. The use of the diagrams is simple and self-evident. Diagram I., for instance, gives the Board of Trade rules for cylindrical boiler-shells, the strength of iron being taken at 47,000lb. per square inch. A series of rectangular lines, with curves diagonally drawn upon them, is the principal part of the diagram. The curves are figured at each end with the thickness of the plates, from 5-16ths of an inch to 1 1/4in. At the side are a series of scales for diameters for different factors of safety; and below is another series of scales for different percentages of strength at joint. When it is required to read the diagram, one edge of a set-square (for convenience) is placed at the proper diameter line on the left hand side, and the square moved till the right-angle corner touches the curve of proposed thickness of plate, then the vertical edge of square will pass through the scale with the pressure below at the required percentage at joint. Each diagram, of which there are 28 in the book, has a note explaining its use at the corner. These several diagrams relate to the Board of Trade rules for boilers of iron and steel, flat plates of iron and steel with different constants; girders, furnaces of iron and steel; after which follow Lloyd's rules for boiler-shells, flat plates, and furnaces, tables for riveting—giving the diameter, pitch, and length of rivets, and the consumption of fuel. Most of these tables are constructed of rectangular lines or ordinates and diagonal lines, and are very intelligible to the engineer. We may add that these diagrams are numbered, and the ledger-form of margin reference enables the consulter to refer to the table at one opening of the book; and the same system has been adopted in indexing the other matter. The letter-press gives a variety of practical information of everyday value to the engineer. The Board of Trade rules for boiler-shells are given, showing the factors of safety and the additions to be made under certain circumstances which are specified. But for cylindrical boilers made of the best material, with all rivet-holes drilled in place and all the seams fitted with double-butt straps and double riveted, and when the boilers have been open to inspection during their construction, 5 is the factor of safety. The boilers must be tested by hydraulic pressure to twice the working pressure and to the Board's surveyor's satisfaction. The memoranda on riveting are useful, and comprise every detail of boiler-construction, butt-straps, manholes, flat plates, stays, dished ends, girders for flat surfaces, circular furnaces and flues. Lloyd's rules for determining working pressure in new boilers are printed, and the chapter on riveting may be profitably consulted, and is full of useful formulae, tables, and examples. Speaking on this subject, the author says, "The diameter of a rivet must always be found before determining pitch, by assuming desirable percentages of strength at joint both for plate and rivets. The diameter being found, the pitch is arrived at by making use of the same percentage of plate section as was assumed." The tables of areas of small circles, of circumferences, areas, squares, and cubes, and weights of plate-iron, bars, boiler-tubes, &c., are very complete, and the book will be found to be an indispensable guide in the office or the factory of the mechanical engineer.

A CHIMNEYLESS LAMP.

THE use of paraffin lamps in country churches and other public buildings would have been more common by this time if chimneys and glasses could have been dispensed with as with gas. The *English Mechanic* describes a new lamp constructed on a totally different principle to that of any we have ever seen. The "Empress" lamp, as will be seen from the annexed illustration, is one of those which dispenses with a chimney, and yet, unlike others, it gives a white smokeless flame which is not affected by draughts. In the ordinary paraffin or kerosine lamp, the object of the chimney is to create a current of air, which aids combustion and produces the flame that gives the light with which we are familiar. The inventor of the "Empress" lamp, a Mr. Heyne,

of the United States, has taken a new departure, for instead of trying to create an artificial draught of air by chimneys or by plates deflecting the current on the flame, he fits the pedestal of his lamps with a clockwork movement driving a small fan at a high velocity. This fan draws in a current of air through the holes seen at the base of the pedestal and drives it out through the cone, thus supplying the place of a chimney in a more effective manner. The invention does more than that, for it robs paraffin lamps of the objection which has in certain quarters been strongly urged against them, by preventing all smell. The basin-shaped portion of the lamp seen in the illustration, is the top of the pedestal, and the reservoir of oil fits into it, being supported by the flanged rim. An air space is thus left all round the reservoir, through which a current of air is being constantly driven by the fan. The result



is that the oil in the reservoir is kept perfectly cool, and even the cone itself may be clasped while the flame is burning. Turned high or low, then, such a lamp evaporates no more oil than it consumes, and there is consequently a complete absence of smell, while the motion of the clockwork is heard only when specially listened for. Explosion with such a lamp is practically impossible. The flame of a 3in. wick is flat, almost perfectly white, and expands to a steady spread of about 3in., without any sign of flickering or waving even in the draughts of a room with open doors—in fact it cannot be easily blown out when turned fully up. The clockwork runs about 13 hours when fully wound, and in the lamp inspected by us the oil reservoir contains sufficient to last 8 hours. We have not tested the economy of the lamp; but inasmuch as there is no waste by evaporation and escape of unburnt gases, the consumption must be very low—the minimum, in fact, for a wick of the dimensions used. The clockwork is made to gauge, so that in the event of any part giving out or being damaged by accident, a duplicate can be at once supplied. To screen the eyes an opal reflector is used, supported slightly above the flame by means of a simple skeleton gallery. The lamp is especially recommended for those who read or work by night, for microscopists (it has been exhibited at the Royal Microscopical Society and the Royal Institution), and particularly for artists and others, who want an artificial light enabling them to distinguish colours in their true tints.

The town council of Yarmouth considered on Wednesday week alternative schemes for the drainage of the low-lying and thickly-populated district of Cobholm Island. The one was prepared by Mr. J. H. Bly, a member of the town council, who proposed to deal with the sewage by gravitation; the other was that of the assistant-surveyor, and proposed pumping, as the street-level was but 3ft. 4in. above low-water mark. After a long discussion, the latter plan was adopted: the estimated cost is £2,000.

A meeting of the subscribers to the Caxton Memorial Fund was held at St. Margaret's Vestry, Westminster, last week, when it was reported that £400 had been subscribed, more than enough to place a stained-glass window at the west end of one of the aisles of St. Margaret's church, but not enough by £200 to fill up one of the principal windows. It was decided to make a fresh effort to raise the balance.

Building Intelligence.

BRADFORD.—On Tuesday new scarlatina wards of the Bradford Fever Hospital were opened. The new section of the building has been in course of erection since September last. It is a double-storied building, and is substantially built throughout, the stone-dressing of the outer walls being of Idle stone, whilst the whole of the walls are lined with brick. The roof is of slate, and the entire building is well-lighted by six double windows in the front, with a large circular light at the top for lighting the staircase and corridors, in addition to which there are a number of side-lights. The entrance is in the centre of the front of the building, and the appearance inside is highly satisfactory. There are four wards on the ground-floor, two on each side of the entrance, and there are also four on the upper-floor. Each of these wards is 18ft. wide and 19ft. 6in. long, the height being 14ft., so that they will be very comfortable and airy. The ventilation is very perfect, Sherrington's patent ventilators having been used to secure an abundance of fresh air. The following have been the contractors for the various works:—S. Jackson, mason; Messrs. Toothill and Bamford, joiners and carpenters; Mr. Nelson, plumber; Mr. B. Dixon, plasterer; Mr. A. Nelson, slater; and Mr. D. Lynn, painter. Mr. Margerison has been clerk of the works. The cost of the new building is about £2,000, but in addition to this there is the expenditure necessitated by the furnishing of the wards.

GAINSBOROUGH.—On the 20th ult., the first stone of the new church of St. John the Divine, Gainsborough was laid. When completed, the church will consist of a nave six bays in length, with north and south aisles, a chancel of two bays, with north and south aisles and sanctuary; preparation is also made for a western tower. The vestries will stand at the east end of the north aisle of the chancel. The total length of the nave is 113ft., divided into six bays, with a width of 36ft. in the clear. The nave arcade is surmounted by a clerestory of two-light windows in each bay, the total height to the wall-plate being 51ft. The aisles of 33ft. in height, and 17ft. 6in. in width, are covered with a flat roof of 15th-century type: the nave with a pitched roof, boarded and panelled, with moulded ribs. The chancel and nave are of the same internal section, not separated by a chancel arch. The roof-truss, taking the place of the chancel arch, is more richly decorated than the trusses of the nave roof. The clerestory is continuous throughout the length of the church, of two-light windows, with tracery in the heads. The sill of east window is raised 27ft. above the floor-line, and has seven lights with flowing tracery in the heads. The total internal length of the church will be, without the tower, 169ft.:—viz., 113ft. in the nave and 56ft. in the chancel; the height, to the ridge of roof, internally, about 70ft. The columns, arcades, and all other stone-work are of Ancaster stone. A passage is arranged at the level of the clerestory string, 33ft. 9in. from the floor, to give access to the windows, this is also carried across the sill of the east windows. Externally the church is built of red brick with Ancaster dressings. The intermediate surfaces in the interior are plastered. The work now commenced consists of three bays of the nave, and the whole length of the chancel up to the clerestory string, the arcades being filled in with temporary walls. The builder is Mr. Johnson, of Doncaster. The architects are Mr. Somers Clarke, jun., and Mr. J. T. Micklethwaite, of 6, Delahay-street, S.W.

LEADENHALL MARKET.—On Tuesday was laid the corner-stone of the New Leadenhall Market. The new market and gangways will cover an area of about 26,900 square feet, and form the shape of a cross, the passage or gangway being 30ft. wide. The four entrances are:—West, from Gracechurch-street; north, from New-street to Leadenhall market; east, from Lime-street-passage; and south, from the side of the old gangway of Leadenhall Market through Beehive-passage. There will be 29 shops on the principal thoroughfares, the general principle of construction being somewhat allied to that of the poultry market. The basements are constructed for the storage of provisions. The cost has been estimated at £50,000. The principal entrance is in Gracechurch-street, and

will, with the other entrances, be kept always open and free from any gates whatever.

NEW BRIGHTON.—The foundation-stone of a New Roman Catholic Church, at New Brighton, was laid in September last. To Mr. Edmund Kirby was confided the work of designing the building. The church, in which accommodation is provided for from 350 to 400 persons, is arranged with a nave and gallery, whilst at the east end are the chancel, a transept, and a sacristy. Early English is the order of architecture which has been followed in the execution of the design. Mr. William Owen, of Liverpool, is the contractor. The church was opened on Wednesday.

PECKHAM.—The foundation-stone of the new Unitarian Chapel, Avondale-road, Peckham, S.E., was laid by Sir James C. Lawrence, Bart., M.P., on Tuesday, the 23rd ult. The style adopted by the architect, Mr. Henry G. Brace, A.R.I.B.A., of Chancery-lane, is Early English, and will be of red brick and stone dressings externally. The chapel will hold 250 persons on the floor-level, and 50 in the gallery. Internally the facing will be of Luton brick with red bands and open-timber roof. After the ceremony above stated, the school-room just completed, in connection with the chapel, was formally opened. The room is 33ft. by 50ft., with stock brick facio and red bands internally, the roof being partly open. The builders of the chapel are Messrs. Hoare and Son; and of the school Messrs. Watson and Dennett.

TOLLINGTON PARK, N.—The inauguration ceremony upon entering the new buildings for the collegiate school recently erected, at the cost of Mr. R. Wells, for the principal, Mr. W. Brown, B.A., F.R.G.S., took place last Tuesday evening, under the presidency of Mr. T. L. Roberts, barrister. The new schoolroom (which is on the first floor) has been built upon the site of stables and coachhouses, which were connected with the houses on either side, and is 62ft. long by 29ft. wide, and 23ft. from floor to apex of roof, with communications on each side to adjoining houses, the one at entrance being the residence of the principal, the other house being devoted to the use of the masters and boarders, and the ground floor is arranged as class-rooms, connecting with the schoolroom. The roof is of composite construction, having wrought-iron trusses, with fir wrought purlins and ridge, covered with wrought V-jointed boarding, roofing-felt, and is slated. The lower portion of walls are protected with wrought and beaded dado, 5ft. high, with moulded capping. The room is lighted by twelve windows, which have double-hung sashes, those at north end having additional sashes hinged, and with quadrant stays. The floor, which is also composite, is carried by rolled iron girders resting on piers built in cement, with buttresses on outside of wall, and by cast-iron columns in centre of each girder. At the west end of room a platform is constructed to receive the organ; also for the use of pupils during examinations. The ironwork was supplied by Messrs. Measures Brothers. Every consideration has been given to ventilation, which is by inlets from below the floor, and opening into the room at dado-level; also to the artificial lighting, for which two sunlights are provided, and as a medium for extracting vitiated air. The space immediately under the schoolroom is devoted, as a cloister, for the use of pupils during hot weather. At the north end, and communicating with the schoolroom, is the cloak-room, forming also the pupils' entrance, and adjoining which are the w.c.'s, planned so as to be easily accessible and under cover. The sanitary system is so arranged that no sewer-gas can enter the premises, and is well ventilated with vertical tubes, all surface-water emptying into interceptors. The playground is laid with tar-paving. The walls of schoolroom are faced externally with picked stocks. The front elevation, which is of a Queen Anne character, is built of stocks, relieved with red brick dressings, with terra-cotta balustrade and capping. The entrance and light to cloisters is provided with wrought-iron gate and grill. The works have been carried out by Mr. Harold, from the designs and under the superintendence of Mr. F. H. Stringer, the time occupied being about eleven weeks.

WICKERSLEY.—On Tuesday the church of St. Alban, Wickersley, after undergoing renovation, was reopened. There was a church in the

parish at a very early period, doubtless of Saxon origin. The present church is a stone Gothic building, consisting of chancel, nave, embattled tower, and three bells. The old pews have been removed and replaced with open benches of pitch-pine. The unsightly gallery at the west-end has been taken away, and the tower-arch has been opened out. New pulpit, lectern, choir stalls, and Communion-rails have been provided. The organ has been repaired, and the case and pipes have been redecorated. The wood from the old seats has been utilised as a dado round the walls. The works have been carried out by Mr. E. I. Hubbard, architect, Moorgate, Rotherham; and Mr. Wm. Earnshaw, of Treeton, was contractor.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

BIRMINGHAM AND MIDLAND INSTITUTE.—On Saturday about fifty members of the Archaeological section of the Birmingham and Midland Institute left Snow Hill by train for Stourbridge, and began the programme with luncheon at "The Talbot," an interesting old inn, retaining a part of its galleried courtyard, some rooms with oak-panelled walls and carved chimney-pieces, and a good staircase, all probably of the early part of the last century. The party then visited Kinver Church, the appearance of which as approached from the south-east is pleasing, the long south aisle, with its steep tiled roof and row of traceried windows, having a striking effect. The continuous ridges of the roofs are happily broken by the picturesque tower, and the stone being of a soft reddish brown, it stands out with fine effect from a background of rich foliage. It is as yet unrestored; there is, nevertheless, on the north side a modern aisle, to make room for which the wall of the Norman nave was pulled down, leaving only the two western flat buttresses and a bit of string-course to mark the previous existence of a church of the twelfth century. The south aisle and arcade and the tower are of the 11th, and the chancel, with north and south chapels, of the 15th centuries. The north or Foley chapel is of Tudor character; in it lies a mutilated effigy of a knight, one of the Hamptons; in the south chapel is a fine tomb of Purbeck marble, on which are embedded somewhat rudely-engraved "brasses" of Sir Edward Grey, son and heir of Humphrey Grey, 1528, and his two wives, the second wife with small groups of effigies of her seven sons and ten daughters, and a marginal inscription. Among the curiosities of the church are three old volumes, and the oak desk to which they were once chained, and a framed charter, with seal of King Charles II. The windows contain many interesting fragments of stained glass, and some valuable detached pieces of heraldic glass of Early 15th-century date have been saved from destruction by the vicar. The font and pulpit are both good examples of their periods, the first of the 15th and the latter of the 17th centuries. The Rev. J. Hodgson, the vicar, having recounted the history of the fabric, its endowments, and its many historical associations, the party walked to the camp on Kinver Edge. Whatever was its origin, the camp was occupied by the Saxon King of the Mercians, Wulfhere, son of the terrible pagan King Penda; and here he held a position in his rebellion against Oswy. The banks are still in good condition, and it is believed that the camp was kept up and occasionally occupied during the middle ages, until as late as the time of Henry IV.

Shropps Park, on the north side of Halifax, was opened by the corporation on Thursday. It is 25 acres in extent, and is planted with about 60,000 trees and shrubs; amongst the alterations are a drive, surrounding the grounds, a drinking-fountain, a summer-house, and a cascade of water carried over a cliff into pools below. The cost has been £11,000, of which £2,000 was borne by Col. Ackroyd, and the remainder by the corporation; the site has been leased for 999 years, at a nominal rent, of Mr. H. Saville, of Rufford Abbey.

The board of Breamford, at their last meeting, decided to retain the services of Mr. Figg, the late surveyor, as consulting engineer for three months, and voted him the sum of £50 as remuneration for that period.

"To a practical man with a taste for mechanics, and the bumps of constructiveness fairly well developed, we can give no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse trap, to the latest method of calculating the phases of Orion"—*The Englishman*. Price Two-pence of all newsmen, or post free 2½d.—31, Tavistock street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.
Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 5s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and SIXPENCE for every eighth word after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33s. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Mr. CHARLES WILSON, of 13 and 15, Laight-street, New York City, is authorised to receive American subscriptions at the rate of 6 dols. 40c. per annum.

Mr. R. M. TUTTLE, of Titusville, Penn., U.S.A., is also authorised to receive subscriptions at the same rate.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

With this number commences Vol. XLII. The title and index to Vol. XL, completed in the last issue, will be published next week, July 8, and bound volumes and cases will be ready shortly after.

N.B.—Bound volumes of Vol. XL should be ordered at once (price Twelve Shillings), as only a limited number are done up. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete Vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—M. and B.—P. and S.—T. E.—J. H.—S. Bros.—H. B. and T. Co.—J. T.—R. S. and Co., Ltd.—W. S. and S.—J. C. and Co.—H. C. C.—T. P. F.—F. R. K.—Rev. E. A. W.—C. R. F. L.—N. C.—J. W.—J. H.—G. B. and L.—J. S.

YOUNG ARCHITECT. (House agents are generally appraisers also, and have to take out licences; but any architect can advertise houses to let without a licence. It is not necessary that an architect should have a valuer's licence; many make valuations without, but valuations required for arbitration purposes can only legally be made by licensed valuers. If an architect intends to make valuation a feature of his business, we should certainly recommend him to take out a licence.)

Correspondence.

COMPETITIONS.

To the Editor of the BUILDING NEWS.

SIR,—Taking in your paper every week, and which I have done for now nearly three years, I have certainly been amused at the frequent outbursts of indignation against competition.

I myself have been, and still hope to be, a competitor; but, standing entirely on neutral grounds, I am fully persuaded that no good will accrue as long as your correspondents entertain the spirit which, it seems to me, runs through the mass of letters on this subject, a spirit of "the dog in the manger"—they do not want to compete themselves, and yet they object to others doing so.

The fact is, Sir, the profession is doing itself an injury by these jealous epistles. Take four cases only, and in the half-year: on Feb. 4th, architects are requested to decline competing on any terms whatever; on March 11th, "Yankee Doodle" writes a sarcastic letter, headed "A

Practical Young Architect"; on May 27th a request is made to close the advertisement columns of the BUILDING NEWS against competitions; and on June 24th (last Saturday) a letter appears, re Wincheombe School, in which it appears a county surveyor figures amongst the competitors, "and, indeed, he appears to be the successful competitor."

Now, Sir, underlying all these letters is a nasty feeling, which it must be plain to anyone brings the profession into derision. If a county surveyor or a young amateur both by their own intelligence succeed in winning a competition, all honour to them; surely England is big enough to contain all its architects, barring, however, one section—viz., the jealous-disposed, whom I should advise to settle in the islands of the Pacific, one in each, and where they can design and build without fear.

But about the competitions themselves. I know a reform is needed; but surely, Sir, the men who have got the sense, or rather non-sense, to write you correspondence complaining of this and that, surely have the sense to be able to understand the conditions of a competition, which if not satisfactory to them it is their fault if they enter it and if they are hurt, follow the example of a little child when it says "I'll tell ma." Competitions in my opinion are admirable things when conducted properly—they bring out the powers of men who otherwise could not show them, and they give everyone a fair chance of success. But in reference to those that are not conducted properly, the best and certainly most exalted method is to pass them by, and not—which is the main point of my letter—squabble over them in a paper. Pass over them, and let those compete who will; but in very love of this noble profession I appeal to all its members to stay this paper warfare, which is doing a silent but sure mischief.—I am, &c.,

A BELIEVER IN HONEST COMPETITION.

BUILDING-STONES.

SIR,—The only thing I can see in the recent correspondence on this subject is a lavish eulogium on the quality of Beer stone as a building material; a Bath and a Caen-stone merchant claim their stones to be equal, or superior, to Beer.

One might let the matter rest here, were it not that Mr. Masey, in his zeal, states that "Beer stone is better than many (*i.e.*, building-stones), and equal to any, for external purposes."

I think he has left out the little words, "at the price." Surely he does not intend to say that Beer stone, which is only one remove from chalk, is equal in durability to Aucaaster, Bramley Fall, Portland, Craigleith, Cullif, Corsehill, Grinshill, Hollington, Horsley Castle, Howley Park, Finsdale, Hayshaw Moor, Shepley, Seotgate, Seotgate Head, Spinkwell, Wild Carr, and a host of other well-known weather-stones, all of which are not used so largely as they ought to be for external purposes in consequence of cost.

A graphic history of any of them would be interesting, or a pilgrimage to the quarries, and the abbeys and mansions near thereto, would be a delightful trip.

Internal Work.—For internal work there is no stone equal for warmth and richness of colour to the Aucaaster and Caen stones. Forty years ago I lined two large buildings internally with Aucaaster, both of which are as good to-day as when first put up. Aucaaster stands equally well externally—evidence the Lincolnshire churches. Not so Caen. This is only good for internal work. Mr. Masey tells us Buckingham Palace was built of Bath stone. I think he will find it was built of Caen stone.

Bath.—There are many buildings in London built of carefully-selected Bath stone, which stand exceedingly well. The Grosvenor Hotel, Victoria Station, is one. This is built out of selected Corsham. Nevertheless, I could point to numbers of failures where Bath stone had been used in London, especially during the last three winters; but deprecating one stone does not make another the better.

Colour.—Colour is a large element in the choice of stone for façades of buildings; hence the present use of coloured stones and red brick.

I venture to think that few gentlemen, after examining the colour of Beer stone in work, will become enamoured thereof. An instance in London may be seen at the corner of Brook-

street, Holborn, in a recently-erected building, the dressings of which are out of Beer stone: the appearance of the stone now is like that of dirty chalk.

Some of my friends and myself tried Beer stone some years ago; but the colour in work we found an objection, although the cost of labour is in favour of Beer stone.

"A Mason" has a practical way of looking at the matter when he states that a glowing description might be made of a visit to many other quarries.

Many of us remember Harry Hems' graphic description of a visit to the Beer stone-quarries published in your journal some months ago, of which it may be said that Mr. Masey's looks like a second edition, save that those of us who know Harry Hems, know also that he will not affirm Beer stone to be a thorough weather stone, or in this respect to be "equal to any."

At the same time it is a sign of progress when professional gentlemen visit and inspect stone-quarries for themselves: all interested in the use of durable stones must heartily wish they would largely extend their visits to stone-producing districts. I can promise them a glad welcome from many.—I am, &c.,

SAMUEL TRICKETT.

Sir,—We did not notice the letter by "Durability,"—appearing in your issue of the 17th inst.—until too late to reply in time for your last publication.

It was with great astonishment that we perused the statement contained therein with reference to Box Ground stone, it being quite inconsistent with the character of this stone.

Our experience, in point of time, is considerably more than double that of "Durability," and, counting it by the number of buildings with which we have been connected, in which Bath stone has been used, must be far greater than his can possibly have been.

The experience we have gained of Bath stone generally—in consequence of the position we hold for supplying parties in the trade—is necessarily very extended; and we have, too, the great advantage of receiving a continual flow of independent testimony from those by whom the stone has been used.

The experience thus obtained, with reference to "Box Ground" is—that it is a weather-stone of great merit and undoubted repute for durability in the most trying situations.—We are &c.,

PICTOR AND SONS.

Box, June 29.

Sir,—Having been connected with the building trade and the use of stones, including Bath stone in particular, in all parts of the country under some of the most eminent architects for upwards of 30 years, and having used a vast quantity of "Box-ground" in particular, I think it only due to the public generally to state that my experience of "Box-ground" is quite the reverse of that of "Durability." My experience is that "Box-ground," of all oolites, is the very best as a weather-stone, and I would advise architects, or any one about to use Bath stone, to make their own inquiries, which I feel confident will confirm my own experience of this stone.

I quite agree with "Durability's" remarks as to the injurious practice of leaving the cleaning down of the building until the conclusion of the work, and I think it is important that the stone should be completed on the banker, so that the case-hardening process, which commences after fixing, should not be disturbed.—I am, &c.,

FAIR PLAY.

Sir,—Mr. Sumson perverts my meaning. Permit me to say that I cast no reflection on the statements of Mr. Kirkaldy—a gentleman I much respect. No one, I am sure, could take more pains and care than he does. My doubt was in respect of the specimens being representative of a quarry. It is not agreeable to common-sense to suppose that Mr. Sumson's quarry is so different to all the rest of the oolitic deposit. There is a hard bed, I know.

It is a base assumption that I have any other than a professional interest in the matter.

I can adduce no other than the St. Stephen's Chapel instance of Beer stone in London, for the simple reason that the great fire of London effaced all medieval work, and since then the stone has not been used here, and but little elsewhere, the quarries being out of the way. A seaside specimen can be

seen at Charmouth, built, I believe, about thirty years, and in excellent condition.

As I spoke in reference particularly to city endurance, the specimens quoted by Mr. S. of old buildings are not admissible.—I am, &c.,

PHILIP E. MASEY.

21, Old Bond-street, W., June 23th.

BUILDER AND ARCHITECT.

Sir,—"Bear's Heart" need not feel discomforted because he has not been article'd, or never worked for an hour in the office of a professed architect. I know a dozen men who have never enjoyed these so-called privileges, but who yet are good architects, some doing a large business. An architect, "architect-builder," and "builder-architect," are merely conventional expressions, and signify really nothing more than that some architects busy themselves more with building than others. Why not, it may be fairly asked, is not building the legitimate field of the architect's artistic labour? Of course there are, as in other things, architects and architects—some who can design, others who cannot; some who devote their time to artistic designing, and others who practise only as architects. There is no royal road. It is really what a man can make of himself, whether he be architect or anything else. Artisanship without ability counts for little.—I am, &c.,

ARCHITECTUS.

CONSTANT SUPPLY OF WATER TO LONDON.

Sir,—Noticing with great pleasure your great kindness in allowing your valuable paper to become the medium for calling public attention to various necessary improvements and requirements, I have ventured to place the following remarks before you on the above subject for publication.

It is now some years since public attention was first called to the necessity existing for a good and constant supply of water to London. Great interest was at first evinced; scientific men, medical and otherwise, entered energetically into the question. The Metropolitan Act of 1871 was an important result, although strenuously opposed by the several water companies; its aim was to solve the difficulty existing between the public and the water companies. Certain regulations were made describing the necessary fittings and method of supply to houses; copies of these "in an abstract form" were made and printed for distribution by the water companies, and everything seemed to point to a speedy and universal unanimity of purpose. A constant supply was the prevailing theme. The late Government entered into the question, but in such an incomplete manner that dissatisfaction was the result, and it soon became evident that the public and the water companies would never become reconciled by "Cross" purposes, and so although a constant supply has been given to small sections of London and its suburbs, yet it is far from being what it ought to be—viz., "universal." Now, no doubt, to many persons the question arises, Why is this the case? It may arise from two causes—Firstly, the indifference of the several water companies to anything except securing good dividends to their shareholders, and secondly, the ignorance of some of their engineers as to the working of, and the advantages derivable from, a constant supply. The indifference of the companies, even under the present system, is shown by the state of cisterns containing the daily supply of water. Covers wanting, full of weeds and dirt, even used as baths by the small boys of the house—this is, I am happy to say, very exceptional—and nearly always allowed to be placed over w.c.'s ready to absorb all noxious gases, all which defects could be remedied if the companies chose to exert themselves, and use their legal powers. This description is not a fancy sketch, as anyone travelling by the railway lines which overlook the back-yards or gardens (:) by which they pass can verify by ocular demonstration. This state of things is a disgrace. As regards the engineers, some of them have shown a laudable desire to do away with this state of things; but even they seem to lose energy when they see the increasing coolness of their directors as to the constant supply: of course they have their own interest to study, and I am sorry to see it made the ruler. An engineer (if he can honestly claim the title), should be fearless in expressing his opinion and in carrying out his works, and not be swayed by directors, who, if they understood the question as they ought to, would be only too glad to hear and uphold their engineer when he laid before them an expanded and practical view of the subject. If Watt, Stevenson, Brunel, &c., had not been men of determination, where would the commerce of the world be? And but for the same trait in Sir Hugh Myddelton's character, where would water companies be? This is, however, a digression. In calling attention to what I consider ought to prove an inducement to the companies to make the constant supply universal, I would refer to the very great superiority in the

designs of the various fittings—viz., taps, ball-valves, waste-preventers for w.c.'s, in w.c.'s themselves, detectors of waste, &c., &c., necessary for providing houses with a constant supply, and if fitted as laid out, and directed by the Act, the storage of water in imperfectly-covered and objectionably-placed cisterns for drinking purposes would become an abomination of the past. An arrangement of supply to a house may be as follows: A lead pipe when size is determined (the regulations obtainable at any of the companies' offices, according to which gives the supply of water, will show the necessary weight, &c.,) coming direct from the company's main, fitted with screw-down stop-cock near entrance, and continued through the house to upper cisterns, with ball-valve, &c.; on this pipe are to be fixed, "as may be required," one or more screw-down draw-off taps for obtaining the water for drinking purposes direct from the company's main. The upper cistern, with necessary fittings, cover, &c., to be placed at such an elevation as shall be necessary for the required supplies. (If hot-water is required, it is best to have a separate cistern, which can be supplied by a branch from the pipe referred to.) The down-pipe from cistern, supplying bath, and the different waste-preventers in the several w.c.'s, can be continued from the supply to lowest w.c., and to the scullery, or other sink, and have a draw-off tap put on it, thus making the cistern available as a reserve for domestic and sanitary purposes should an accident occur requiring a suspension in the supply. The continuation of the pipe from last w.c. to sink has been objected to, as the water was liable, by not being drawn off regularly, to become impregnated with lead, and so become dangerous to health; but as this chemical action does not take place in a few hours, and as a tap over an ordinary sink in the scullery is seldom long unused, I venture to think the objection may be put on one side. Should, however, this be made an obstacle to having a reserve, another simple plan might be adopted. Let a wrought-iron cylinder, water-tight, with only holes with unions for inlet and outlet pipes capable of withstanding the co.'s pressure, be fixed in a vertical position, where most convenient (it should have capacity sufficient, say, for 30 gallons), and supplied by a branch-pipe from the main-pipe in the house, with a proper joint where connected to cylinder at top, and also again where draw-off pipe and tap are fixed at bottom. A valve opening inwards must be fixed on top of cylinder; this will be kept close when pressure is on, but when the pressure is removed by Company's main being shut back, &c., it will open, and allow the contents of the cylinder to be withdrawn. A manhole in the side, having door and proper joint made, would admit, by its removal, the cleansing of the cylinder, which would be about once in three years; here is a reserve without the nuisance of ball-valve or chance of contamination. All cisterns should be well covered and placed so as to admit of their being easily cleaned and examined. I would also impress upon architects the desirability of making the proper positions of pipes, cisterns, and w.c. part of their original plans, and not, as is too often the case, "after-thoughts" to be placed where convenient; not only does the water supply require protection, "especially during frost," but sanitary considerations demand its attention. By the before-mentioned arrangements, as good water as it is possible for the companies to deliver can be drunk without fear of contamination from sewer exhalations, &c., and would always be fresh, cool, and unlimited in quantity. The cistern is, to the companies, as the "old man of the sea," hard to shake off. As regards the quality of the fittings, if the companies would insist on the materials and workmanship being first-class, those makers who sacrifice reputation to cheapness would be compelled to come up to the standard, and not only would the companies gain, but the trade would generally assume a healthful and substantial tone. This improvement in the fittings combined with the simplification of the method of laying on the water, would materially reduce the waste of water. The constant supply also acts as a preventive of waste by causing annoyance from a dripping or leaky tap, or an impromptu shower-bath from cistern overflow, due to defective ball-valve, &c., the annoyance from such causing the most careless to have repairs done, and be careful in future not to abuse the fittings, or hold in contempt the power behind them. The removal of the extra cistern will be a source of gain to the companies, as there is emptying of cistern to obtain a fresh supply (the general idea of cleansing). Yet it is really waste of water. Although useful in flushing the drains, it is not the legitimate purpose for which it was delivered. This, I think, conclusively proves that the companies stand in a great measure in their own light by withholding a constant supply. I trust my remarks may again call Government attention to the subject, and not leave us to imagine that the Irish Land Bill has completely imbibed the moisture from the Water Bill. I am sure honourable mem-

case, Dalton having been the contractor employed by the Commissioners.—HUGH McCLACHLAN.

[6547].—**Measuring Up.**—The following is from Hurst's "Architectural Surveyor's Handbook":—"The charge for measuring works in small new buildings and in repairs, including a bill of the particulars is 2½ per cent. For large new works of plain character the usual charge is 1½ per cent. When the works are of elaborate construction the charge will vary from 1½ per cent. upwards, according to the additional trouble entailed in measuring." Surveyors vary much in their charges, from 1½ to 2½ per cent. being charged by experienced men for the same class of work, 2 per cent. is also very usual; this I believe arises from there being no recognised scale, as is to be found in the architectural profession.—HUGH McCLACHLAN.

[6549].—**Portland Cement Mouldings and Flat Surfaces.**—Thoroughly saturate with water the surface of cement-work before applying the finishing coat so as to remove all irregular suction. The finishing coat to be of same proportions sand and cement as preceding coats, only the sand to be of a finer grain. Apply as much as can be safely finished before it gets too dry for floating. Float with wooden float until the glazed and watery appearance leaves the face of the work, which will come out a nice and uniform colour if carefully done. Mouldings: After getting the moulding as full as the mould, let it stand until hard. Apply water same as preceding. Mix fine sand and cement, same proportions as surface finish, and keep part of it dry. Give the moulding a coat of fine stuff, gauged very soft, then pass the mould across it, keeping it very tight. Take the cement and sand that you have kept dry, and damp it sufficient to make it bind together. Throw it all over the moulding (be sure that it is all covered), run the mould across it quite slack, so as it will not take off all the dry stuff. With practice you will make it come out the same colour as the plain surface. I hope this will suit "Stone Finish."—PLASTERER.

[6550].—**Egg-Shell Polish for Antique Furniture.**—This is done by first bodying up your work the same as before directed, and, after standing twelve hours, again body up with white polish. It is then rubbed down with a felt rubber and pumice-stone until sufficiently dull. It is then wax-polished, giving the work a gloss instead of a polish. Dry shining is a new system of polishing or shining called the American system, and is used mostly for American black walnut. First oil, fill in then with a wet rubber passed smartly over the work straight from end to end until a shine or gloss appears. No oil to be used in the rubber, and no spiriting off is required. Be careful to dry rubber well, and have the work free from rubber marks. This system is becoming very popular in the trade.—C. W. S.

CHIPS.

The Cambridge Improvement Commissioners recently wrote to the Local Government Board, asking if that authority would be likely to sanction the adoption at Cambridge of a sewerage scheme similar to that in operation at Coventry. At the last meeting of the commissioners a reply was read from the Local Government Board, informing them that, while it was not the usual practice of the Board to express any opinion as to a scheme until plans and details were submitted, they would, in this instance, state that the Coventry system could not be recommended as the best for the disposal of the sewage of Cambridge. On the contrary, the Board were advised that it could best be dealt with by a system of broad irrigation over land, or intermittent filtration through land.

The Brecon town council inspected, on Wednesday week, the system of sewers and sewage-tanks and works which have just been completed in that town.

A brass eagle lectern has just been placed in the pro-Cathedral, Liverpool, and it is a fine example of ecclesiastical brass-work, and reflects credit upon Messrs. T. Potter and Sons, of South Molton-street, London, by whom it was executed. It stands about 8ft. high, and the book is supported by three massive feet of brass, with a lion crouching at the base of each; and, immediately under the globe are three finely-executed figures of angels, with their wings outspread. Round the base of the lectern, and also in the Bible which accompanies the gift, is an inscription.

Christ Church, Blakenhall, was reopened on Wednesday week, after the addition of a tower with pinnacles of stone, like the other part of the edifice. The enlargement of the structure was done by Messrs. Barker and Sons, contractors, Handsworth, from the designs of Mr. Naden, architect, Birmingham, and the internal renovations were carried out by Mr. Fryer, of Bloxwich.

Extensive alterations and additions are about to be made to a Primitive Methodist Chapel at Noland, near Halifax, from the plans of Mr. Thomas Firth, architect, of Elland.

The Plumstead district board of works, at their last meeting, accepted the resignation of Mr. T. C. Haworth, surveyor of Eltham, tendered, after 26 years' service, on account of advancing years, and granted Mr. Haworth a retiring allowance of £60 per annum; it was resolved to offer the salary of £150 a year to the successful candidate for the appointment. At the same meeting Mr. E. L. Rumble was elected surveyor for Plumstead parish in succession to Mr. Thorne, resigned.

PARLIAMENTARY NOTES.

RAILWAY EXTENSION TO RICKMANSWORTH.—A Select Committee of the House of Lords on Wednesday passed a Bill, which has already received the sanction of the House of Commons, authorising the construction of a line from the Uxbridge branch of the Great Western Railway to join the Watford and Rickmansworth Railway to Rickmansworth, a distance of over eight miles. The line will be constructed by an independent company, who have powers to raise capital to the extent of £150,000, and to borrow any sums not exceeding £50,000. The cost of construction is estimated at £114,425, which provides for the erection of stations at Uxbridge, Denham, and Harefield, and for enlarging or building a new station at Rickmansworth.

LEGAL INTELLIGENCE.

LOCAL BOARDS AND CONTRACTORS.—**FLETCHER v. HUDSON.**—This case, tried in the Court of Appeal on Tuesday, before Lords Justices Bramwell, Brett, and Cotton, raised a question of some interest, especially to members of Local Boards—namely, whether, if a member does an act—as taking a contract with his Board—which is declared to vacate his seat, he is also liable to a penalty imposed on a member acting when disabled from acting. It was an action against a member of the Local Board of Grasmere, in Westmoreland, to recover from him a penalty of £50 for acting as member when disabled by such a contract. It appeared that there were several contracts between the member sued and the Board (for work to be done by him in carting materials for roads), the contracts extending from March, 1877, to March, 1878, under which payment was made to him on the 6th of March, 1879: and on that day he sat and voted as a member of the Board. He was sued for the penalty, and at the trial, at the Assizes at Appleby, the Judge (Mr. Justice Stephen) held him liable. This was an appeal by the defendant from that judgment. There was also, besides the main point, another objection to the action that the plaintiff is not a "party grieved," and that the action was not sanctioned by the Attorney-General. By the Act of 1875, section 61, any member who accepts or holds any office or place of profit under the Board, or in any manner concerned in any bargain or contract entered into by the Board, or participates in the profits thereof or of any work done under the Act, shall cease to be a member and his office shall become vacant. Section 65 says that any casual vacancy occurring by disqualification or otherwise shall be filled up; and then section 70 says, "Any person who not being duly qualified to act as member, or not having made the declaration required by the Act, or being disabled from acting by any provision of the Act, acts as member, shall incur a penalty of £50." Sir J. Holker and Mr. Crompton, for the defendant, who appealed, argued that he was only temporarily "disabled" during the continuance of the contract, and not afterwards, or at the time he sat and voted: that he was not disqualified, though his office was vacated, for he might be reinstated; and therefore he was not liable to the penalty, not being "disabled" when he sat and voted, though as his seat was vacated he was not a member. The statute contemplated the case of a member disabled from acting while still remaining a member, whereas here he had ceased to be a member and was a mere stranger. Lord Justice Brett observed upon this that it would be strange if a member acting wrongfully when legally disabled from acting was liable to the penalty, and a mere stranger sitting and acting not liable. Lord Justice Bramwell put the case of a mere stranger intruding into the House of Commons and sitting and voting. Would he be liable to the penalty for sitting and voting without taking the oaths, &c.? The House, of course, would turn him out, and so could the Board in such a case as the present. Mr. Charles, Q.C., with Mr. Addison, Q.C., argued for the plaintiff that the action was maintainable, and that there never was a case more clearly within the mischief met by the Act, and it would be a strange construction of the Act to hold that the case was not within the Act. Mr. Crompton having been heard in reply, the Lords Justices conferred together, and then said they would take time to consider their judgment, but that both the parties would do well to agree to a *set process*.

STAINED GLASS.

ALL SAINTS' CHURCH, SOUTHPORT.—Three stained-glass windows have been erected in this church. The central four-light east window is an illustration of the "Te Deum," containing groups of figures representing the angels, apostles, prophets, martyrs, and the Holy Church. The principal tracery contains a figure of Our Lord seated in majesty, and the smaller traceries, the four archangels, and groups of cherubim and seraphim. This window is flanked on either side by a two-light

window: that to the north contains, beneath rich canopies, figures of SS. Matthew and Mark, and the tracery above a seated group of "Faith, Hope, and Charity." The window on the south side has figures of the other two Evangelists, SS. Luke and John, and in the tracery is another seated group, representing "Temperance, Justice, and Fortitude." The border to these windows shows a conventional rendering of the Vine, through which, clad in white, are small delicately-drawn angels, bearing the various emblems of Our Lord's Passion. The windows were designed and executed by Messrs. Shrigley and Hunt, of John o'Gaunt's Gate, Lancaster, and 28, John-street, Bedford-row, London.

BARTON-ON-IRWELL CHURCH, NEAR MANCHESTER.—A rich medallion stained-glass window, in the Early English style (in character with the architecture), has been erected in this church. The subject illustrated is the "Parable of the Sower," the principal figure occupying the central medallion, and in the upper and lower medallions are subjects—"The End of the World, with the Reaping Angels," and the "Euemy Sowing Tares while the Husbandmen Sleep." The window is full and rich in colour, much in the manner of the celebrated Canterbury glass. The window was designed and executed by Messrs. Shrigley and Hunt, John o'Gaunt's Gate, Lancaster, and 28, John-street, Bedford-row, London.

STATUES, MEMORIALS, &c.

BRIGHTON.—A memorial has just been erected in the Extra-Mural Cemetery, over the grave of the late Mr. Albert Creak, M.A., Principal of Wick House School. The design is by Mr. Arthur Cawston, of Clement's-lane, London. It consists of a massive cross, with the sacred monogram at the intersection of the arms, supported by a moulded base, on which is the text, "In Thy light we shall see light," beneath which is the inscription. The monument is in Carrara marble, and has been executed by Messrs. B. and W. Bennett, of Brighton.

WATER SUPPLY AND SANITARY MATTERS.

GOOLE, YORKSHIRE.—This town is about to be supplied with water by the New Gas and Water Company, the Bill having passed. Mr. E. C. Buchanan Tudor, C.E., the town surveyor, has completed his scheme for the remaining portion of Old Goole, and tenders are being invited for the works, which are to be commenced immediately.

CHIPS.

A free public library was opened at Richmond, Surrey, on Saturday week. The building is Gothic in character, and has cost £2,000; Mr. J. S. Brunton, of Richmond, was the architect, and Mr. J. J. Osborne, of Turnham-green, the contractor.

A scheme of sewage is about to be carried out for the Brownhills local board, the works including the laying of 5,000 yards of stoneware pipes varying from 6in. to 15in. in diameter, and 600 yards of 12in. iron pipes. The engineer is Mr. J. H. Shipway, of Colmore-row, Birmingham.

At a meeting held at Newport, Mon., on Thursday week, plans prepared by Mr. Fawcner, architect of that town, were adopted for the enlargement of the infirmary and dispensary by 20 additional beds, and the widening of staircase and doors and other works.

New premises were opened last week by the Yorkshire C. and C. Bank in High-street, Doncaster. They have been refitted and altered by Mr. William Anelay, of Doncaster; the architect was Mr. J. Demaine, of York; and Messrs. Maw and Son carried out the decorations.

At the annual diocesan conference held on Tuesday week, the following grants towards increase or improvement of church-accommodation were made:—In Ely archdeaconry: restoration of Barton church, £60; mission-room at St. Andrew the Less, Cambridge, £10. Sudbury archdeaconry: Glemsford mission-room, £20. Bedford archdeaconry: restoration of Eggington Church, £30; of Toddington Church (renewed), total cost £1,200; £10; of Thurleigh Church, £25; and New chancel, Christ Church, Luton, £40.

An exhibition of sanitary and labour-saving appliances will be held in the Ironmasters' Exchange Hall, Wolverhampton, in August next.

The memorial to Earl Beaconsfield, to be erected by the City of London Lands Committee in the Guildhall, has been intrusted to Mr. R. C. Belt, and the bust of Earl Russell, to be placed in the same building, will be executed by Mr. C. B. Birch, A.R.A.

Our Office Table.

A SPECIAL meeting of the Metropolitan District Railway Company was held on Monday, to consider a Bill authorising the making of a railway from the London and South-Western Railway Company's station at Surbiton to the Fulham extension terminus of the district system. The Bill, which has passed the House of Commons, and is now in committee of the House of Lords, is the outcome of the more ambitious project, the Guildford, Kingston and Fulham scheme, of which the other section, that from Guildford to Surbiton, is to be constructed by the South-Western Co. The line under notice will be $7\frac{1}{2}$ miles long, and will proceed from the South-Western Station at Surbiton in an almost direct line outskirting Wimbledon Common to Putney, crossing the river to Fulham by a bridge of five arches. The cost will be £750,000, the bridge and a mile of tunnelling greatly augmenting the estimated outlay. The meeting, with but one dissentient, approved of the scheme, which is to be carried out by the independent company already formed, under the direction and at the joint cost of a committee of the South-Western and Metropolitan District Companies.

In order to enable the night-work at the new Swansea Docks to be carried out with greater regularity, the contractor, Mr. Walker, has had recourse to the electric light. Six lamps on the Brush system, worked by a 12 h.p. portable engine, have been hung near the lock excavation since Thursday, last week, and the result has been satisfactory. A staff of 500 men—one half the number at work by day—are now employed each night in the lock excavation, which is 600ft. long, 150ft. wide, and 40ft. deep, and is said to be well illuminated by the half-dozen electric lights.

On Sunday last the members of the Sunday Society paid a visit to Apsley House, by permission of the Duke of Wellington, and the same afternoon the United Arts Gallery was opened for the first time on Sundays. The members of the society visited this gallery to the number of 574, and next Sunday both the United Arts Gallery and the Herbert Exhibition Gallery are to be open to the public by free tickets, which may be had by all who make written application and send a stamped and addressed envelope to the honorary secretary, Mark H. Judge, 8, Park-place-villas, W.

THE arrangements for the International Medical and Sanitary Exhibition, to which we have referred more fully elsewhere, are now complete: the offices are removed from the Parkes Museum to the Exhibition Buildings at South Kensington. The Right Hon. Earl Spencer, Lord President of the Council, has accepted the office of president, and will preside at the opening ceremony, on Saturday, July 16th. The exhibition is to be complete on Wednesday, July 13th, and the judges will make their examinations for the awards on the two days previous to the opening.

THE late Dr. Edmund Lambert, a Bath physician, bequeathed a sum of money to the "Trustees for Improving the Dwellings and Sanitary Condition of the Poor of London." It having been decided in Chancery that the Society for Improving the Condition of the Labouring Classes was entitled to the bequest, the matter on Wednesday came before the Probate Court to decide the amount, the testator having left a blank before the word "thousand." Upon the finding of the jury, Sir J. Hannen ordered the probate of the will to be recalled in order to fix the bequest at two thousand pounds.

PROF. IRA REMSEN, of Johns Hopkins' University U.S.A., who has been engaged for some time past experimenting on carbonic oxide as a source of danger to health in apartments heated by hot-air furnaces and cast-iron stoves, has finished his investigations, and will report shortly to the National Board of Health, for whom the work was undertaken. Prof. Remsen states that he has examined the different methods in use for the purpose of detecting small quantities of carbonic oxide, and then applied the best of these methods to the study of the air of a large number of buildings. A specially-constructed cast-iron stove was used in a second series of experiments, and the air of the room in which the stove was situated was

examined under different conditions. The results, Prof. Remsen states, cannot well be given in a few words, but in general, he is of opinion that there is practically not much danger from the carbonic oxide involved in the use of hot-air furnaces and cast-iron stoves.

COMMON glue has most enormous strength and adhesive powers, if it is good. But to be good it must not have been injured in the making by decomposition, to which the material and the glue itself are peculiarly subject. If offensive, it cannot be trusted to hold wood. The strongest known glue is that made from the skins and sounds of fishes, and the strongest of this class is made in Lapland, from the skin of a perch. The Laplanders use it in making their bows, which are both strong and durable. In making it their cold climate is greatly in their favour; here a fishskin will begin to undergo decomposition before it can be dried. In making it the skins are put into a bladder, which answers for a water bath, and heated in water until a sort of glue results.

ACCORDING to the *Industrial World*, to make brick masonry impervious to water, there may be employed two washes or solutions for covering the surface, the one caustic soap and water, the other alum and water, the proportions being three-fourths of a pound of soap to a gallon of water and a pound of alum to four gallons of water, both being well dissolved. The wall must be perfectly clean and dry, and the air at least 50° F. The soap wash should be laid on boiling, with a flat brush, and so as to form no froth. After remaining 24 hours to become hard, the alum wash is applied in the same manner, but at the temperature of 60 to 70 degrees. After another 24 hours a second soap wash is put on, this being repeated until the walls are impervious.

CHIPS.

A meeting of the Architectural and Archaeological Society of St. Alban's was held in that city yesterday (Thursday) afternoon, under the presidency of the Earl of Verulam.

The music-hall in De la Beche-street, Swansea, is being reconstructed and improved, the new works including the addition of a minor hall, 50ft. by 35ft., provision of kitchens and retiring-rooms, and rearrangement of lavatory accommodation. The contract for the works has been taken by Mr. D. Morgan, of Brunswick-street, at £1,070.

At Llangennech, a village four miles from Llanelly, the foundation-stone of a new Congregational chapel was laid on Monday. The building will cost £1,500, and is erected by Messrs. Walters and John, Contractors, of Morriston.

The cemetery at Doncaster is about to be extended; the plans for the enlargement have been prepared by Messrs. Wilson and Masters, of Sheffield and Doncaster.

The annual meeting of the Sussex Archaeological Society will be held on Thursday, August 11th, and will include a visit to Ashburnham-place, near Battle, the seat of Earl Ashburnham.

The Mayor and corporation of Swansea have advertised for the name and address of "Progress" whose plans were recently submitted under motto in a competition.

The railway station at Pickle-bridge, near Halifax, is in course of entire reconstruction on a site 300 yards off, and when completed in December next, will be renamed "Wyke." The contract has been taken by Messrs. Henry Siddall and Co., of Sowerby-bridge, at about £4,000.

The Congregational chapel at Eastbourne has been reopened after the completion of extensive internal improvements. Mr. George Mitchell was the architect, and Mr. Martin the builder. The foundation-stone of a new Baptist chapel in Grove-road, Eastbourne, was laid on Saturday. Beneath the chapel, which will seat 700 people, will be the schoolroom and class-rooms, vestries, &c.

An inquiry was held at Doncaster on Tuesday week before Mr. S. J. Smith, C.E., an inspector of the Local Government Board, into an application from the corporation of Doncaster for sanction to borrow a further sum of £10,000 towards the completion of the new water-works. The town clerk stated that the works consisted of three storage reservoirs holding 290 million gallons, from whence the water is conveyed to another reservoir of a million gallons capacity at Warneford, and so into the town. The sum of £160,000 had already been borrowed; but £165,819 9s. had been actually expended; the original estimate was £80,000. The works were practically completed except about

£800 of work; but certain claims had yet to be met. Mr. B. S. Brundell had been the engineer. The inspector inquired closely into the admitted waste of water, and suggested that the district be divided into sections, and test-meters be put down. The excess money spent must be met out of current rates, and could not be borrowed.

The Steyning Union Rural Sanitary Authority is about to erect a new infirmary, in two blocks, for male and female patients, at the workhouse, Shoreham, Sussex. Tenders have been invited for the 9th inst. The works will be carried out under the superintendence of Mr. S. Johns, district surveyor, Station-road, Portslade.

Leadenhall-street and Gracechurch-street are about to undergo improvement as regards new buildings in the immediate locality of the Market, now undergoing reconstruction. A large block of shop and other property, extending in Leadenhall-street from the corner of Gracechurch-street to a distance of about 100 feet eastward, and the same length southward along Gracechurch-street to the boundary of the approach to the Market in that thoroughfare, is at present in course of demolition, preparatory to the erection of a large block of new property on the site, which covers an area of 17,000 superficial feet, and which includes the site, adjoining the market, on which the leather market formerly stood. The new premises will have handsome frontages to Leadenhall-street and Gracechurch-street, and a frontage of 113 feet to the new street leading out of Leadenhall-street to the market, which is to be formed as a part of the new scheme.—*City Press*.

Holloway's Ointment should be well rubbed upon the pit of the stomach and region of the heart in that particular form of indigestion which gives rise to palpitation, shortness of breath, and a suffocating sensation. Every distressing symptom soon yields, digestion becomes easy, the spirits light, and good health returns.—(Adv't.)

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (TO-MORROW).—London Association of Foremen Engineers and Draughtsmen. Discussion upon Mr. W. Lloyd Wise's paper on "Mr. Anderson's Patent Bill." 8 p.m.

EXAMINATION UNDER THE

METROPOLITAN BUILDING ACT (18 and 19 Vict. cap. 122, Sect. XXXIII).—The Board of Examiners, appointed by the Royal Institute of British Architects to examine all persons presenting themselves for the purpose as to their competency to perform the duties of DISTRICT SURVEYOR IN LONDON, and to grant CERTIFICATES to Candidates deserving of the same, will hold an Examination on the 28th and 29th inst. Each Candidate must, on or before FRIDAY, the 22nd inst., send to the secretaries an APPLICATION, which must be accompanied by a statement drawn according to a form to be previously obtained from them; and each Candidate will be required to attend at the Royal Institute of British Architects on THURSDAY, the 28th inst., from TEN a.m. until ONE p.m., and from TWO p.m. until FIVE p.m. for the WRITTEN and GRAPHIC Examination, and on FRIDAY, the 29th inst., at TWELVE noon, for the ORAL EXAMINATION. Each Candidate on sending in his formal statement and application, must pay to the Royal Institute of British Architects a fee of TWO GUINEAS; and each Candidate, on receiving his certificate—should the same be granted to him—must pay to the Institute a further sum of THREE GUINEAS. No person will be admitted to the Examination unless he declare that he intends to offer himself as a Candidate for the Office of District Surveyor in London.

J. MACVICAR ANDERSON, Hon. Sec.
WILLIAM H. WHITE, Secretary.
Royal Institute of British Architects, 9, Conduit street,
Hanover-square, London, W.

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates.

General Repairs and Alterations Executed: Experienced Workmen always in readiness, and sent to any part of the country.—[Adv't.]

Doultling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to CHARLES TRASK, Norton-sub-Hamdon, Rminster, Somerset.

—[Adv't.]

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE.
CORSHAM DOWN

CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.
(See trade adv't. on p. XXV.) [Adv't.]

TENDERS.

. Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

BRIGHTON.—For completion of works at Brighton New Club. Messrs. Linsion and Son, architects:—
Cheeseman and Co. (accepted) ... £4,278 0 0

THE BUILDING NEWS.

LONDON, FRIDAY, JULY 8, 1881.

DESIGNERS AND ARCHITECTS.

IT seems a rather remarkable circumstance in the education of the young man destined to follow the profession of architecture, that he so invariably halts on the threshold of his career, and so often feels at a loss as to his future position as to deem it necessary to ask the opinion of his friends whether he has made the right choice—as if they were better judges of the matter than himself. While the young student in the law who is reading preparatory to his examination, or the student of medicine who has duly served his time and has “walked the hospitals,” knows exactly the kind of work he will have to perform, and feels fully confident of his ability to discharge the duties of his avocation, the architectural tyro seems less fortunate in obtaining a clear idea of his duties, for he is constantly found stumbling over doubts and perplexities in his own mind, or has probably received a very mistaken notion of the work of the architect. Indeed, we know that a very large percentage of those articulated to the profession follow other avocations. It would be an easy task to prove that these difficulties and misunderstandings which beset the pupil arise from the unsatisfactory mode in which our architects are trained, the payment of premiums for terms of years, the want of a probation, and the very one-sided view of the architect's work obtained in most offices. It is not our purpose to enter into this question; we simply accept the fact, sufficiently notorious, that in a large number of cases the pupil gets a very imperfect and vague idea of the practical architect's work, and is allowed to drift for himself in a hopeless, helpless sort of a fashion into whatever class of practice he can pick up. While it has turned out many good architects, the “pupilage” system has been a rock on which many hopes have been wrecked. It is our more immediate object in the present paper to point out that the system has favoured the production of two very different types of individual, described at the head of this article. There is the young man with business proclivities and a taste for drawing, and the born artist full of enthusiastic love for his art. One turns out a business man or a practical man, the other often a mere enthusiast or an artist, whose ability is measured by his very modest assertion of his real powers. The qualification for business stands its possessor in very good stead. If he happen to be a fair draughtsman, he can invariably obtain a livelihood as an assistant, if he cannot enter into practice on his own account. In nine cases out of ten, however, he quickly gets into the latter position. In the architectural profession we may discover what has been called a good “all-round” man: one who is a good accountant or quantity-surveyor, knows a good deal about practical detail, and can write a specification, or make out a builder's account with as much facility as he can get out a set of drawings. As a matter of course, success in business awaits him. But there is another manifestation of the architectural draughtsman—the “designer” as he is sometimes ironically called. The demand for designers as assistants to architects, art manufacturers in ceramics, wood, metal, or woven fabrics, has tended to separate the designer from the architect, and the correspondence which has been going on in our pages on the relative claims of the builder-

architect and designer, or art architect as he may be more properly called, shows in what manner this class of artists has affected the architectural profession. A provincial architect who has a comfortable practice in the erection of small residences, shops, and surveys, who is not inflated with the claims of “high art” or æsthetics, and does not trouble himself about the rival claims of Gothic or Queen Anne, finds the “designer” occasionally a useful help in the preparation of perspectives, competition or show designs. The designer, not unnaturally, has the assumption to call himself the architect and his employer a “builder-architect,” and as long as such bargains are made we cannot exactly draw the line where the claim of each in the production of the design begins and ends. We consider that an architect who places himself entirely in the hands of a draughtsman as regards the preparation of his design has forfeited all right to be called its author, and must not be offended if he gets the name of a “builder-architect,” even if he does not undertake the contract himself. It is very usual, too, as one or two correspondents have shown, for the designer to become the paid servant of a contractor in a large way of business, and we know perfectly well that many of our best London firms of builders, whose names are familiar to the profession, have their own paid assistants or architectural designers who undertake to carry out the design, decoration and all, of any building intrusted to their care. Such a combination may not be looked upon with favour by the *élite* of the profession, and no doubt the practice of getting buildings contracted for by a firm who also supplies the design, is not to be commended. At the same time the practice is one sanctioned by those who admit the co-operative principle, and we should not be surprised to find it extending yet more on these lines, in spite of all the protestations of R.I.B.A.'s and others. This amalgamation of interests will not fail to extend so long as architects delegate their work to draughtsmen, for we cannot see the difference between an architect of a building getting the design prepared for him, and the contractor saving his employer the expense of a middle-man by preparing the drawings at his own establishment. One is quite as vicious in principle as the other. The designer is a specialist: he can draw with facility, though his knowledge of materials and construction is generally of the most scanty kind. He, however, manages to fill up the gap between the real architect and the business or practical architect which the pupilage system has created. In many instances he may have never seen an architect's office, as a correspondent points out, but has obtained his knowledge of architecture from Government schools. The average country practitioner has little opportunity for cultivating the artistic faculties of his pupils; the consequence being the chances are against the youthful architect ever succeeding in an artistic sphere of work; while the enthusiastic draughtsman often scorns the practical building part, and finds it equally hard to get a livelihood as an architect. Extremes meet; the one finds the other necessary. We cannot lose sight of the twofold function of the architect, his ability as an artist, and the business qualifications required. Those men who have succeeded, and have risen in the profession by their merit have generally shown a happy combination of these qualifications.

A more important consideration in this view of the subject is the competency of the designer, and his position in the profession. His antecedents may be anything but architectural, though, as we have seen, he is an admitted factor under the present régime. The great question with the profession is, Whether the designer, apart from the architect, is a desirable being, whether there can

be a true accord between the æsthetic and useful, by separating the functions of designer and architect? So long as there are æsthetes who affect to enjoy the quaint and grotesque, instead of the intelligible and natural, and people who cannot see the beauties in tertiaries and semi-tones, the artistic designer may have a useful part to perform at the present time. In justice to the architect, however, he should know something of the technical. We have always denied the possibility of securing good architecture when the plan and elevation of a building have been prepared by different men; yet there are many in the profession who do not scruple to make the plan the limit of their architectural work, and to hand over the elevations, details, and decorative accessories to the designer. We can understand an architect who has an extensive range of factories to build, or an iron roof of great span, consulting an engineer about the details, or an engineer submitting his skeleton framework or construction to an architect; but for an architect to delegate his professed details to another designer is almost tantamount to a painter obtaining commissions for pictures executed by other artists, or for a lawyer to accept a case and get a brother-lawyer to undertake it. The system has its evils: it encourages a sort of commercial agency highly injurious to the interests of art; the “designer” gets so much to do that he becomes a veritable “crib,” and a kind of illicit practice is promoted. It is dishonest towards the designer himself, for he is only encouraging a system of protection which is equally destructive to his own personal advancement as it is to commerce. People are led to believe that to get good art, high prices must be paid and only a few enriched; they are proverbially blind enough in building matters to go to a man who is either quite ignorant of what they require, but who never refuses a job, or to an eminent member of the profession, who cannot possibly find time to devote his personal attention to a work he could well afford to throw up. It is certainly vain to expect now the magnanimity recorded of many of the great artists of the Renaissance, much less to anticipate that the public will ever be discerning enough to select the most competent men in the ranks of any profession; and without competition, in spite of all its evils, is it really possible? The profession owes to itself the duty of placing the architect in his true position, and of making it clear under what limitations the draughtsman is also an architect.

NEW BUILDINGS IN LONDON.

IN Fleet-street, Ludgate-hill, Cheapside, and Cornhill, the improvements of late, both of a public and private character, have been evident. It is true these have not altered the general aspect of the City much, though they have added to its material appearance and convenience, and in a city where the price of ground, already of fabulous value, is increasing every day, it would be useless to look for any of those sweeping alterations in the lines of streets which are so common in the cities of the United States, or for the magnificent schemes of reconstruction which our French neighbours have partly realised in their own capital. Even the comparatively modest proposal to widen the precincts round St. Paul's has not been revived of late years, owing to the excessive value of property in the locality, and the same prohibitive price of land has operated in restricting many schemes of street improvement.

In the Strand the new is jostling with the old, and a few time-honoured buildings are being replaced by structures often picturesque in their composition. Dilapidated houses

afford a favourable excuse for rebuilding in a style which has lately been revived, and still promises to hold out. We may, for instance, remark the quaintly designed little front of red brick, with its gauged arches and setting of white painted frames and window-sashes, erected for the "Express Country Milk Company" in a kind of Queen Anne, the chief points of interest in which are the red-brick, white-pointed front, with its homely-looking shop-window, the framework of which has been designed in accordance with the fashion of windows of the 17th century, having a voussoir and keystone arrangement in the division. There is much to suggest the dairy in the quiet, cosy-looking fittings of the shop, the clear white enamelled tiles which relieve the spaces beneath the windows, and the pediment over the shop-front. Passing through the Strand to Fleet-street, one narrow stone façade may be noticed, not for any novelty in the design, but as indicating the manner in which a cramped frontage may be architecturalised. The flat, stilted arches of the three-light windows, with their rather coarsely-carved capitals, seem to be a little too ambitious a treatment for so restricted a front, and the pilasters at the sides, with the returned cornice are the best features. The carved swags in the pilasters are a little outré. Mr. G. Pidding is the architect. The *Daily Telegraph* new premises, higher up, have a considerable frontage. The façade is divided into three by narrow wings, pronounced by coupled Corinthian pilasters, and surmounted at the top by Mansard roofs. The centre is pierced by pedimented and arched windows, and the interfenestration is generally plain. A sense of disproportion is felt in the superposition of wide panelled pilasters over the coupled Corinthian ones below; the former crush the latter, and the large rosette in the centre and dark marble panels add to the effect. The details follow those of the advertising offices recently built on the opposite side. The façade is entirely of stone except the pilasters, which are of red granite with panels of darker materials over. The block of old houses from the Law Courts to Chancery-lane, doomed for removal, has not been touched. The site will afford a capital opportunity for business premises. There is little noticeable in Cheapside, but in Cornhill a new block of buildings, faced with stone, chiefly built for the London and Lancashire Life Co.'s new offices, with the upper stories planned as offices, may be seen on the north side. The façade has been designed with some freshness, and the architect (we believe Mr. Chatfield Clarke) has attempted at least a very suitable type of French Renaissance, the main features of the front being its division into orders, corresponding with the stories, of which there are four altogether, and the deep, carved friezes which divide them. The orders are not the Classical, but are freely designed, and the columns are coupled, except at the ends, where single columns are used. An apparent weakness arises from this circumstance, and it is a pity the ends were not more solidly treated. The principal, or ground-story, to be used for the large office, is adorned with grey granite columns in couples. The architect has secured light, and avoided a projecting porch or archway, with the commonplace pedimental head, by making the principal entrance a filling-in to one of the inter-columnar spaces. A circular pediment rests on two deep consoles, the motive apparently suggested by a wooden framework. The friezes above each of the orders are deep, and are carved in relief. Medallions, with Cupid and Eros, are the leading features, and these have been executed with Classical feeling. The first floor is relieved by double Ionic columns over those below; the windows between are of three main lights, with mullions, the faces of

which are decorated by orders in relief, and a stone transom cuts off the upper part. Another deep frieze intervenes between this and the next story, decorated in bas-relief figures with shields. There is a kind of composite order in the upper stories, and the façade is crowned by a rich corbelled cornice and four dormer gables with circular pediments and finials of rather florid detail, in which a kind of scalloped-shell enrichment largely enters. The insurance office has a plaster ceiling, decorated with ribs in the form of circles, and circular intersecting arcs, and the iron columns at the top, above the capitals, are finished as fan-shaped pendentives, with radial ribbings. The offices above, approached by a stone stairs, well lighted from an area, have no particular features. Turning down Bishopsgate-street Within, Mr. Norman Shaw's picturesque front of red brick and white-painted sashes for Messrs. Barings' Bank, will suggest new reflections to some who have not hitherto, perhaps, entertained any decided misgivings respecting the style of which he is one of the acknowledged leaders. For the curiosity of those who have not seen this latest attempt to revive brick architecture in the City, we may describe the new front—and it is merely a façade tacked on to the old buildings—as a particularly plain red brick wall pierced with windows of rather elongated proportions, having sashes with segmental heads and gauged brick arches. There is nothing very different in these to any of those seen in Mr. Shaw's other works. The front thus treated is surmounted by a massive, handsomely-moulded and modillioned cornice, as might be seen in many old buildings of the last and previous century, above which, upon a steep tile roof, peer three dormers, with richly-moulded pediments and small panes of glass, painted white. A little on one side is a wide archway built of stone, with gauged-rubbed brick voussoirs at intervals. The elliptical archway is delicately moulded on the edge, and is covered by a pediment composed of two ramps of ogee outline. These ramps are curiously broken by a small window in the centre, which pierces a portion of the tympanum. Of the merits of this composition, which has elicited much adverse criticism, we say no more than that we hardly think it will add to the reputation of the author of that earlier and better-studied building, the New Zealand Chambers, not far off. One peculiarity in the front is that the painted wood window-frames are fixed within two or three inches of the face of the brickwork, as a correspondent pointed out some time ago in these pages. In connection with street improvements, the pulling down of the houses at the corner between Gracechurch-street and Leadenhall-street, in connection with the new market, is important, as a measure calculated to relieve a very congested part of the City. A large site of considerable frontage on both sides will be thereby rendered capable of architectural amelioration. Making a long stride from the City to South Kensington, an allusion may be made to a very important building by the last-named architect, the "Albert Hall Mansions." This colossal block of red brick has the apparent effect of at once destroying the scale of the Albert Hall, which it adjoins, and unmercifully crushing Mr. Shaw's own work, Lowther Lodge, which, unfortunately, stands close to it on the east side. It is a pity, for the credit of our metropolitan architecture, such an unfortunate juxtaposition of buildings can be possible. Mr. Shaw has literally overpowered his charmingly picturesque house by the towering erection of residential flats. The composition itself has one long façade towards the park, and

is broken by three gabled projections, which stop arched balconies on each side on the first and second floors. These balconies will form very pleasant outlooks over the park. There is a general similarity in the windows, which are chiefly three-light segmental-headed, relieved by white sashes. Picturesqueness has not been lost sight of; the gables are composed of curved ramps and pediments, and the little oriels, corbelled out from the main brick cornice, with their deep-set series of members in the cornice and pediment all painted white, have a quaint effect. The stone lines of balconies and corbels, the admirably-designed and executed cut-and-rubbed cornices and string-courses, and the narrow brick pilasters from the caps of piers, break up an otherwise rather heavy composition. Relief of a more decided kind will be afforded by the two tiers of white roof-dormers in the steep roof of green slating. These high-class residences, when finished, will naturally be looked forward to by many interested to know how the seventeenth-century domestic brick style can be appropriately applied, by the best master of the style, to buildings of an ambitious residential character in flats in the fashionable quarter of London.

BALUSTERS AND BALUSTRADES.

FEW architectural features are so common as balustrades, though we occasionally find very poor or feeble apologies for them. We speak here chiefly of stone balustrades, such as are common in buildings of Classic or Italian design. Every architect knows when he sees the proportion which is most pleasing, yet it is rather curious to find that the design is left in many cases to the builder's foreman's idea, or the mason is allowed to give his own proportions and to render the architect's small scale elevation as best he can. The chances are that the beauty of a good profile is entirely lost, and that a meagre "skinny" looking object is introduced. There are at least three different types of baluster, which we may designate as the ordinary or single-bellied form, the double-bellied, and the inverted form. As the chief value of the baluster as a feature is its repetition, it is essential that a good form be selected, and the architect ought never to think it too trivial a matter to be worth giving a full-size or large-scale drawing for. The Italian architects, who were constantly using them, have left many excellent models, and the best types are those which combine graceful outline and simple treatment. The outline ought to be well-proportioned and refined. Sir Wm. Chambers, in his "Decorative Part of Civil Architecture," well describes the simple baluster, and his proportions may be accepted as almost perfect. He there says the "best proportion for balustrades of this kind is to divide the whole given height into thirteen equal parts, and to make the height of the baluster eight of those parts, the height of the base three, and that of the cornice or rail two." "Or, if it should be required to make the baluster less, the height may be divided into fourteen parts, giving eight to the baluster, four to the base, and two to the rail; one of the parts may be called a module, and, being divided into nine minutes, serve to determine the dimensions of the particular members." In the example given, the subordinate members are divided thus: The plinth and its mouldings are made equal to 3 modules; the base, including the cavetto and members, 2 modules; the plain curvilinear part of baluster, including the swelling, 4 modules; the necking and cap-members, another 2 modules; and the rail, 2 modules; thus making 13 modules in all. The proportions here given are very agreeable to the eye. Double-bellied balusters are often

used regardless of the connection in a composition. As a decorative adjunct to the base of a building, the simple form is much to be preferred for its solidity of character; but in parts of a facade, where the members are small, the double baluster, being slenderer, is a good substitute. Chambers divides the whole height of balustrade into 14 modules: 9 of these are given to double bellied baluster, 3 to the base, and 2 to the rail. The double-bellied baluster is well adapted for staircases and balconies, where a light character is necessary.

A point quite as much lost sight of by architects is the distance that should be allowed between balusters, and many lamentable failures occur through inattention to this point, or not clearly figuring the distance in the clear or from centres. Sir W. Chambers observes: "The distance between two balusters should not exceed half the diameter of the baluster measured in its thickest part, nor be less than one third of it." The pedestals which occur at intervals should not be too far apart, or the balustrade looks weak, nor should they be too close. Eight or nine whole balusters, besides the two half ones, are considered the best number between the pedestals; but of course the intervals have to be adjusted by the piers or columns below. In long ranges the balusters are broken at intervals by a die or more, flanked with half-balusters; and Chambers gives the breadth of a die at from two-thirds to three-quarters of the breadth of those of the principal pedestals. Of course the latter are regulated in width by the columns below, or the top of shaft. Those who wish to study good examples of balustrades may do well to examine those in the facades and terrace of Somerset House; and the parapet of Waterloo Bridge. The third kind of baluster is the inverted form, usually square in plan, of which we cannot say much in commendation. The double-bellied baluster is a frequent introduction in the balconies of the Venetian palaces; and is also adapted for wood or metal.

It is often a question with architects how a balustrade for a staircase may be treated. We think Chambers' opinion may be taken as a judicious one. He thinks it better to keep the mouldings of the balusters horizontal than that they should follow the inclination of the stairs, and no architect who has seen the two methods will hesitate to give preference to the former. The distances apart of the balusters ought to be rather less than for horizontal balustrades, as the thickest portions do not come opposite. Those who desire to make themselves acquainted with the subject will find the treatise of Chambers a useful guide, but our chief object is to draw attention to the very miserable designs and proportions often seen in modern-executed work, possibly owing to the fact that few draughtsmen can draw a baluster correctly.

Scarcely any architectural feature looks more meagre or weak than a balustrade in which the interspaces are made wider than the rule above given allows; the balusters become caricatures of what they ought to be, and the top rail or capping always appears crushing. Very wretched spindling-looking things often take the place of balusters, in which the swell of the balusters is reduced so much that they lose all the character essential to them. When stone balusters are used, this reduction from the standard proportions has even a more serious objection, for it leads one to suppose some other material has been employed. We frequently find balustrades in modern work of the most absurd profile, and some, even where the plinth and abacus of the baluster are made circular also, giving the effect of a lathe-turned baluster. Such faults as these are pardonable in some little builder's work, but are inexcusable in the architect's. The custom has lately become

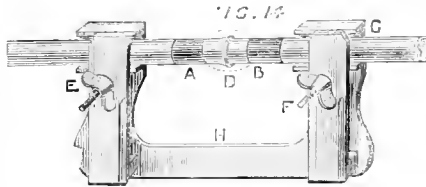
prevalent of inverting the baluster, the bellied part being put on the top; and we find the "Queen Anneists" do not scruple to employ this and other modifications, if not distortions, of the feature for the sake of variety.

PRACTICAL NOTES ON PLUMBING.—IV.*

By P. J. DAVIES, H.M.A.S.P., &c.

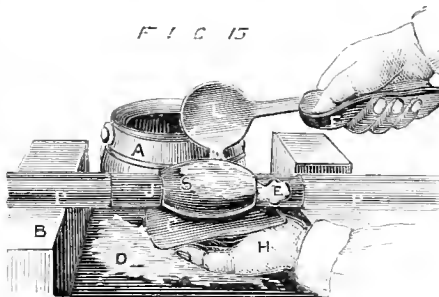
UNDERHAND JOINTS.

THESE joints are shown made, and as they should be finished at Figs. 7 and 8 (see last chapter). You prepare the ends as you did for the upright joints, and as shown at section K E, Fig. 5 (also see previous chapter), and also shown at A, B, D, in the elevation, Fig. 14.

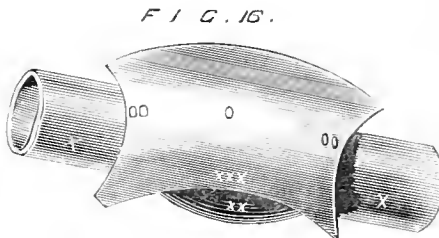


Here you see the pipe prepared, and the joint fixed in a plumber's clamp ready for soldering.

Fig. 15 shows the pipe fixed upon two bricks:



the pipe is put together as at A, B, D, Fig. 14, but weighted down to keep it steady during the time of making the joint; then place a small piece of paper under the joint to catch your surplus solder, and begin soldering as follows:—Take the felt in your right hand and with it hold the ladle three parts full of solder; to see that it is not too hot, hold the back of your hand within 2in. or so of the solder. If it quickly burns your hand it is too hot; if you can hold your hand without pain, use it; but if you cannot feel the heat it is too cold: this is soon known by a little practice. Another test is to take a little piece of newspaper and immerse it below the metal, if it blazes instantly it is too hot; if it browns quickly use it. When you begin to pour your solder upon the joint, do it very lightly, and not too much on at a time, but keep the ladle on the move backwards and forwards, pouring from E to J, Fig. 15, first on one side



of the joint to the other, and from end to end, also up the soiling, as shown at E, Fig. 15, on purpose to make the pipe nice and hot. The further in reason this heat is run or taken along the pipe the better chance you will have in making your joint; hence one reason for the long joint (as was shown at Fig. 8). Keep pouring away, and with your left hand hold the cloth C to catch the solder, and cause same to tin the bottom of the joint (especially in large joints), and to prevent the solder from dropping down.

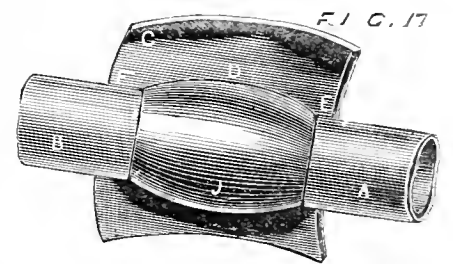
* All rights reserved.

Now turn this solder out of your cloth up the sides of the joint and on to the top. Keep pouring the solder on and working it up round the joint until you can feel it all soft together; keep it on the work, and begin to get it as round as you can in the centre. You should in this manner get the shape as near as possible, taking care to have it all soft, and when it is in this state quickly put the ladle down and do not stop a second for anything, but with your left hand shape this side of your joint as previously shown at DEF, Fig. 8, always beginning at the outside or that part next the soiling; then take your cloth in the right hand and do this side, finishing on the top; then if you have a small joint, say up to 2in. and have been quick with your solder, it will not be set; then give the cloth a light run round all your joints, and this will make it look like a turned joint. After a little practice you will be able to wipe your joint without shifting your cloth from one hand into the other. The secret of joint-making is getting the lead to the heat of your solder, and by rough shaping the solder whilst in the semi-fluid state, or, as some plumbers do, by keeping the outside of the solder on the move round the joint until the joint is finished. Again, some plumbers make the joint very roughly first, and let it just set; after this, they take a ladleful of semi-fluid metal and pour over the joint, and as quick as possible wipe it off again. This kind of work looks exceedingly bright, and is not likely to be porous. A good joint should not have a mark with the cloth left on it, but should be as though it were turned in a lathe.

ROLLED JOINTS.

When wiping brass-work on such as unions, some plumbers cut a quantity of splints about 9in. long, and drive them into the brass-work, and then into the lead-pipe. This is called fixing for rolling (but I do not care for this practice), which is done as follows: Fix the union firm to the pipe with the splints, then place the pipe upon two pieces of, say, quartering. Take the ladle of solder, and proceed as you did with the underhanded joint. As soon as the heat is properly got up, take the cloth in the right-hand and turn the lead pipe round with the left (or get your labourer to turn it for you), at the same time hold the cloth in, or between the fingers to as near the shape of the joint as you can keep the forefinger, pressing on one side or end of the cloth, and the third finger on the other, so as to get the cloth as near the shape of the joint as possible (see Fig. 16). OO shows the point where the fingers press on the cloth; XXX shows where the thumb holds, but on to the underside.

Fig. 17 shows the general shape of the cloth.

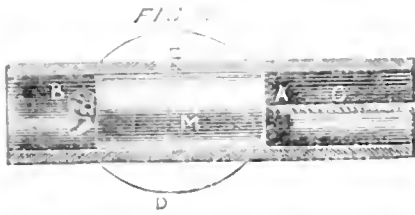


when making underhanded fixed joints in their place; it also shows that you should bulge your cloth as at D and keep E close down on the edge of the joint. After you have done on the side or end E, work the side F, then turn the cloth into the right hand; bring up this side, and finish with a run round as a "smoother."

PNEUMATIC TUBE JOINTS.

These tubes are required to be laid very true at the joints, in order to allow the piston, or carrier, to pass on its journey uninterrupted. In order to make sure of this the company adopt the butt-joint, which is made as shown at Fig. 18. A, B is the pipe; M a steel mandril which is made to the same heat as the solder, and exactly fits the lead pipe E. This joint is made as follows: First true the ends of your pipe so that they butt together truly. Soil and shave same as in the ordinary way, then heat your mandril to the heat of the metal, or hot enough to just brown a bit of cotton-waste; remember not to have it too hot, or you will not be able to

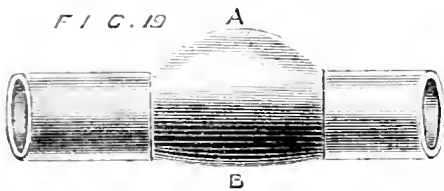
keep any metal on the bottom part of your joint. Suppose your mandril to be just the heat, place it in the pipe, then thread the rope through the next length, and fix the end of these pipes to-



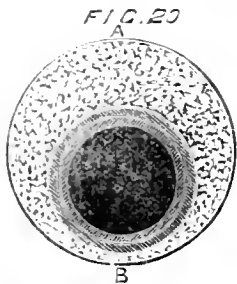
gether. Proceed to make your joint as you did underhanded joints; make it quick, and as soon as you have finished pour some water on it, either out of a sponge or otherwise. This will set your solder round the bottom, which is the touchy part of this work, because of the mandril keeping this hot. As soon as the joint is thoroughly set have the mandril drawn out.

BAD-SHAPED JOINTS.

Before I leave underhanded joints, I wish to show what my foreman of plumbers calls the "Universal joint," Fig. 19. It is just the shape



of a dutching-made plumber's joint, and Fig. 20 is the section of same. Fig. 19 is too well



known to require any description—in fact, how it is made is a puzzle. But it is not at all uncommon (when coarse solder is used) to find good-shaped joints as porous as the one shown here; hence one reason why, after making a joint, you should, when hot, rub some touch round same, which will nearly always stop up the pores, and prevent sweating. I have seen the touch (after the joint has been broken asunder) when it has penetrated its way through the solder, and the cells of the solder itself were full of the same, especially after the joint has been cut in two. Of course, it is no use to touch a joint over if it is for hot-water pipe work. Here you must always have your solder fine enough to prevent sweating.

PLUMBERS' JOINT-MAKING WITH LAMP.

For this, see BUILDING NEWS for June 10, 1881, p. 688. But for the benefit of those not sufficiently advanced in the art of plumbing, I may mention that these joints may be made quite as well horizontally as when the pipe is vertical. For testing solder, see p. 687 and 688, BUILDING NEWS, June 10, 1881.

(To be continued.)

IRON BUILDINGS.

A FEW useful hints on iron buildings are given by Mr. Matheson, in his new "Aid Book," recently reviewed by us. The author, speaking on cheapness and facility of removal, observes, in colonies and at public works, where-

ever, in fact, the requirements of a building may be of uncertain duration, minimum expenditure on them is often best. Then the chances of removal, and the ease with which a building or a shed may be taken down are important points for a contractor's consideration, and even where permanency can be reckoned on, says Mr. Matheson, the "need for cheapness may outweigh all other considerations." Where money has a high value, cheap construction is still more desirable, as the saving in interest on a low capital outlay may provide for repairs. A saving of a few hundreds of pounds may be worth to the proprietor a greater percentage, so as to enable him to renew when required.

The cheapest form of iron building or shed consists of a curved roof of corrugated sheet-iron, tied at the springing by a tie-rod, and supported by columns, such as may be frequently met with on railway sidings and wharves. Columns placed about 10ft. apart may be of the same height, and each pair of columns might carry a light T-iron principal bent to the curve with a tie-rod, and if the span is wide a king or queen posts with struts. The unit of cost in an iron building is of course the distance apart between the principals and the iron columns, and economy is best consulted when the maximum distance between the columns and principals has been reached with the security of roof covering necessary. It must not be forgotten by the designer of such erections that the greater the distance between the supports, the more efficient will have to be the girders or arches which carry the roofing, as one or more intermediate principals then become necessary, and the additional cost of these girders ought to be put against the extra number of columns required if the simpler plan be adopted of carrying each principal by every pair of columns. Of course the span of roof is the decisive point, and this has to be determined by the requirements and the space to be covered. In large buildings, such as railway stations, the lattice girder may be the most desirable and economical form of carrying the roof principals; but the further apart the columns are arranged the more necessary it becomes to make them efficient as points of loading. A very economical mode of roofing large areas like railway-stations, where the columns ought to be few, we have before pointed out in these pages. This consists in carrying the roof principals, of ordinary construction, on deep open lattice girders placed 30ft. or 40ft. apart. Each roof has, therefore, this span, the iron principals can be reduced in size and height, and the extra expense in deeper girders is more than saved by the reduction in the height and construction of the principals.

Mr. Matheson, in speaking of coverings, says that "sheets of corrugated iron are sufficiently strong in themselves to need supports only at intervals of 8ft. to 12ft.," and this limit may determine the spacing of the principals. Zinc is not so strong, and has to be laid on wooden rolls, which require supports every 6ft. or 7ft. The same author throws very little new light on roof-trusses, though it is well for the designer of buildings of this sort to remember that certain forms of trusses are more economical than others, because the divisions in length which they involve will agree with the usual lengths of rolled iron. Other things being equal, the architect must use his own judgment in determining the shape of the roof-trusses or principals; but whatever form be adopted, it must not be lost sight of that iron roofs require periodical inspection and painting more than wooden roofs. On this account the "ridge and furrow" principle has been recommended for the access it allows to every part. Thus a roof with circular or curved lattice ribs may have the ridge and furrow covering between them, the series of small roofs resting on purlins formed between the main ribs, which purlins also serve to connect and stiffen them.

Referring to roof coverings, the author very truly remarks that galvanised iron will not last long in cities or railway stations, exposed to the fumes of coal or gas. For such purposes the gauge to be selected is 18 B.W.G., and this is generally used for good work. The thinner sheets cover more surface, and are on this account sent to the colonies, especially Nos. 21 and 23, though they are dearer per ton. When once the zinc coating is rendered imperfect decay rapidly succeeds, so that economy in such matters is very dearly bought. Though zinc is more durable, it is less often used. Economy in

laying these coverings is consulted by using boarding, which enables the purlins or rafters to be placed further apart. No. 18 gauge of sheet-iron weighs about 2-8lb. per square foot, and the durability may be insured by painting. The thinner the sheets the oftener the painting is required, as even a scratch or crack on the surface causes a speedy destruction of the sheet.

Coming to the prices of buildings of this description, the author observes with reason, that it is difficult to value them according to area, as modifications are so various. The strength and weight of roofs per foot increase with the span, and the cost of the building would naturally be greater as it increased in size, height also being a factor. The price per cubic foot cannot easily be determined, as even this would vary with the span and other circumstances, and so render calculation by such a method impracticable. The only way of estimating iron structures is therefore to separate the parts or take the columns and girders separately. Mr. Matheson says: When pig-iron costs £1 per ton iron columns and other cast-iron parts fitted for a building cost from £9 to £12 per ton; but if the design be complicated, or the parts very light or ornamental, these rates may be considerably increased. Wrought-iron parts, such as girders, will cost from £15 to £18 per ton at a time when iron plates cost £10 per ton, and lighter parts, as in roof work, will cost £17 to £24 per ton." Again he says: "Omitting very small roofs, it will be found that the framing of trussed roofs, exclusive of supports and of covering, will weigh from 5 to 6 cwt. per square (horizontally measured) for spans between 40ft. and 50ft.; 6 to 8 cwt. per square for spans between 50ft. and 60ft.; 7 to 9 cwt. for 80ft.; and 8 to 12 cwt. for 100ft.," the rates being as above. A corrugated iron covering needs a very light framing, owing to its inherent strength. It weighs from 150 to 300lb. per square, according to thickness. "Exclusive of main framework, galvanised corrugated sheets cost from £2 to £4 per square; zinc, £3 to £5; tiles, £3 to £4; slates, £3 to £5; and glass, £4 to £7; these rates including the subsidiary supports." Ordinary sheds and storehouses, 12ft. high to the eaves, are priced at from £8 to £15 per square; if inclosed, from £12 to £20. Railway station roofs between 80ft. and 150ft. Mr. Matheson puts at from £14 to £25 per square, including erection and coverings. Beyond those spans, and up to 240ft., the cost of station roofs in England during the last 30 years has ranged from £25 to £50 per square. These figures have a rather wide range, as it will be seen but the circumstances are so different that it is impossible to make them more than approximate. Again, in the erection of buildings of this class, it is necessary to have properly-prepared drawings and details with every dimension and thickness given, so that the competitive prices may be based on the same footing, as any slight differences in the quality of the iron or the sectional thickness of the parts may make very considerable variations in the cost. We cannot too forcibly point out, indeed, the necessity of correct figured details in everything relating to iron structures.

MR. MUNDELLA, M.P., ON ART PROGRESS.

ON Saturday last the annual anniversary festival of the Artists' Benevolent Fund took place at the Freemasons' Tavern, under the presidency of Mr. Mundella, M.P.

The Chairman, in proposing the toast of the evening, "Prosperity to the Artists' Benevolent Fund, coupled with the Health of the President and Vice-President," said he was there, he was told, because he was officially connected with art just at present. Happening to be Vice-President of the Council, he had to propose the annual vote for supplying that institution of science and art at South Kensington with which all artists were familiar; and it might be that the reason he was there was because they were doing more to manufacture poor artists than any other institution in the kingdom. He hoped, however, that what they were doing was in the direction of giving a right tone and impulse to art, and he thought what was to be seen at South Kensington Museum justified him in the belief that it was of some value to artists—that that institution had done something for art. He, and all of his standing, could testify to the wonderfully im-

proved taste of the people of this country in all that related to art. Forty years since he was a manufacturer in a provincial town, and thirty years since he was an exhibitor in the 1851 Exhibition, from which there might have been formed a Chamber of Horrors, so far as art was concerned, that would have eclipsed Baker-street. Comparing what our textiles, furniture, and wall paper were at that time with what has superseded them now was not only matter of rejoicing to him, but made him tolerant even of those aesthetes who furnished matter for so much amusing satire in *Punch*. Aestheticism, even when it became a little effeminate and depraved, was infinitely better than the rudeness and grossness of forty years ago, and he would rather see a man worshipping a blue vase than worshipping a pint pot. Sombre colours he held to be better than the horrid mixtures that used to be common in English houses. In regard to English art, he would say that when in Paris in 1878, before the opening of the Exhibition, he was in the building and heard some French artists, who saw the inscription over the compartment to be devoted to the works of our artists—"English School"—after speaking in a depreciatory fashion of English art, began to dispute whether there was an English school at all. Speaking to Sir F. Leighton on the subject of the badinage which Englishmen had then to suffer on the subject of their art pretensions, he said, with a great deal of confidence, "Wait till our opening day, and we shall see whether there is an English school." When that opening day came he saw French artists stand aghast at the Exhibition of English Art in 1878; and, when he went to the French School, he stood aghast too, but not in admiration at what he saw, and he had no difficulty in saying that, so far as he was concerned, he preferred the modern English School to any other modern school in existence. The English School he held to be the only real school of landscape-painting in existence. Really good modern art had been revived by Hogarth, Gainsborough, and Reynolds, and from their days to the present art in England had been making wonderful progress, and had now become part of our home every-day life. It was no longer an art for the priests or for the palace—it was the art of the home and the art of the people. There was no better illustration of that than what was seen in the wonderful picture-books which reflected the social life of the present day. Grey-beards like himself, who could remember the picture-books of their youth sufficiently well to compare them with the productions of the present day, must be astonished at the contrast. No one nowadays could take up one of these children's picture-books, no matter how old he was, without receiving impressions of pleasure and delight, to say nothing of instruction and enjoyment, from them. The rising generation that was being reared on such books as those would learn to appreciate art in a manner to which those who were passing away could never attain. They were, in fact, a new revelation of art.

SMOKE-ABATEMENT.

THE Board of Trade has officially declared the exhibition of smoke-consuming apparatus, fuel, &c., to be held at South Kensington, Oct. 20th till Nov. 26th, to be "calculated to promote British industry, and prove beneficial to the industrial classes, thus conferring protection on all inventions exhibited during the time of exhibition, and for six months afterwards (in virtue of the Protection of Inventions Act, 1870)."

The Secretary of the Admiralty, Mr. Trevelyan, has also forwarded a communication, promising that the Admiralty will favourably consider application for trials of apparatus at one or other of the dockyards, in case the size and character of the appliances should in particular cases exceed the capabilities of the testing places already provided.

These communications were read at a special meeting of the committee, Mr. Ernest Hart in the chair. Present among others:—Sir Frederick Pollock, Bart., Sir A. Brady, Lady Borthwick, Miss Shaw Lefevre, Prof. Roberts, F.R.S.; Mr. Aitchison, Miss Kate Potter, and Mr. W. R. E. Coles (hon. sec.). At the same meeting it was resolved that a public meeting should be held to report progress, and to inform the public and all interested of the forward state of the existing arrangements, and a hope

was expressed that the Duke of Westminster, President of the Society, would allow the meeting to be held at Grosvenor House. It was mentioned that, in addition to premiums conferred by the committee, a series of extra prizes would be arranged, including a "Ladies' Prize" for the best smoke-consuming domestic grate, and that Mrs. Rathbone, of Kensington, had headed the latter prize with a subscription of 10 guineas.

STABLE VENTILATION.

IT has been stated by Dr. Parkes that a horse requires at least 2,166 cubic feet of fresh air per hour. The army regulations allow in new stables to each horse 1,605 cubic feet, and 100 square feet of floor-space. This allowance is shamefully deficient in many stables. The most necessary thing in planning stables is, as Capt. Galton says, to have the air moving freely through every part of them, above and around the horses when they are standing, and in all the angles between the floor and walls when the horses are lying down. How this freedom of circulation is secured it is difficult to see in the ordinary plans of these buildings. There is the door and the windows along the front; there may be, in addition, end openings and a few air-bricks: but the main spaces, occupied by the horses in the stalls, are quite closed against any free current of air, and the foul air stagnates naturally along the stalls and boxes, particularly if there be no top ventilation. As for stables with lofts and living-rooms above them, they are simple abominations, and rooms in the lofts of stables are little better than fever-dens. The most effective plan that can be adopted is to construct louver openings along the ridge, or to introduce in it a few of the ventilators on the induced air-current system. But these should be well chosen, and placed in proper positions: air-inlets, in connection with these, are necessary, above the stalls and under the mangers, so that no stagnant air can remain in these positions.

A NEW SYSTEM OF GLAZING.

THE British Patent Glazing Company have directed our attention to their patent system of glazing, suitable for railway-station roofs, docks, and mill-sheds, conservatories, greenhouses, frames, and winter-gardens, which is identical with that of Messrs. MacKenzie, Harley, and Co., to which reference is made in our "Legal Intelligence" (p. 59) this week. The patent bar which the company uses is formed from solid malleable iron of a T section, but having the cross-web shaped after a U form. The bar is enveloped in soft ductile metal, either virgin lead, copper, or other, the top only being uncovered. These bars are fixed at centres under 24in. The glass is laid on the soft metal, which acts as a cushion and prevents breakage through shocks or vibration, while the soft metal at the top half of the T section is folded down over the glass, and thus completes the glazing. The means of glazing being metallic, allowance is thus made for expansion and contraction, the glass also having clearance. Besides, as the bars are rendered anti-corrosive by Professor Barff's process, no waste of the iron is incurred by exposure to the atmosphere. Among the advantages claimed for the system are: Channels provided in the bar or astragal for conducting moisture to the outside. It can be glazed in any weather and by entirely unskilled labour. It forms a strong binding to the roof or other construction, and requires no more cross-beams or purlins than are compatible with the safety of an iron structure. It possesses a maximum of strength with a minimum of weight, and dispenses with the periodical outlay for paint and putty required by the old system.

SECTIONS OF ROLLED IRON AND STEEL.

MESSRS. MACNAUGHT, ROBERTSON, AND Co., of Bankend, Southwark, S.E., have published a useful book of sections of rolled iron and steel joists and patent compound and other girders, which will be found an acquisition to the architect's and engineer's office. The present number contains no less than 34

sheets of sections, giving in every case the lengths made and the safe loads for each span, and the weight per foot. Many of the rolled joists show compound arrangements of two joists connected together by top and bottom flange-plates or riveted vertically. In ordering any girder for a particular span, it is only necessary to quote the number of the section and sheet. Heavy rolled sections, 20in. deep by 10in. wide, are kept, as well as light sections as small as 3in. deep by 3in. wide, suitable for small verandahs or green-house roofs. These sections show also every variety of form in the flanges as well as in the proportions. The sheets of channel iron are equally complete, and contain almost any section, from small grooved bars of less than half an inch each way, to sections 12in. by 3½in. Types of rails with the weights in lbs. per yard: pile-iron, fluted door-plates, fire-bars, sash-bar sections of every conceivable form of moulded edge, numbering up to 183, cross-iron, convex-iron, T-iron, and every description of square and angle-iron are to be found illustrated. A large number of sections are quite new, and engineers, especially those engaged in iron construction, will find Messrs. Macnaught and Robertson's illustrated list of great service in being able to adapt the sectional forms found in it to their designs, thus saving considerable cost.

THE INSTITUTION OF CIVIL ENGINEERS.

THE originality, labour, and ingenuity displayed by the authors of some of the communications submitted to this Society during the past Session have led the Council to make the following awards:—

FOR PAPERS READ AT THE ORDINARY MEETINGS.

1. George Stephenson Medals, and Telford Premiums, to Thomas Forster Brown and George Frederick Adams, M.Inst.C.E., for their paper on "Deep Winning of Coal in South Wales."
2. A Watt Medal, and a Telford Premium, to John Isaac Thornycroft, M.Inst.C.E., for his paper on "Torpedo Boats and Light Yachts for High Speed Steam Navigation."
3. A Telford Medal, and a Telford Premium, to Theophilus Scrymgeour, M.Inst.C.E., for his paper on "Different Modes of Erecting Iron Bridges."
4. A Telford Medal, and a Telford Premium, to Max am Ende, Assoc.M.Inst.C.E., for his paper on "The Weight and Limiting Dimensions of Girder Bridges."
5. A George Stephenson Medal, and a Telford Premium, to Benjamin Baker, M.Inst.C.E., for his paper on "The Actual Lateral Pressure of Earthwork."
6. A Telford Premium to Richard Henry Brunton, M.Inst.C.E., for his paper on the "Production of Paraffin and Paraffin Oils."
7. A Telford Premium, to Charles Colson, Assoc.M.Inst.C.E., for his paper on "Portsmouth Dockyard Extension Works."
8. A Telford Premium, to Christian Hendrick Meyer, Assoc.M.Inst.C.E., for his paper on the "Temporary Works and Plant at the Portsmouth Dockyard Extension."
9. A Telford Premium, to Benjamin Walker, M.Inst.C.E., for his paper on "Machinery for Steel-making by the Bessemer and the Siemens Processes."
10. The Manby Premium, to Joseph Prime Maxwell, Assoc. M.Inst.C.E., for his paper on "New Zealand Government Railways."

FOR PAPERS PRINTED IN THE PROCEEDINGS WITHOUT BEING DISCUSSED.

1. A Telford Medal, and a Telford Premium, to Professor Dr. J. Weyrauch, for his paper on "The Calculation of Dimensions as Depending on the Ultimate Working Strength of Materials."
2. A Telford Premium, to James Richard Bell, M.Inst.C.E., for his paper on "The Empress Bridge over the Sutlej."
3. A Telford Premium, to John Lewis Felix Targett, M.Inst.C.E., for his paper, "Experiments on Modules for Irrigation Purposes."
4. A Telford Premium, to William Thomas Henney Carrington, Assoc.M.Inst.C.E., for his paper on "Three Systems of Wire Rope Transport."

FOR PAPERS READ AT THE SUPPLEMENTAL MEETINGS OF STUDENTS.

1. A Miller Prize, to James Bernard Hunter, Stud. Inst.C.E., for his paper on "Wood-Working Machinery as applied to the Manufacture of Railway Carriages and Wagons."
2. A Miller Prize, to Mathew Buchan Jamieson, Stud. Inst.C.E., for his paper on "The Internal Corrosion of Cast-Iron Pipes."
3. A Miller Prize, to Thomas Stewart, Stud. Inst.C.E., for his paper on "The Prevention of Waste of Water."
4. A Miller Prize, to William Henry Edinger, Stud. Inst.C.E., for his paper on "Brick and Concrete and Concrete Gas-holder Tanks."
5. A Miller Prize, to Daniel Micalister, Stud. Inst.C.E., for his paper on "Caissons for Dock Entrances."
6. A Miller Prize, to Lindsay Burnett, Stud. Inst.C.E., for his "Description of a Carriage Casting Steamship, with Detailed Investigation of its Construction."
7. A Miller Prize, to Edward Walter Nether Wood,

* Has previously received the Telford Premium, the Watt Medal, and the Stephenson Medal. † Has previously received the Telford Premium.

Stud Inst.C.E., for his paper on "The Improvement of the Old Harbour at Holyhead."

8. A Miller Prize, to Arthur Stuart Vowell, Stud Inst. C.E., for his paper on "Steel; its Chemical Constitution and Behaviour under Tensile Strain."

9. A Miller Prize, to William Mairrett, Stud Inst.C.E., for his paper on "Boilers."

HOW VENEERS ARE MADE.

THE following is the method adopted in a large manufactory in the United States:—The logs are delivered in the mill-yard in any suitable lengths as for ordinary lumber. A drag saw cuts them into such lengths as may be required by the order in hand. After cutting, the logs are placed in a large steam box, 15ft. wide, 22ft. long, and 6ft. high, built separate from the main building. This box is divided into two compartments. When one is filled entirely full the doors are closed, and the steam, supplied by the boiler in the main building, is turned on. The logs remain in this box from three to four hours, when they are ready for use. This steaming not only removes the bark, but moistens and softens the entire log. From the steam box the log goes to the veneer lathe. It is here raised, grasped at each end by the lathe centres, and firmly held in position, beginning to slowly revolve. Every turn brings it in contact with the knife, which is gauged to a required thickness. As the log revolves the inequalities of its surface of course first come in contact with the keen-edged knife, and disappear in the shape of waste veneer, which is passed to the furnace to be used as fuel. Soon, however, the unevenness of the log disappears, and the now perfect veneer comes from beneath the knife in a continuous sheet, and is received and passed on to the cutting table. This continues until the log is reduced to about a seven-inch core, which is useless for the purpose. The veneer as it comes rolling off the log presents all the diversity of colours and the beautiful grain and rich marking that have perhaps for centuries been growing to perfection in the silent depths of the great forests.

From the lathe, the veneer is passed to the cutting table, where it is cut to lengths and widths as directed. It is then conveyed to the second story, where it is placed in large dry rooms, air tight, except as the air reaches them through the proper channels. The veneer is here placed in crates, each piece separate and standing on edge. The hot air is then turned on. This comes from the sheet-iron furnace attached to the boiler in the engine room below, and is conveyed through large pipes regulated by dampers for putting on or taking off the heat. There is also a blower attached which keeps the hot air in the dry rooms in constant motion, the air as it cools passing off through an escape pipe in the roof, while the freshly heated air takes its place from below. These rooms are also provided with a network of hot-air pipes near the floor. The temperature is kept at about 165°, and so rapid is the drying process that in the short space of four hours the green log from the steam box is shaved, cut, dried, packed, and ready for shipment.

After leaving the dry rooms it is assorted, counted, and put up in packages of one hundred each, and tied with cords like bales, when it is ready for shipment. Bird's-eye maple veneer is much more valuable and requires more care than almost any other, and this is packed in cases instead of tied in bundles. The drying process is usually a slow one, and conducted in open sheds simply exposed to the air. The mill will cut about 30,000ft. of veneer in a day, and this cut can be increased to 100,000 if necessary. The timber used is principally curled and bird's-eye maple, beech, birch, cherry, ash, and oak. These all grow in abundance in the vicinity.

A new parish church is about to be erected at Mather by H. M. Office of Works, the site being that recently occupied by the "Lord Raglan," in the High-street. The contract has been taken by Mr. John Jones, of Llanymyrdan, and building operations were commenced last week.

The parish church of Impington, Cambs., has been formally reopened after restoration, including the laying of new floors in nave and chancel, replacement of high pews by oak benches, erection on stone base of a new oak pulpit formerly in Histon Church, and erection of new altar and vestry. Mr. Ewan Christian, of Whitehall, was the architect.

At the Trinity Quarter Sessions for Berkshire, held last week, a report by Mr. Joseph Morris, of Reading, the county surveyor, was adopted, recommending the partial rebuilding of Briscot-bridge near Pangloss, at an estimated cost of £50,000, to be carried out by a local mason by day charge.

The foundation-stone of a mission-chapel in St. John's parish, Billingsgate, was laid on Tuesday week. Mr. Dixon is the architect, and Messrs. C. Lloyd and Sons are the contractors; the cost will be £1,300.

Building Intelligence.

BOLTON.—Last week the new church of All Souls, situate in Astley-street, off Blackburn-road, Bolton, was consecrated. The new church, which has been erected from the designs of Messrs. Paley and Austin, of Lancaster, is of the Late Decorated period of Gothic architecture. The plan consists of a nave, which is a parallelogram, 86ft. long and 52ft. clear span, without aisles or arcades, but with a tower at the west end 26ft. square; and at the east end a chancel 46ft. long and 25ft. wide, with polygonal end, and north and south aisles, the eastern part of the north aisle being utilised for the organ, and that of the south aisle as a choir-vestry, with additional clergy-vestry on the east. The chancel and its aisles open into the nave with three lofty arches, the chancel arch being 36ft. to the apex. The main object in the plan has been to secure an unobstructed space as far as possible, the whole church, with the exception of the western tower, forming a complete parallelogram. The total expenditure upon the structure and its accessories has been about £20,000. Adjoining the church are schools, which were erected in 1877, from the designs of Mr. J. J. Bradshaw, of Bolton. They have cost about £7,000.

BRISTOL CATHEDRAL.—Dean Elliot, as treasurer of the Bristol Cathedral Completion Fund, published on Friday his half-yearly report, in which he expresses gratification at the response made to his appeal in January, for funds to enable the south-west tower of the new nave to be raised to the same level as that at the north-west angle of the same front. Towards the cost, £650, £588 13s. 4d. has been received, and the work has therefore been commenced by the contractors, Messrs. Booth. It will, he remarks, give due effect to the beautiful western porch, the carving of which has just been finished. Mr. Dodd has promised a further £500 to be paid "when a reasonable prospect of finishing both towers presents itself." The chapter-house at the western end of the cathedral has been taken down, and in the autumn the Chapter will consult their architect, Mr. G. E. Street, R.A., P.R.I.B.A., as to the course to be taken in respect of the two houses to the west of the cathedral.

BURHAM.—The memorial-stone of the new church at Burham was laid on Wednesday week. The church is to accommodate 380 persons. The plan consists of nave, aisles, chancel, transepts, vestries, a narthex porch entrance, and a central tower; the whole designed in the 14th-century Gothic. The tower, being at the cross of the church, will form a landmark in the midst of the parish. The roofs of the nave, aisles, and transepts will be open-timbered, and the ceilings of the chancel and tower will be groined in pitch-pine. The church will be lighted by candelabra and candles with oil-burners. Mr. E. W. Stephens, of Maidstone, is the architect, and the proposed cost is £1,500.

CASTLEFORD, YORKS.—Further considerable additions are being made to Red Hill House, the residence of Mr. J. Austin, J.P. The style of the building is Elizabethan, stone-dressings to all windows and the main entrance, also a stone terrace to the front, lead glazing to the top part of the windows. The contractor is Mr. Thomas Hinsley, of Carlton, near Selby. New workmen's cottages with stabling are to be built, the style of which will be Elizabethan with stone dressings. The gables have ornamental barge-boarding and plaster eave to eaves. The architects are Messrs. William Lewis and Son, 46½, Stonegate, York.

FOXTON, CAMBS.—The parish church of St. Lawrence, Foxton, was reopened by the Bishop of Ely, after restoration, on Tuesday week. The church consists of chancel of the 13th century, nave and aisles of Decorated Gothic character, chantry-chapel inclosed by a screen, and west tower. The chancel was restored a few years since from Mr. Ewan Christian's plans, and the restoration of nave, aisles and tower has now been carried out by the same architect, under the supervision of his chief assistant, Mr. Parbury. There was, till now, no chancel arch, but one has been erected in half-timbered work of oak. The floor, which was brick-faced, is now laid with Minton's tiles; the old oak seats have

been patched and some new ones of pitch-pine added. A new window has been opened at the west end of south aisle. The roofs have been almost renewed, except the principal timbers. The work of restoration was commenced by Mr. E. Brown, of King's Lynn, and has been carried out by Mr. Bardell, of the same town; the cost has been about £2,500.

LEWISHAM.—The new Sunday-school buildings in the Court Hill-road are now completed, and have been fitted up and decorated for a fancy bazaar in the old English style, by which a large portion of the cost it is hoped will be raised. The new structure, including infants' room and a large number of class-rooms, will accommodate upwards of 500 children. Heating and ventilation have been especially attended to, and the whole of the work carried out in Kentish rag and Bath stone and other substantial materials by Messrs. Staines and Son, builders, of Great Eastern-street, London; the architect being Mr. George Sherrin, of No. 2, Broad-street Buildings. The total cost is about £4,000.

LICHFIELD CATHEDRAL.—An appeal has just been issued by the Dean and Chapter of Lichfield for further contributions in aid of the restoration of the west front of the cathedral. On this work the sum of £22,692 9s. 4d. has been expended during the last few years, with which considerably more than two-thirds of the undertaking has been completed. The twin western spires are now thoroughly restored, and finished with lightning conductors on approved principles. The whole of the south-west tower and the upper stage of the north-west tower, as well as the intervening gable, with the great western porch beneath it, are now completed; leaving yet unrestored the greater part of the north-west tower. For the remaining work, which will probably cost a further sum of £10,000, the Dean and Chapter will have to depend on voluntary contributions, and if these are supplied there is no reason why the whole work should not be accomplished in two more years. The present contract will terminate in a few months, and the writers of the report remark that "it would be lamentable indeed if at this advanced stage of the operations the Dean and Chapter should be obliged to part with their contractor, Mr. Thompson, and his excellent staff of operatives, and to see the scaffolding removed, thus involving a great and serious loss upon the undertaking."

NEW SWINDON.—The new district church of St. Paul, New Swindon, was consecrated on Tuesday week. It consists of a nave, 8ft. by 24ft., and lean-to aisles 12ft. wide. The walls are of local brick, with bands of grey Staffordshire brick, and the arcades are carved on Forest of Dean piers with caps and bases of Stoke-ground Bath stone. The nave-roof has a panelled polygonal ceiling, with beams and moulded king-posts exposed. All the woodwork is left unstained and unvarnished, and the internal walls are of pointed brickwork. The aisle windows are of three lights, and above are clerestory circular-cusped windows. The cost has been £1,000, and it is proposed hereafter to add chancel, organ-chamber, vestry, and tower. Mr. Edmund B. Ferrey, of Spring-gardens, London, is the architect, and Mr. William Jones, of Gloucester, the contractor.

NORTH CURRY.—The parish church at North Curry is being restored under the direction of Mr. John Oldrid Scott, as regards its nave, aisle, and transepts; and the chancel part, from the designs of Mr. Ewan Christian, of Whitehall Place, S.W., the architect to the Ecclesiastical Commissioners. North Curry church is a particularly interesting one, and has a central octagonal tower. The church stands in the midst of a graveyard, in which are the remains of a good ancient cross. One point of exceptional interest about the building is the excellent groining under the tower. The work is now being rapidly pushed, and it is hoped that in a few months the renovated building will be ready for re-use. Mr. Charles Trask, of Norton-sub-Hamdon, is the contractor; the carved stone-work is by Mr. Harry Hems, of Exeter; and Mr. G. Hannaford is the clerk of the works.

NORWICH.—The first portion of the new buildings of the Norfolk and Norwich hospital, viz., a pavilion and central administrative block, was formally opened on Thursday, the 30th ult. The buildings are in the Queen Anne, and will consist of four blocks, besides

the chapel and out-patient department. The administration block has two pavilions on either side, and consists of a basement and three stories above. In the basement are kitchen 51ft. square, housekeeper's room, servants' hall, scullery, stores, &c., with a wide corridor containing lifts. On the ground-floor is entrance corridor, 12ft. wide, leading to waiting-hall 50ft. square; to the right are porter's room, library, surgery, dressers' room, and dispensary, and to the left secretary's room, board-room, matron's and store room. Above are the resident officer's sitting and bedrooms. At the rear of this block is a one-story building consisting of operating theatre 40ft. by 20ft. surrounded by six small wards for one and two patients each, a scullery, nurses' bedroom, bath, and lavatory. There has also been completed a pavilion, approached from the administration block by a 10ft. corridor, and consisting of two stories, each divided into two wards 100ft. by 26ft., two small wards, nurses' room, and scullery; at each end of the block are turrets, containing bath-rooms and lavatories. The heating is by open fires in the wards and principal rooms, supplemented by hot-water coils and pipes, and all the corridors are heated by hot-water coils. A hot and cold water service is laid over the whole hospital, two sets of boilers, capable of use together or separately, being fixed in a central situation. The wards and over-kitchens are built on a fireproof principle, with iron girders bedded in concrete. Messrs. T. H. Wyatt, of London, and Edward Boardman, of Norwich, were appointed joint architects; but since Mr. Wyatt's death the appointment has been solely in Mr. Boardman's hands. Messrs. J. W. Lacey and Co. were the contractors, and Messrs. G. W. Haden and Son, Trowbridge, fixed the hot-water supply and heating apparatus. We illustrated the new hospital in the *BUILDING NEWS* for June 13, 1879.

NOTTINGHAM.—The new University College at Nottingham was opened last week. The buildings occupy an excellent position in a central part of the town, and the site is inclosed by wide, open streets, namely, South Sherwood-street, Bilbie-street, and Shakespeare-street. The principal front is towards Shakespeare-street, and is 260ft. in length and 60ft. in height. The style of the building is Gothic. The general outline of the front is composed of the principal entrance-gable in the centre, projecting considerably from the general line, and terminated at each end by gables, also projecting. These three gables have massive pinnacles at their angles, rising from the ground-line. The façade between the centre and the two end gables is divided into two-light windows, with shafts in the jambs, and with shafted mullions. The upper floor is formed into a continuous arcade of single-light windows, with piers between, formed of double-coupled columns. These ranges of windows, on the ground and first floors, are broken in the centre by projecting bay windows of different treatment, with square heads at the top filled in with tracery. These bay windows are carried the whole height of the building, and their lofty roofs are carried into the main roof. Between the bays and the wing are placed four dormer windows. The central entrance-gable is the principal feature in the front, and is divided on the ground-plan into three pointed open archways, with clustered columns and beautifully carved capitals. On the first-floor level, over the three archways, are three windows which light the main entrance-hall and are filled with Geometrical tracery, with shafts to the jambs and mullions. The upper part of the central gable is covered with diaper-work, and divided by a broad band of sculpture, representing a school of students of the arts and sciences, and also by three large medallions, in high relief, of Music, Sculpture, and Painting. In each of the three gables of the principal front are placed two statues, 7ft. 6in. high, on pedestals, with canopies over, of Shakespeare, Milton, Bacon, Newton, Watt, and Cuvier. These statues, which are executed in the same stone as the building, add greatly to the character of the front, and are the work of Farmer and Brindley, of Westminster. In the centre, at the junction of the principal gable and the side roofs, is placed a fleche, or spire, of wood covered with lead, rising to a height of 120ft. The façades towards Bilbie-street and South Sherwood-street are treated in a similar manner to the principal front, and designed to group

with it, and to form a picturesque outline. The building throughout is built of Ancaster stone, of a bright, warm colour. The interior of the building is simple in its arrangement, but very convenient. The entire cost of the whole works, including furniture, fittings, and decoration, is about £70,000. The workmanship throughout has been carried out under the supervision of Mr. Richard Bates, the clerk of works, from the plans of Messrs. W. and R. Mawson, architects, Bradford.

CHIPS.

A new place of worship, in connection with the United Methodist Free Churches, was opened on Thursday week, in Cloughton-road, Birkenhead. The architect was Mr. R. H. Roberts, of Everton; the contractor for the work was Mr. Edward Legge, of Birkenhead. The building is constructed of brick, with red brick facings. Seat accommodation has been provided for 550 persons.

The memorial-stones of a new Oddfellows' lodge at St. Agnes, Cornwall, were laid on Friday week. Br. Richard King, P.G., was intrusted with the preparation of the plans. The building will be 60ft. by 33ft., and is to be built with Bodys' stone, with Carmarsh granite dressings. The hall will seat 300 people.

The foundation-stone of a new Sunday-school for Holy Trinity parish, Swansea, was laid on Thursday, the 30th ult. The building will be Gothic in style, and will be erected from Yeo-street; the dimensions are 50ft. by 30ft. Mr. David Morgan, of Brunswick-street, Swansea, is the contractor, and the cost will be about £720.

Brompton Ralph parish-church, Somersetshire, was reopened last week after restoration, the works including entire rebuilding of chancel, raising of nave walls and new roof to same, and erecting a new chancel-arch in Ham-hill stone.

A series of memorial stained-glass windows have just been placed in the Roman Catholic Church of the Sacred Heart, Camberwell, by Messrs. Livers, Barraud, Westlake, and Co.

At the last meeting of the School Board for Great and Little Brompton, Cumberland, plans for new schools, prepared by Mr. Banks, their architect, were approved and ordered to be executed at once.

The temporary iron church of St. Paul's, Bedford Park, Batham, was opened on Saturday. It has been built by Mr. J. C. Hawes, of Wandsworth Common, consists of nave 61ft. by 36ft., and chancel 17ft. by 20ft. across, and cost £500.

Parish-schools are about to be built in connection with St. John the Divine's Church, Halifax, from the plans of Mr. Richard Horsfall, of Post-office Buildings, in that town.

It has been decided that the Worcestershire memorial to the late Archdeacon Hone shall take the form of completing the restoration of Hidesowen church. The nave and chancel were restored at a cost of £6,000 a few years since from the plans of the late Sir Gilbert Scott, and it is proposed to complete the work by repairing the tower, spire, and aisles. A striking feature of the church, said by Sir G. Scott to be without parallel in England, is the insertion of the tower in the nave, nearly midway between east and west.

A visit of inspection was made by the chairman and directors of the Swindon, Marlborough, and Andover Railway, of the first completed section, that from Swindon Junction to Marlborough. Mr. J. C. Shopland is the engineer.

At a recent meeting of the committee formed for the purpose of presenting a pastoral staff to the Bishop of Bath and Wells, a design by Mr. J. D. Sedding, of London, the diocesan architect, was provisionally accepted.

An inquiry was held at Keighley on Tuesday week before Mr. C. N. Dalton, one of the inspectors to the Local Government Board, with respect to an application from the Keighley local board to borrow £41,500. The town clerk explained that of this sum £28,000 was required for waterworks purposes, including £15,000 for the Sladen scheme; £2,500 was asked for private streets improvements, £6,000 for public streets improvements, and £2,700 for completion of purchase of sewage farm. No opposition was raised to the proposal.

An accident occurred at the Cardiff Gasworks, Grangetown, which will delay the completion of the extension by several weeks. Messrs. Horton have taken the contract for the erection of a large gas-tank and gasometer at the works, and on Friday, while a ring of riveted iron plates for the gasometer were being lowered into the stone well, under the supervision of the foreman, Mr. Gilbert, one of the timber supports snapped, all the others following in quick succession, causing a complete collapse. Fortunately, no workmen were in the tank at the time.

COMPETITIONS.

BIRMINGHAM.—At the meeting of the Birmingham Town Council on Tuesday, in accordance with the recommendation of the Markets and Fairs Committee, made at the last meeting of the council, Mr. M. J. Hart proposed that the plans now submitted by the Markets and Fairs Committee, bearing the motto "En Avant," for the erection of shops and other buildings in St. Martin's-lane and Jamaica-row, in connection with the covering in of the Smithfield Vegetable Market and other works authorised by the Council, be approved, and that the Committee be empowered to carry out the work at a cost not exceeding £11,000. In accordance with the resolution of the Council requiring that competitive plans should be obtained for all works involving an outlay of £10,000, the committee invited three firms of architects in Birmingham to compete for the preparation of plans for the market buildings fronting St. Martin's-lane, and to include the re-erection of the Woolpack Hotel, and the gentlemen to whom application was made readily consented to engage in the competition. Three plans had been sent in, and after a careful examination of them, the committee had selected the one signed "En Avant." The elevation was considered to be the best of the three, and the various rooms and accommodation provided would, in the opinion of the committee, meet most adequately the wants of the public. Mr. Brinsley seconded the resolution, and it was passed. Alderman Kenrick said he could not congratulate the committee on the elevation presented to the Council for acceptance; but as the committee had had greater opportunity of examining the three plans, he was quite content, on that occasion, to be guided by their judgment. He doubted whether £14,000 would cover the erection of such a large block of buildings as was shown on the plan, and if the committee obtained tenders for that amount, he should congratulate them very much. Mr. M. J. Hart reminded the Council that the £11,000 asked for that day was not the cost of erecting the buildings shown on the plan signed "En Avant," but the additional cost. Still, they hoped to get the whole of the work completed within the sum asked for altogether, viz., £35,000. The Mayor stated that Messrs. Osborne and Reading, architects, of Bennett's Hill, Birmingham, were the authors of the accepted design.

LIVERPOOL.—In the pending competition of designs from architects for the New Exchange Station, Liverpool, in connection with the Lancashire and Yorkshire Railway, nothing has yet been decided finally, though Sir Jno. Hawkley, the official referee, is said to have made his inspection of the plans this week. Forty-four sets of designs have been received. After the award has been arrived at, the public will be admitted to see the drawings, which are arranged on trestles in a large hall at Manchester. There were over 300 sets of conditions of competition issued.

WESTMINSTER.—A limited competition is about to be held for the completion of the National Opera House on the Thames Embankment, in the form of a club house, and of course utilising the present walls and foundations. Among the competitors are Messrs. Fowler and Hill, the architects engaged on the original buildings, and the competition plans are now being prepared.

The Cumberland Industrial School for Boys is about to be informally opened. It has been built at a cost of about £9,000, from the designs of Mr. John A. Cory, the county surveyor, and it was reported to the recent quarter-sessions that the building will be completed within the specified time, and within the estimated cost.

During the progress of restoration at the parish-church, Farnham, Surrey, a 12th-century three-light window was found in the east wall of north transept, and it will be opened out. Mr. Woodyer, of Guildford, is the architect, and Messrs. Goddard are the contractors. A window in the south transept has just been filled with stained glass by Messrs. Powell, of Whitefriars, London.

A large block of licensed premises, at the corner of King and Regent streets, Great Yarmouth, were reopened on Saturday, after rebuilding and setting back. The frontages are of red brick, with Portland-stone dressings. Messrs. Bottle and Olley, of Yarmouth, were the architects, and Mr. J. Leggett, of the same town, was the contractor.

CONTENTS.

Designers and Architects	37
New Buildings in London	37
Balusters and Balustrades	38
Practical Notes on Plumbing.—IV.	39
Iron Buildings	40
Mr. Mundella, M.P., on Art Progress	40
Smoke Abatement	41
Stable Ventilation	41
A New system of Glazing	41
Sections of Rolled Iron and Steel	41
The Institution of Civil Engineers	41
How Veneers are Made	42
Building Intelligence	42
Chips	43
Competitions	43
Our Lithographic Illustrations	43
Architectural and Archæological Societies	44
Parliamentary Notes	44
To Correspondents	44
Correspondence	57
Intercommunication	57
Legal Intelligence	59
Statutes, Memorials, &c.	59
Our Office Table	59
Meetings for the Ensuing Week	60
Trade News	60
Tenders	60

ILLUSTRATIONS.

ST. CUTHBERT'S NEW CHURCH, USHAW.—COOMBE WARREN.
WIMBLEDON.—DESIGN FOR A GAMEKEEPER'S COTTAGE.—
HOLY TRINITY CHURCH, BURTON-ON-TRENT.—BOWLING
GREEN, BRADFORD.

OUR LITHOGRAPHIC ILLUSTRATIONS.

ST. CUTHBERT'S NEW CHURCH, USHAW.

Our double-page illustration to-day shows the new R.C. collegiate church of St. Cuthbert, at Ushaw, from the interior perspective drawing now at the Royal Academy Exhibition. Messrs. Dunn and Hansom, architects, of Newcastle-on-Tyne, are the authors of the work. We have no further particulars.

COOMBE WARREN.

This house, of which we give a view to-day of the entrance-front, is the property of Mr. B. W. Currie, and is picturesquely situated near the road from Wimbledon to Kingston, backed by Coombe wood. The part illustrated was commenced in 1870 to replace portion destroyed by fire the same year, the original structure in the half-timbered style having been built in 1831. Externally, the building is of red brick, with dressings of Tisbury stone, medallions of red terra-cotta, and a red tiled roof. The builders of the principal portion were Messrs. Myers.

"BUILDING NEWS" DESIGNING CLUB—A GAME-KEEPER'S COTTAGE.

To-day we give drawings of the two chosen designs, which we placed on an equal footing. "Quiet and Simple" was, on the whole, the better plan, though we do not quite like the corner-sort of entrance to the sitting-room, and a fireplace between two doorways is not the most convenient arrangement. "Jack's" design is less economical, but has much to recommend it.

HOLY TRINITY CHURCH, BURTON-ON-TRENT.

We illustrated the interior of this church in our issue of June 4, 1881, when a brief description of the building was also given. The architect is Mr. John Oldrid Scott.

BOWLING GREEN, BRADFORD.

The accompanying illustrations delineate the layout of the above park, also the entrance-bridge and gates. The designers are Mr. Lister K. Isham, landscape-gardener, Brighouse, and Mr. George Hewarth, an architect and surveyor, Bradford, who, some two years ago, in an open competition, out of a list of 22 competitors, succeeded in carrying off the first premium of 10 guineas, awarded by the Bradford Corporation for the best design for laying out the park and proposed buildings to be erected thereon. The park covers an area of nearly 50 acres, and is the fourth park possessed by the inhabitants of Bradford. It was opened to the public on the 14th of September last by the Mayor of Bradford, Mr. Angus Holden.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

ST. ALBAN'S ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETY.—A meeting of this society was held in the Council Chamber, St. Alban's, on Thursday week. The Earl of Verulam, who presided, said: "Ladies and gentlemen, how much we may quarrel amongst ourselves whether there is to be a high roof or a new roof, or whether there is to be a Perpendicular window at one end of the Abbey or not, yet I am sure we shall all join together in unanimously thinking that it is the very best thing we can possibly do to preserve the ancient monuments in every neighbourhood and preserve a record of them; and we ought to be much obliged to those gentlemen who take pains so to do, and hand down in papers read upon occasions like the present, the state of things which now exist, in order that we may follow the example—the good example—of our ancestors, and do what we can to make old England as comfortable as possible to those people who live in it." Canon Davys then read the record of business of the last meeting. These having been confirmed, Dr. Griffith read his paper on "The Recently-discovered St. Alban's Parish Registers," after which the Rev. Canon Davys read his paper, which was entitled "A Brief Review of the Restoration Works since 1877 in St. Alban's Cathedral."

CHIPS.

At the Essex midsummer quarter-sessions, held last week, the Wickham Bishops proposed site for a second lunatic-asylum was definitely abandoned, on the ground that, after the expenditure of £7,281 under Messrs. Easton and Anderson, engineers, in boring for water, none had been obtained. A letter was received from Mr. Stock, the county surveyor, asking for some remuneration for the time and labour expended in the preparation of working drawings for the Wickham asylum. Mr. Stock said that he was personally engaged on the business for 153 days of eight hours each, and that seven clerks were, amongst them, engaged for 442 days of eight hours on the work, which work, putting his own time at five guineas per day, and the clerks at actual value, amounted to £1,050. Besides this, there were travelling-expenses and stationery, the whole value, on the ordinary professional rate, being not less than £1,400. All this labour and material were thrown away, as he now had to prepare fresh plans for additional buildings for 450 patients at Brentwood. The court of quarter-session voted Mr. Stock £300 as a special gratuity: the plans to be the property of the county.

At a meeting of the school board for Merthyr, held on Friday, Mr. John Williams, architect, of that town, was intrusted to prepare plans for additions to the schools at Grangetown.

Stockton Church, near Salisbury, was reopened on St. John the Baptist's Day, after restoration effected at a cost of £1875, the works including rebuilding and enlargement of the north aisle, erection of new oak roof, removal of gallery, and reseating of nave.

The new Chichester and Milhurst Railway, constructed by the London, Brighton, and South Coast Railway Company, was officially inspected by Colonel Yolland, Chief Inspector of Railways to the Board of Trade, and the line will be opened for traffic on Monday next.

At Dublin University, on Thursday week, the degree of Doctor, "in Utroque jure," was conferred on Mr. Bindon Blood Stoney, C.E., City Engineer of Dublin.

A new post-office is being built in St. Thomas-street, Weymouth, and will soon be opened. The style is Elizabethan, the lower part of frontage being of Portland stone, and the upper stories of red brick with stone dressings. The building has a frontage of 35ft., and a depth of 100ft. The plans were furnished by the Department; Mr. L. Bartlett is the contractor, and Mr. Jerrard, the foreman, the stone carving being executed by Mr. Peters, of Broadway.

Memorial-stones of new Wesleyan schools in Saltaire, Tewkesbury, were laid on Tuesday week: Messrs. T. Collins and Sons, of Tewkesbury, are the builders.

An inquiry was held at Torpoint, on Tuesday week, before Mr. Arnold Taylor, C.E., Local Government Board Inspector, with reference to an application from the rural sanitary authority of St. Germans, for sanction to borrow £6,000 for providing a water supply for the parish of Torpoint. The scheme was explained by the engineer, Mr. R. Wavish.

PARLIAMENTARY NOTES.

PREVENTION OF FLOODS.—The Rivers Conservancy and Prevention of Floods Bill, as amended by the Select Committee, was issued on Tuesday. The Bill contains two important changes affecting city and borough populations contained in the following new clause:—"The Council of a municipal city or borough having, according to the census for the time being in force, a population of not less than 25,000 inhabitants, may, on their application, be constituted, by the provisional order made by the Local Government Board, after such local inquiry as is required by this Act, a Conservancy Board for a district corresponding with the area of their municipal jurisdiction. The Local Government Board may also, on the application of any such Council, declare by provisional order that any expenses incurred by them as such Conservancy Board shall be defrayed either wholly or partially out of the city fund or city rate, or borough fund or borough rate, instead of in the manner in this Act provided for defraying the expenses of conservancy boards, and may also on the like application make the like provision in any case where the area of any such city or borough as aforesaid is constituted a sub-district of a conservancy district under this Act, and is placed under the charge of the Council as the committee for such sub-district." The new sub-clause introduced declares that no Conservancy Board, save so far as expressly authorised by provisional order confirmed by Parliament, shall be entitled "to interfere with in such manner as injuriously to affect the right to any waters, watercourses, springs, streams, or gathering grounds belonging or appropriated to or used by any municipal corporation or other local authority, or any incorporated company for the construction of waterworks and the supply and distribution of water, or the reservoirs or other works for the supply and distribution of water of such corporation, authority, or company, or to interfere with in such manner as injuriously to affect any works for the utilisation, treatment, or disposal of sewage, constructed under the express authority of any Act of Parliament."

ILLUMINATING LIGHTHOUSES BY GAS.—In reply to Mr. Gray, Mr. Chamberlain stated on Tuesday that the system of illuminating lighthouses by gas, patented by Mr. Wigham, of Dublin, had been strongly recommended by Sir William Thomson, F.R.S., and Professor Tyndall, Scientific Adviser to the Board of Trade, the Trinity House, and the Board of Irish Lights, but not to the exclusion of other systems. The Trinity House, in January, 1875, recommended the further development of the system in Ireland. The question of the hon. member suggested some official opposition to the system on the part of two distinguished officers of the Board, the Messrs. Douglas. It was their duty from time to time to offer their opinion on the systems of lighting, but on no occasion had they exceeded their duty in this respect.

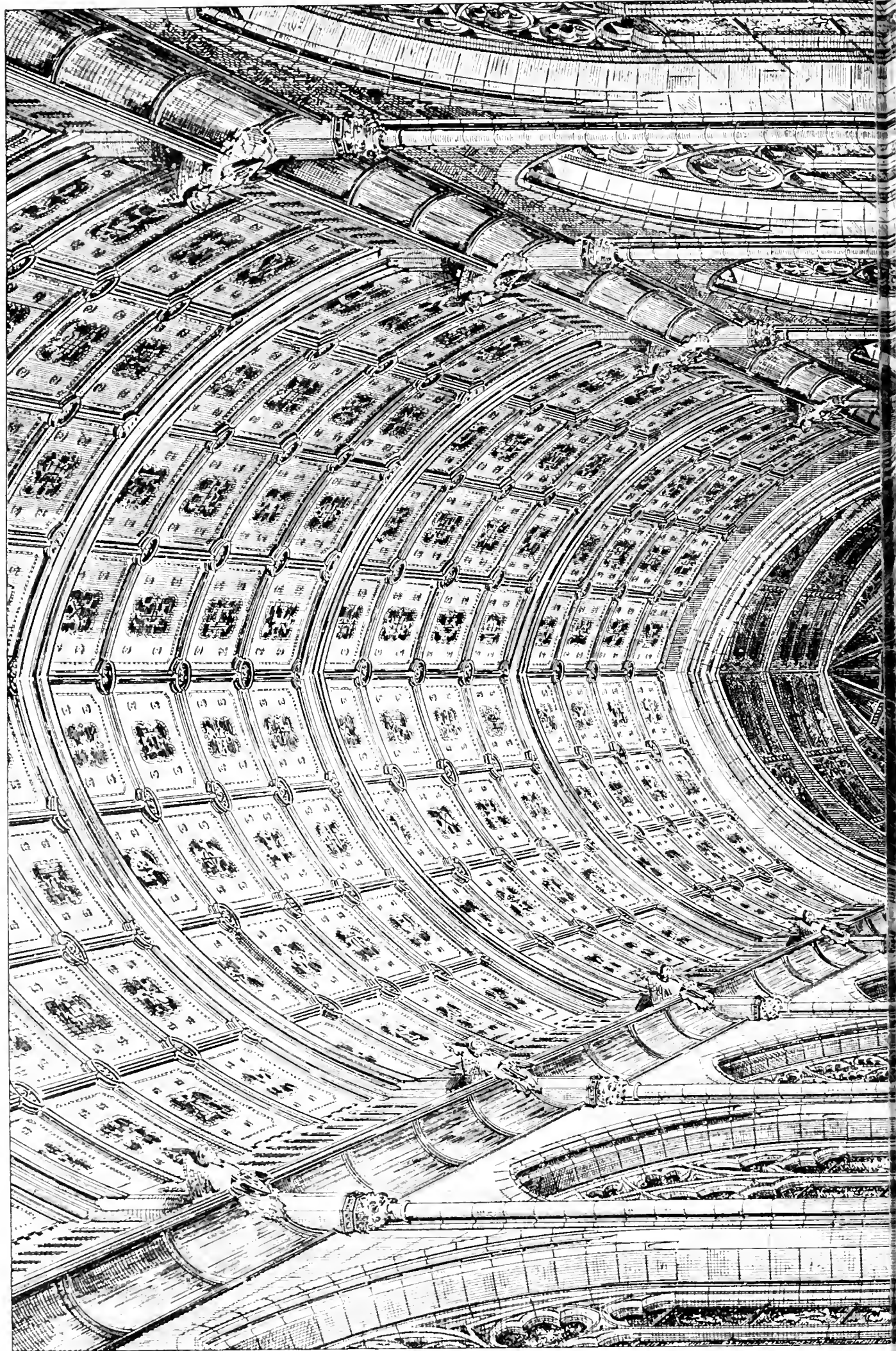
CENSUS (ENGLAND AND WALES) PRELIMINARY REPORT.—Lord Carrington, in laying this report on the table of the House of Lords, said, on Tuesday: The Census Act requires that the preliminary abstract of the census taken on the 4th of April last should be laid before Parliament within three months after the 1st of June. It is satisfactory that the Registrar-General has been able to complete this abstract at so early a date. This is not the time to go into particulars, but it may be interesting to know that the total population of England and Wales is now 25,968,286, being an increase since 1871 of 3,256,020. The rate of increase was higher than in any decennium since 1831-41. The birth-rate was unusually high, while the death-rate was still more unusually low. The higher birth-rate in 1871-81, as compared with 1861-71, implies the addition of 26,774 persons beyond the number according to the previous rate, while the lower death-rate implies that 299,385 persons survived who according to the previous rate would have died—a result which seems to show that modern sanitary legislation has produced useful and important effects. It may be added that the population of the metropolis is now 3,814,751, showing an increase of 569,311, while the population of the City of London has decreased by 24,414.

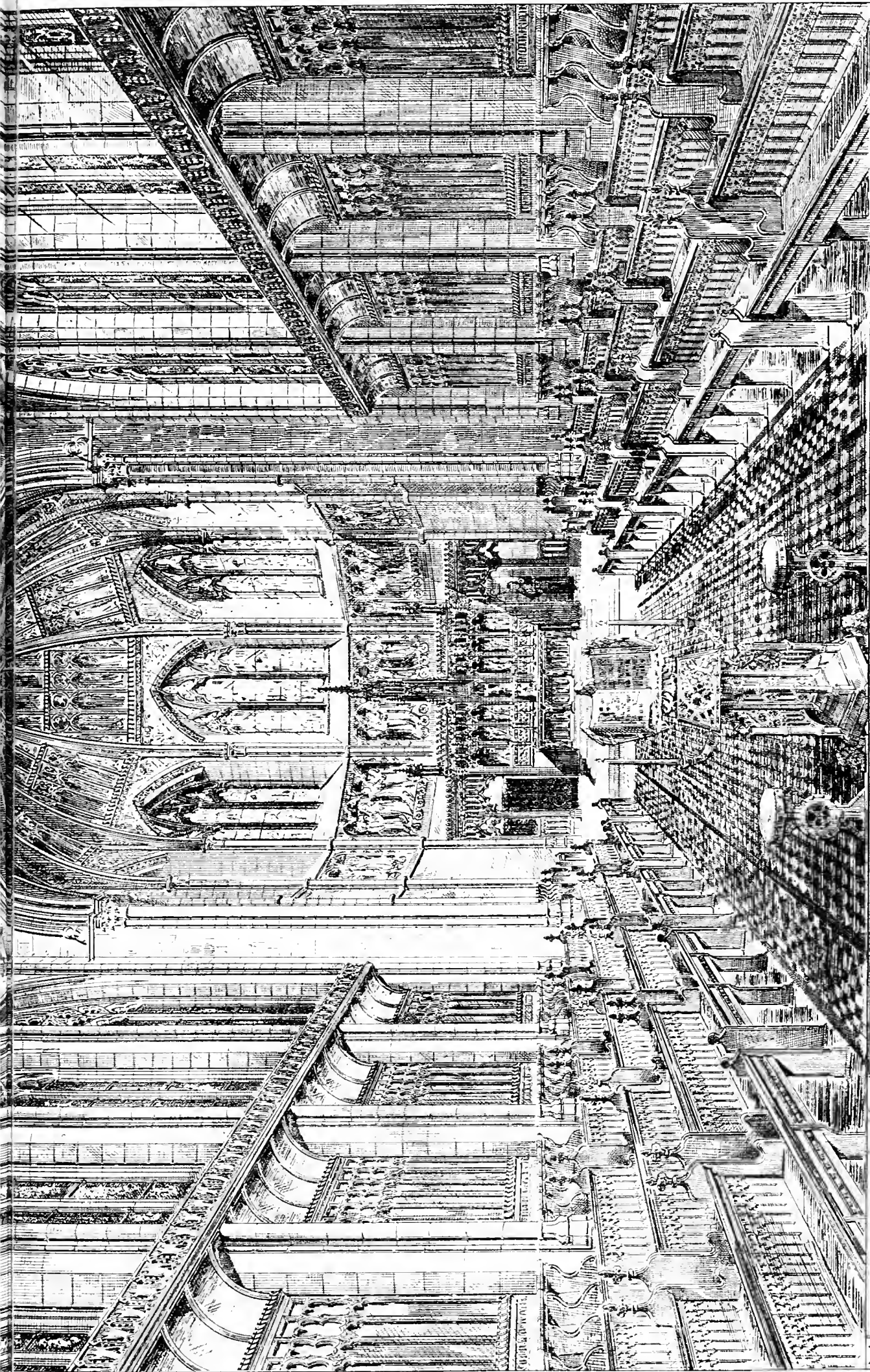
The village of Fochriw is being supplied with water by the rural sanitary authority of Merthyr. The contract has been taken by Mr. Gould, and is being carried out under the supervision of Mr. J. Jones, the surveyor to the sanitary authority.

It has been reported to the Margate town council that the Marine Drive, designed and constructed by Mr. Albert Latham, C.E., has cost the borough £39,550, or £19 per foot linear. The estimated expenditure was £40,000.

St. Michael's Church, Newquay, Cornwall, was reopened on Wednesday week, after enlargement, by the addition of a south aisle, accommodating 200 persons. The work has been carried out by Mr. Libby, of Newquay.

THE BUILDING DEWS, JUL. 8, 1881.



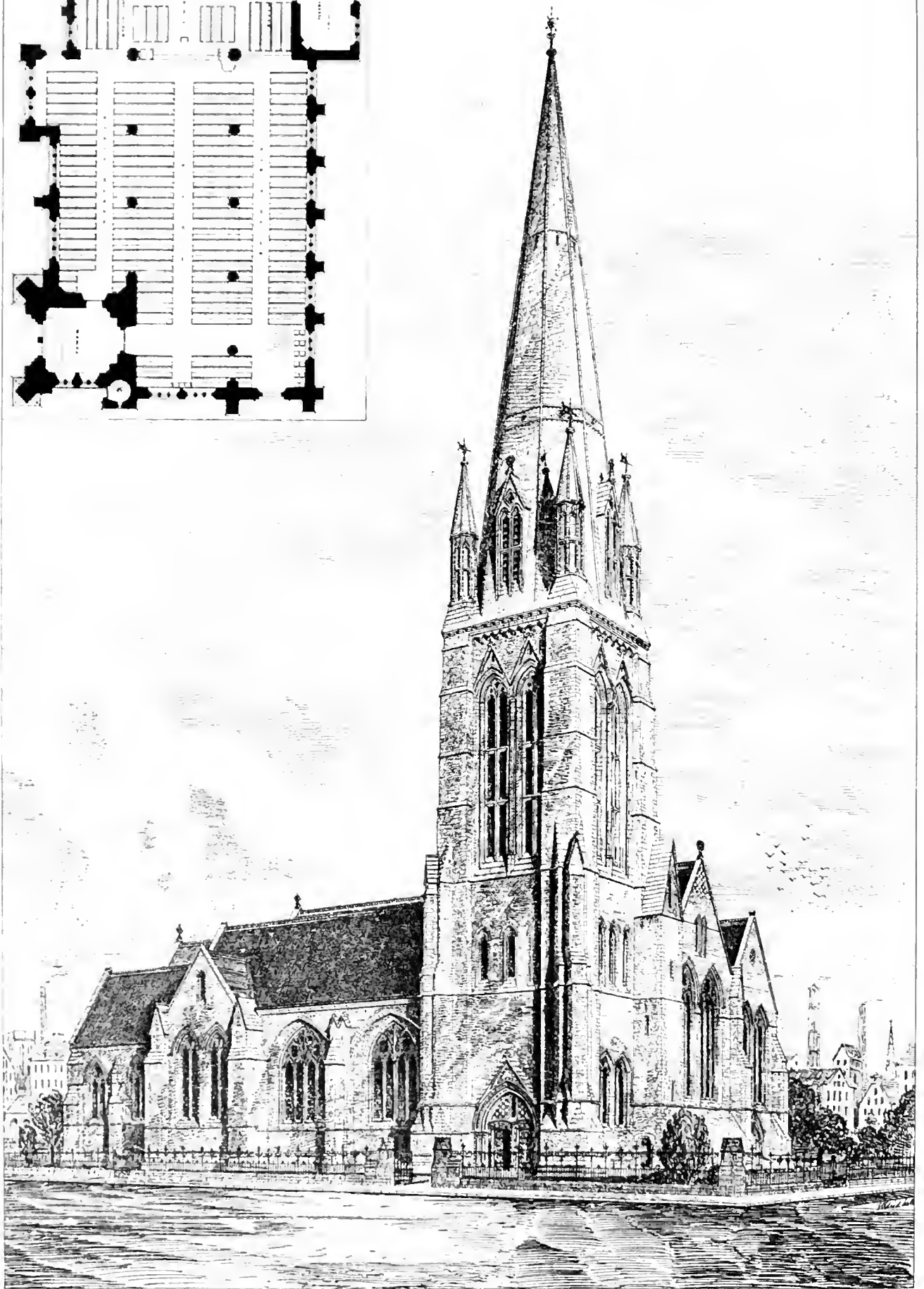
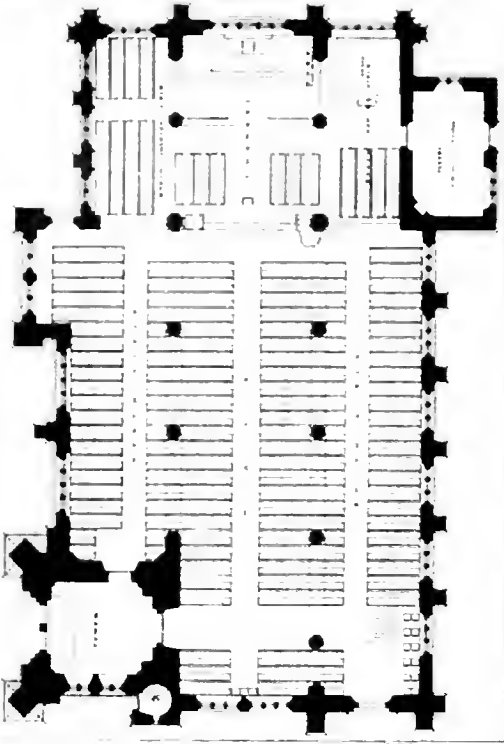


ST. CATHERINE'S : new : COPENHAGEN.

DENNIS HANSON.
Engraver 1879.

Photo. Lithographed & Printed by James Agnew & Sons, 15, Queen-Street, W.



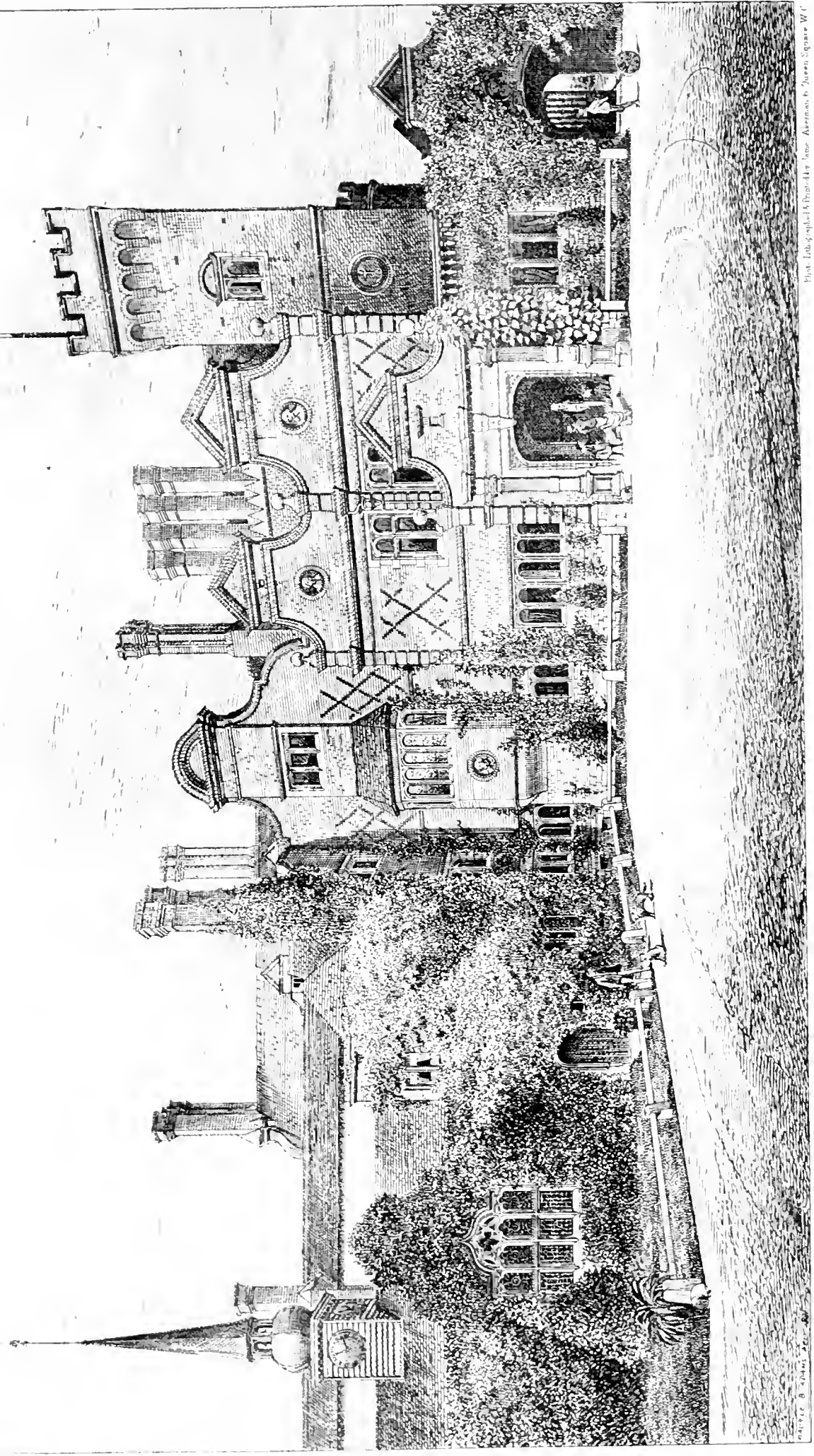


Photolithographed & Printed by James Atkinson & Co. Queen Square W.

HOLY TRINITY CHURCH, BURTON-ON-TRENT.
JOHN OLDRID SCOTT ARCHITECT

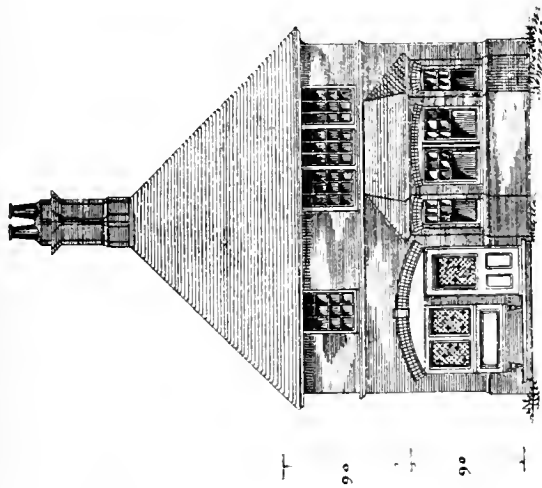
THE BUILDING DEWS, JUL. 8, 1881.

COOPER WARREN WINBLETON THE SELF OF B.W. CURRIE ESQ
GEORGE DENTY ARCHITECT

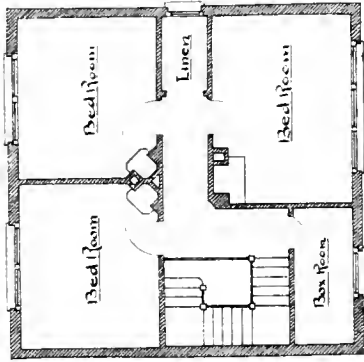


Printed by J. G. & J. H. Smith, 41, Ave. des Capucines, Paris.

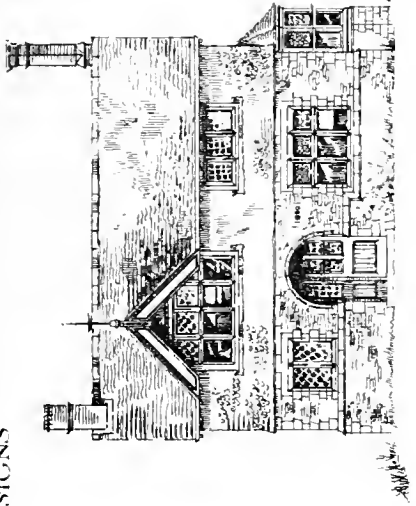
"Building News" DESIGNING CLUB A Game-keeper's Cottage
SELECTED DESIGNS



Front Elevation



Chamber Plan



Side Elevation



Rear

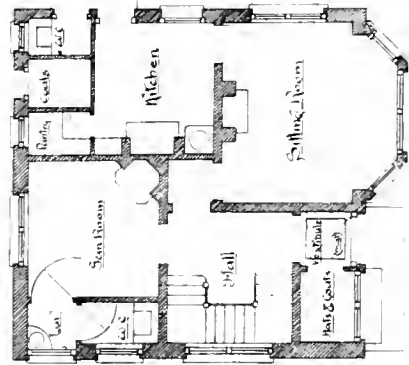
Side

"Quiet & Simple"

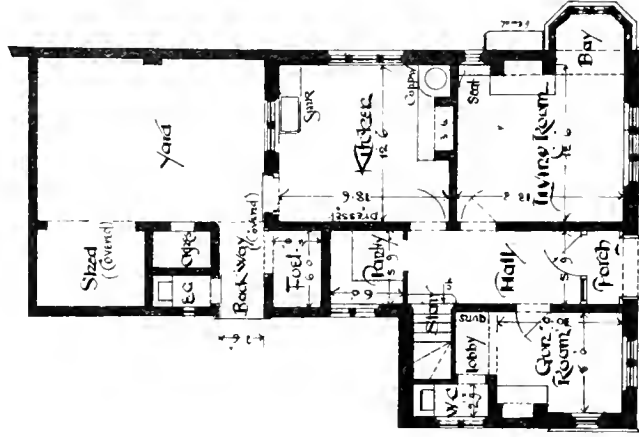
Notes.

The Walling either of Flint courses of rubble work, with dressed stone sills, or of Flint work with red brick sills + bonding courses - Dark brown tile roofs, Brightly for the Hanging, Lead cladding in windows

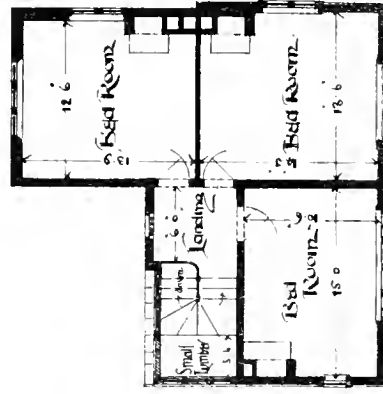
By "Tide"



Ground Plan



Ground Plan



First Floor Plan

'To a practical man, with a taste for mechanics, and bumps of constructiveness fairly well developed, we can give no higher mental treat than a couple of hours spent over the numbers of that truly marvellous publication the *Eng. Mechanic*. In a hundred and fifty odd pages that make up bulky mass of letter-press, there is recondite information on just every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of an orbit.—*The Brightonian*. Price Two pence of all newsmen, or 1 free 2½d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.
 Remittances and Post-office Orders to be made payable to FASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement is inserted for less than half-a-crown. Special terms for insertion of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound annum (post free) to any part of the United Kingdom; the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33s. 30c.). To India (via India), £1 10s. 10d. To any of the Australian Colonies, New Zealand, to the Cape, the West Indies, Canada, or Scotland, or Natal, £1 6s. 6d.

Mr. CHARLES WILSON, of 13 and 15, Laithe-street, New York City, is authorised to receive American subscriptions at the rate of 6 dols. 40c. per annum.

Mr. R. M. TUTTLE, of Titusville, Penn., U.S.A., is also authorised to receive subscriptions at the same rate. Charges for binding the half-yearly volumes, 2s. each.

NOTICE.

Vol. XII. commenced last week. In the present issue are published the title and index to Vol. XL., and bound volumes and cases will soon be ready.

N.B.—Bound volumes of Vol. XL. should be ordered at once (price Twelve Shillings), as only a limited number are done up. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete Vol. XL. just ended should order at once, as many of them are run out of print.

CEIVED.—H. and O.—P. and Son.—J. L. N.—C. Bros.—D. C. A.—E. F.—D. H. and Co.—E. Bros.—A. R.—J. C.—J. J. McL.—J. W. G.—B. L. Co.—L. and N.W.—T. Co.—H. J. H.—J. S. B.—C. J. F.—W. B. C.—I. T. G.—E. S. and Co.—N. U. and P.—W. W.—H. and S.—C. of K.—F. I. Co.—S. and H.—J. McD.—V. & R.

ASSOW. (Osgood and Co., Boston, Mass., U.S.A. price, including postage, 5½d. each copy.)

"BUILDING NEWS" DESIGNING CLUB.
 AWINGS RECEIVED.—Fiat, Lancaster, Per, Wall.

Correspondence.

NITARY PLUMBING AND PLUMBERS' WORK.

To the Editor of the BUILDING NEWS.

SIR,—To revert to Mr. Hellyer's third lecture, will be remembered that Mr. Hellyer asserted, building a house for himself, he would have in his traps for the w.c.

In his lecture of the 30th ultimo and 1st inst., he, however, adopts quite another theory, inasmuch as he said, "That where the trap was smaller than a waste-pipe, no good flushes could be sent rough such piping to cleanse it"; he also says at the inlet to the trap should be larger than the body of the trap (quite so), but I maintain that in general practice this cannot be done, and such theory will stand, for the following reasons:—Take an ordinary lin. lavatory basin, washer and plug (which is considered to be a large size), and have the strainer bars across it, what size trap would he require? Certainly not more than a ½ in.

Now, fancy any sensible plumber fixing a ½ in. trap and waste-pipe from a lavatory. It would be simply ridiculous. My idea is that they should never be less than from 1 in. to 1½ in. throughout, including washer and plug.

Next let us take that part of the lecture in your last week's issue, on page 9, line 20, 3rd column, where it speaks of Mr. Hellyer being frequently interrupted by suggestions for making the experiments more complete and fair. I may say that, although Mr. Hellyer stated he was not aware of the working model of the O-trap exhibited by him being extremely unfair, it nevertheless was so, which was soon detected by many other plumbers present, besides myself, and after the close of the meeting on Friday night last I pointed out to Mr. Hellyer several little things with his models, which were in favour of the O-trap, but dead against the working of O-trap. Now, if models of two kinds are exhibited working as a test one against the other, each should have the same chance; this, however, was not the case, thus:—Mr. H. had a small O-trap, made with glass sides, to show that it was not self-cleansing, and was exceedingly pressing upon this point, so much so that he gained much applause from the inexperienced portion of his audience, who could not detect the unfairness in the construction of the two models, whilst other old hands at the trade, seeing the great disadvantage under which the O model was working, certainly did frequently interrupt the lecturer, for which they were decidedly hissed; but to prove that they were justified in interrupting, I must call your readers' attention to the following fact—viz., the first night, the basin supplying the water to the O trap, was much smaller than the basin supplying the S-trap; this was rectified on Friday night. Next there was the O-trap made about 4 in. high, or nearly half the height of the ordinary closet-trap, having only a 1 in. outgo (if really so much); the dip which was only 1 in. pipe, should have been at least 1½ in. or 2 in. internal diameter, as also the outlet pipe, for, according to Mr. Hellyer's own teaching, it should, if possible, be larger than the body of the trap. Fancy this dip, only a "one-inch" pipe, which of course did not allow a large enough body of water to enter the trap at one time, so as to drive out the foul water; but even besides this, it was very evident there was something else radically wrong. What was it? On examination I found a "bar" fixed across the basin-washer, which retarded and split the current of water, thereby causing an immense eddy, which, to say the least, would interrupt the flow to about one half. I arrived at this conclusion in the following way: Noticing that the water was an unaccountably long time in running from the basin into the trap, I requested Mr. Hellyer to place another three pints of water in the basin, and then timing it by a stop-watch, was convinced that the water had not a clear passage. Again, another point—the relative fall from the basins into the traps. The S model had an advantage of at least 4½ in. out of about 12 in., and by all the laws of gravitation this must mean at least one-third increase of pressure, even provided that each trap had the inlet and outlet in proportion.

Now, seeing how unfairly these two models have been placed before the trade, can it be wondered, when a large manufacturer of the O-trap is present and sees the too palpable blunder in the manufacture of the models, that he should interrupt? All I can say is that had he not done so, many hundreds of the young members of the trade would have gone home impressed with the idea that they had witnessed a legitimate test of the relative value of the two traps. Mr. Hellyer, however, at the close of the meeting, endeavoured to convince me that he was right by transferring the supply-basin from the O to the S-trap, and it acted all right; but that is not the point at issue. Now, if Mr. Hellyer will put inlet and outlet pipes, "full bore" to the O-trap as he did in his model of the S-trap, it will then be a fair test, but as done at his last lecture, radically wrong, and, I say, unjust.

Now we come to the highly important and sanitary point—Ventilation.

What does Mr. H. want plumbers to believe by these words? "If absolute safety was needed, the Eclipse, the Power, and even the O-trap, must be ventilated,"—he says, on account of the siphonage. Now, I agree with him that every trap should be ventilated; but I take an exception in the case of the O-trap, so far as siphonage is concerned, though all traps should be ventilated to prevent the decay that must take place through chemical action on the lead,

a most important point that, for some unexplained reason, Mr. H. has never, in the most remote way, made any reference to, or, at least, that I am aware of. So important, indeed, is it, that a well-ventilated trap will last twenty times as long as one not ventilated, as traps having no ventilation are condensers, and the action of the pent-up carbonic acid, in conjunction with this condensed water, sets up a very powerful corrosion, and the surface of the trap above the water-line becomes one mass of, so to speak, ulcers, and when, by the action of the closet, the water is disturbed in the trap, it dissolves this oxide of lead, then this solution, formed on these corroded or eaten parts, rapidly absorbs more carbonic acid, and thereby creates a quantity of hydrated oxy-carbonate of lead (PbO, HO + PbO, CO₂), which is deposited in white scales.

A word or two, by way of caution to plumbers, as to what Mr. Hellyer said about pumps drawing water 32 ft.; let me say that no pump-bucket in the world will act in any way satisfactory, even at his depth of 5 ft. less, i.e., 27 ft., 20 ft. being the maximum any plumber should fix a bucket from the surface of the water in the well. For my part, I rarely exceed 12 ft.

As a concluding remark on this subject, I would remind your readers that we Society Plumbers have never disputed that the O-trap has the best chance of clearing itself of any foreign substance, such as gravel, sand, or other matter that will not float, and not usually thrown down a closet; but, in cases where there is not a good flush of water, it may often be noticed that portions of the soil remain on the inlet side of the trap.

Now, one of the great advantages that the O-trap possesses over the S-trap is, that it allows the soil much more readily to pass to the other side of the trap, where it is little or no consequence, and any common-sense person must know that this is better than floating about (as is very frequently the case) on the dip or pan side of the trap.

If the O-trap is so self-cleansing as Mr. H. has shown in his small glass models, why are nearly all small-sized O-traps made with cleansing-caps and screws, which we plumbers frequently have to open, to clear them of small pieces of soap, and other matters.—I am, &c.,

P. J. DAVIES, Hon. Mem. A.S.P., &c.

BUILDING-STONES.

SIR,—I can understand and respect Messrs. Pictor and Sons' partisanship for their Box-ground stone, but they have overlooked my point. As a weather stone, i.e., in the usually received sense of the term, ability to stand frost, I willingly allow their Box-ground stone the characteristic of excellent, supposing it to be quarried under right conditions, and that its natural bed be scrupulously retained. But what I maintained, and must continue to do, is that of all the Bath oolites the Box-ground is most affected by the steady action of a south-west exposure to severe storms, a damp climate, or a chemically affected atmosphere. The coarseness of the grain or quality of this stone is against the formation of that permanent glaze or case-hardening which, as I explained in my last letter, is the result of working the oolites fresh from the quarry, such being really the case with all stones in a greater or less degree.

I can well understand the process of slow and sure destruction is not so observable in the generally sheltered localities of the counties of Wilts and Somerset, the climates of which are amongst the driest in England; but I am quite sure that if an impartial examination be made of any of those buildings erected of Box-ground stone more than 20 years ago, and in positions to be affected by the conditions I have described, they will find the grading process steadily at work. In London this is, to a degree, most distressingly manifest; no one of any feeling or who possesses a genuine love for good, enduring work, can walk a mile in any direction, without having aroused in himself feelings almost of hatred—if I may be allowed to use the expression—against the persevering use of a stone so utterly wanting in all those qualities required, if the purposes of architecture is to be fulfilled—that of being a joy and a teaching to men—the actual reflex of the mind of the artist, and his expression of the honour and glory due to the Creator, or to himself, according to the principle from which he works.

One writer refers to the Grosvenor Hotel, Victoria, as being built of Corsham stone. A careful examination of this building confirms me in my belief, as expressed in my last letter, that this stone is the most lasting, if worked under the conditions I stated. I was particularly pleased to find that, so far, the hotel shows no signs of being anywhere affected by the trying London atmosphere. If such has been the result under the ordeal of the cleaning-down system, we may look for much more favourable results when this stone is allowed to protect itself by its own natural weather coat.

At the risk of making, I am afraid, my letter rather too long, I should wish to make one more remark upon the stone to be used in Truro Cathedral.

Would, that before finally closing the question, the committee could give the following principles their full weight and value, underlying as they do all true growth in architecture: That the building completely fulfil modern requirements; and that, used with all the skill and experience which modern science can supply, the very happiest results will follow upon using those materials which are the readiest to hand, and consequently the most available.

In Mr. Pearson's hands, than whom to my mind no architect of modern days has so thoroughly solved the problem of giving dignity and real character to his buildings by the use of the simplest materials, I am thoroughly convinced that the Cornish granite—a stone admirably expressive of the steady persevering character of Cornishmen, and characteristic of the ruggedness of their country, will readily assume and fulfil that thorough adaptation of means to an end, which is one of the first principles of successful designing. For a proof of this, I need only point to that admirable work, the Thames Embankment, than which no grander result has been obtained in this country, from following simple first principles.

What is the object of a cathedral but to express in the highest and stateliest manner possible, the principles of the religion of its founders?

We, as followers of that branch of the Church Catholic, the Church of England, do not need to be informed what our principles are: they are embodied in this text, "In quietness and in confidence shall be our strength." Simplicity, then, and dignity only are the characteristics required externally; and internally all is to bear the stamp of the "beauty of holiness," viz., the adornment of God's house by the appellation of all we hold most precious and most valued of the arts with which our bounteous Creator has so richly endowed us.

Used internally, Caen-stone, as a decorative stone, stands very high. Coming to be used, as it thus would, for window tracery, I believe the contrast with the granite would prove highly satisfactory, especially when time shall have toned down the vividness of the colouring of the two stones.

Trusting you may be enabled to find space for these few further remarks—I am, &c.,

July 6th.

DURABILITY.

SIR,—During a recent visit to King's College, Camb., I was surprised to find the recently-erected fountain showing such early evidences of decay. Whoever is responsible for the use of the cheap and inferior class of Portland stone used, I feel, will regret the folly of selection.

The west block of the quadrangle, erected in 1724 of Portland stone, and the magnificent chapel, erected during the intervening years from 1416 to 1515, of Barnack and Riche Abbey stone, are in a better state of preservation than the recently-erected fountain of two years ago.

Sir Christopher Wren stipulated in the conditions regarding the stone to be used in St. Paul's Cathedral, namely, each block to be subjected to five years' exposure on the coast previous to being shipped to London. Hence, we have a building in good preservation, although some of more recent time are in a state of decay.

Some reliable work on the history and behaviour of building-stones, under the varied conditions of the atmosphere in the towns of England, would be of immense value to the architectural profession, and could be readily obtained from the buildings of historic interest in every county.

Possibly, Mr. Armistead, R.A., the eminent sculptor, can account for the above unfortunate circumstance. An explanation will be of interest to the readers of your valuable journal during the present controversy regarding building-stones.—I am, &c.,

CANTAB.

SIR,—I should not have thought it worth while to further trespass on your valuable space had not Mr. Masey challenged the correctness of the fact of the specimens submitted by me to Mr. Kirkaldy being representative of my "Monks' Park Quarry." I affirm that they were fair and reliable samples taken from different beds, and not from a "hard bed" which Mr. Masey knows of, as that class of stone does not appear in my quarry.

Mr. Masey says, "it is not agreeable to common-sense to suppose that Mr. Sumsion's quarry is so different to all the rest of the oolitic deposits." As a matter of fact it is different, as all the beds throughout this quarry are as near as possible of one uniform colour and texture. Of this assertion Mr. Masey may convince himself by a personal visit.

In conclusion, I would say that most of the examples I mentioned of old buildings are either city or suburban. I could quote very many others were it necessary.—I am, &c.,

ISAAC SUMSION.

Bath Stone Office, 4 and 5, Newark-street,
Bath, 5th July.

SIR,—In reference to Mr. Trickett's remark, I beg to say that I do consider, in point of durability, that Beer stone is equal to any. The facts relative to the chapel at Westminster fully justify my assertion. I also wish architects to inspect the specimen of Beer stone in Holborn, as I assert there is nothing otherwise than pleasing in its appearance. In London, where in a few months everything is coated with soot, original tints, even if objectionable, are but of little consequence. But whether new or old, I prefer the appearance of Beer stone to what seems at the present time to be the favourite—Portland. Its patchiness of colour, as may be seen at the new Government Offices at Whitehall, interfering with the lines and light and shade of the architecture, deteriorates much the general effect. Some Gothic architects like patchiness, but in Classic architecture colour should be uniform.

Messrs. Pictor, I see, assert that "Box-ground" endures "under the most trying circumstances." Such is not my experience. I last week visited a celebrated house at Kensington. The balustrades, of ordinary Bath stone, were much decayed, and the main building, which is of "Box-ground," in two or three dozen places was showing signs of decay. Kensington is, I should say, a favourable place, whilst Holborn is the reverse. Yet Beer stone in the house-front in Holborn shows no sign of decay, though built at the same time as the mansion I have referred to in the better situation. Facts are stubborn things. Here are a couple which cannot be explained away. Bath stone, as at Buckingham Palace, cannot be safely used in London without painting it. This, whilst considerably adding to expense, takes away the character of stone. Cement might just as well, or in fact had better, be used: it is the superior material.—I am, &c.,

PHILIP E. MASEY.

24, Old Bond-street, W., July 6.

LONDON BUILDINGS.

SIR,—I have read in your ever-interesting columns the articles treating about the above, and emanating without a doubt from a sagacious pen.

May I be allowed to submit a suggestion of a point, which it seems has not been sufficiently touched upon?

A far greater blame and want than that of style and taste, or scale, is that in the use of materials. For what is the finest style and ornament, if executed in an unfit material? I will not venture, by enumeration of the latter, to raise controversies, but leave every one to form his own judgment from the facts before us. Look at the countless buildings in the main arteries of our metropolis: what an aspect their exterior presents! Parapets, balustrades, and cornices in a threatening condition, with their "bones" sticking out and saw-like edges, brackets, cappings, courses—all vying with each other in decaying, scaling off, and crumbling.

And what a legion of other buildings there exists, in the finest quarters too, where oil-paint, finger-thick levelling, and filling up in many cases what there is of bosses and enrichments, tides them over a number of years, till one neglect of the brush seals their fate too.

And all this in a climate which is known to put materials to the severest test, to which even some of the most durable succumb.

That class of buildings above alluded to cannot fail to be a disgrace to their constructors, a disfigurement to the metropolis, and an injury to our nation, which is renowned throughout the world for its substantial turn of mind and soundness of taste.

Let us, therefore, endeavour to dam this over-growing evil, and to build more "not for an age, but for all time."—I am, &c.,

MATERIALIST.

COMPETITIONS.

SIR,—In last week's issue of the BUILDING NEWS, "A Believer in Honest Competitions" tries to induce competitors to refrain from venting their grievance in your columns. In the particular case, viz., the Winchcombe School competition to which he refers, I quite agree with him in deprecating the correspondence which has taken place.

I was a competitor, and, as far as I know, the competition was carried out in a straightforward and satisfactory manner. I was also a competitor for the new church at Windermere; but the arrangements were not satisfactory, and this is what I wish particularly to bring before your notice—not from any personal feeling in the matter, but from a conviction that the unfair treatment which competitors are occasionally subjected to is to be remedied by publicity alone.

The designs were sent in, carriage paid, on the 11th June, and about three weeks after I received the printed circular inclosed.* This is all the information that has been deemed sufficient for competitors to have, and besides the insult of leaving unsuccessful competitors in ignorance of the successful architect, an injury was inflicted when the drawings were returned, the cost of carriage unpaid. More than a week since I wrote to the chairman of the committee asking for information; but my temerity in doing so has been treated with the silent contempt that I suppose he thinks it merits.—I am, &c.,

QUID.

CLERICAL COURTESY.

SIR,—I don't know what you think about the inclosed circular, but I think it is cool impertinence not even to say whether a design has been selected, and if so, whose.—I am, &c.,

"ONE OF THE FOOLISH."

Windermere Rectory, June 20, 1881.

DEAR SIR,—By desire of the Committee I beg to return, with their best thanks, the Plans sent by you for the New Church at Windermere.—I am Sir, your faithful servant.

EDW. P. STOCK.

THE WOOD-CARVING AT THE HOUSE OF LEOPOLD ROTHSCHILD, ESQ., HAMILTON-PLACE, W.

SIR,—Through the kind influence of Mr. I. Jackson, of the firm of Messrs. Jackson and Son, Rathbone-place, Oxford-street, the woodcarvers of London obtained special permission last Saturday afternoon, from 3 to 5, to see the woodcarving at the house of Leopold Rothschild, Esq. Two hundred cards for admission were distributed by the Secretary of the Society of Woodcarvers, the majority of whom visited the house in Hamilton-place on Saturday, and expressed their admiration of the work that has been done. The work in the library, done by Italian woodcarvers, well sustains their character, both for design and execution; at the same time great credit is due to the firm of Messrs. Jackson and Son for the work that has been done by them, and will bear favourable comparison with any work in that style. In fact, the whole of the work, so far as we were able to judge on Saturday (not forgetting the marble-carving by Mr. Forsyth, and plaster decorations of the upper rooms by Messrs. Collinson and Luck), deserve great praise, and was very much admired. We hope to be allowed to see the work again when everything is finished.—I am, &c.,

W. SANDLANDS,

Secretary, Society of Woodcarvers,
119, Great Titchfield-street.

* The circular is identical with that appended by another correspondent.—Ed.

THE RECENT ELECTION AT THE ROYAL ACADEMY.

SIR,—I still think "A. B." is incorrect in saying that "it seems to be particularly the case with regard to architecture that men of distinguished merit are passed over by the R.A., and others of less note are elected."

After the insinuations in his letters, it is quite unnecessary for him to dispute with me whether the present list of architectural Academicians and Associates does or does not contain the names of second-rate men.

He "wonders upon what possible grounds the recent election can have been made," with three such men as those he names standing outside the door. I contend the new A.R.A. is in every sense an architect; and, moreover, he is a leading artist, and that these are the grounds upon which he was elected.

I am sorry that it should be necessary to explain this; but so it seems that such as he are not as generally known as those who are in a "large way of business," and I suppose this is the reason why "many persons outside the world of artists are in much amazement."

I quite think it to be a question of artistic ability, yet I could not help expressing a regret that in our Academy of Arts Classic work is not properly represented by architects.—I am, &c.,

ONE WHO WAS NOT SURPRISED.

29th June.

Intercommunication.

QUESTIONS.

[6558.]—**Staircasing.**—Will some one kindly give list of some reliable works on staircasing, with prices, particulars, and opinion of same?—SNAWSEBURY.

[6559.]—**Assize Courts.**—Would any architects who have built assize courts, kindly give the cost in round numbers, for the information of the querist? Durham has been named as a good example as to arrangement, cost, ventilation, &c. Perhaps the architect would be good enough to reply to this.—SPENCER.

[6560.]—**Bearing Loads.**—Will you kindly inform me, through your columns, a safe formula for calculating the safe bearing load for a cross stanchion in section (cast iron)? I should also be glad to know which is the best method for calculating safe loads for cast iron columns, and H and I stanchions. Is there a calculator published which will give this?—ENOXBOROUGH.

[6561.]—**Well Pudding.**—Having sunk a well and steened same with 1½ in. ring, I now wish, by puddling, to effectually exclude all surface-water, &c. Will some reader kindly tell me what thickness of clay is required, how much more brickwork there should be in the rings, and whether the same should be in cement or mortar? The well is 35ft. deep, and the stratum of clay commences at a depth of 18ft.—CONWAY SUBSCRIBER.

[6562.]—**Defective Rain-Water Tank.**—A circular tank, 7ft. diameter and about 5ft. deep, leaks, hard water percolates through the sides, and renders tank of no use. The sides are 1½ in. brickwork, and puddled behind with clay. Portland cement has been tried, and will not answer; also a mixture of plaster and cement. Wanted to know any method of cementing the tank so as to avoid digging down outside the brickwork, or the use of asphalt as being too expensive.—THE USER.

[6563.]—**Durer's Works.**—Where can I obtain reproductions of Durer's drawings and paintings? Some have, I know, appeared in your journal. A reference to biographical notice or book will also oblige.—G. W. T.

REPLIES.

[6549.]—**Portland Cement Mouldings and Flat Surfaces.**—I am thankful to "Plasterer" for his reply, which is well put and useful, but not to the point required. The work is finished, and the information sought is—What composition as a preservative should be applied that would not have the oily look of paint, a composition that will act as a preservative and leave the cement surfaces more of a transparent and stone-like appearance.—STONE FINISH.

[6551.]—**Decoration.**—I would recommend "Occupier" to select a dado in which the lighter ground-colour was of a cream tint. A shade or two darker might be better, and the pattern would harmonise very well if it was a warm citron or chocolate colour, of course darker in tone than the wall-paper.—G. H. G.

The completion of the first section of the proposed enlargement of St. Peter's Church, Bedford, was celebrated on Wednesday week: it consists of an extension of the north aisle, providing 50 additional sittings. The arcade and window-dressings are of Corsham Bath stone, and the roof is higher than that over older portion of aisle. Mr. J. Piers St. Aubyn, of London, was the architect, and Mr. William Osborne, of St. Neot's, Hunts, the contractor; the cost was about £350. The other contemplated works include new organ-chamber and vestry, lengthening of south aisle, adding a staircase turret to the central tower, and removal of pulpit to new position.

The *Liverpool Journal of Commerce* says it is expected that a large quantity of Canadian cement will be shipped to Europe this fall.

LEGAL INTELLIGENCE.

LIABILITY OF CONTRACTORS TO MAKE GOOD DAMAGE TO ROADS.—Mr. Alexander Glen, barrister, of London, has had a case submitted to him by the Stratford-on-Avon Highway Board as to the liability of owners, contractors, or sub-contractors to make good damage to public roads caused by excessive traffic. Mr. Glen's opinion just given is interesting to public bodies throughout the kingdom. The Board's case is somewhat peculiar and complicated. Mr. Carlile, a large landowner, of Grafton, a parish about six miles from Stratford-on-Avon, in 1878 commenced to build a large mansion, which has since been completed. Mr. Lovatt, of Wolverhampton, being the contractor, the bricks being supplied from Mr. Espley's brickyard, at Stratford, and were delivered by carts belonging to different persons, including some Grafton farmers, and also by Messrs. Ball and Horton, who used a traction-engine, with broad-wheeled road-trucks. The roads leading from the brickyard to Grafton are under the management of the Board. The surveyor of the Board certified that the expense of the repairs of the road in question in 1879 exceeded by £116 5s. 10½d. the average cost of the two preceding years. Counsel was informed that a provisional order had been made for the dissolution of the Board, but it had not yet been confirmed, nor, if it be confirmed at the ensuing Sessions, to be held in July, could it yet be settled at what date the dissolution would take place. Counsel was requested to advise the Board (1) whether they had a right, under section 23 of 41 and 42 Vic., c. 77, or otherwise, to compel the payment of any sum of money, and if so, by whom and what process? (2) To advise the Board as to what steps they had better take under the circumstances. Mr. Glen's opinion on the case is as follows:—(1) "If it appears from the surveyor's certificate, and can be proved, that the excess of the expenditure on the roads in 1879 over the expenditure on them in previous years was due to the carting of bricks for Mr. Carlile's house, both in carts and trucks, drawn by a traction engine, they are in my opinion entitled to recover such excess from the person or persons 'by whose order' the traffic was conducted, under section 23 of the Highways and Locomotive (Amendment) Act, 1878. It is suggested that the traffic was conducted 'by the order,' within the meaning of that section, of (a) Mr. Carlile, for whom the house was built (b) Mr. Lovatt, the builder, who contracted to erect the house; (c) Mr. Espley, who supplied the bricks; or, (d) Messrs. Ball and Horton, and others, who, as I understand, contracted with Mr. Espley, to carry the bricks from his brickyard to the site of the house. Now, in the case of Williams v. Davies (44, J. P. 347), where a timber merchant bought timber near a railway station, and contracted with carriers for the carriage of it to the station, it was held that the merchants, and not the carriers, ought to repay the extra expenditure on road repairs rendered necessary by reason of the carriage of the timber. Now, it was for the benefit of Mr. Carlile, and it was a necessary incident to the orders which he gave and which the builder agreed to carry out, for the erection of the house, that the bricks were carried over the road; and, although the point is not free from doubt, I think that, on the principle of the above case, Mr. Carlile cannot escape his primary liability under the section because he employed a contractor to do all that was requisite (including the carriage of the bricks) for the erection of the house, or because the contractor carried out his contract, through sub-contractors, in such a manner as to damage the roads. (2) The dissolution of the district not being completed, the provisional order for its dissolution need not prevent the Highway Board from proceeding to recover the expenses in question summarily before the magistrates, at petty sessions; and I think that such proceedings should rather be taken against Mr. Carlile than against any of the other persons above-mentioned—(Signed) ALEXANDER GLEN, 4, Garden-court, Temple." Should Mr. Carlile decline to pay the amount demanded by the Board, viz., £116 5s. 10½d., the clerk has been instructed to take legal proceedings against him to enforce payment.

IN RE C. SAMUELS.—The bankrupt, carrying on business as a builder at East Dulwich, applied on Tuesday to pass his public examination. His balance-sheet showed liabilities amounting to £1,770; fully-secured debts, £1,850; with assets, inclusive of a large estimated surplus from property in the hands of secured creditors, £2,919. The bankrupt, after some opposition, passed his examination.

BIG BEN AND SIR EDMUND BECKETT.—STAINBANK v. BECKETT.—The trial of the action of libel against Sir Edmund Beckett for statements published in the *Times*, having reference to the founding of Big Ben, was concluded on Tuesday in the Queen's Bench Division of the High Court of Justice. Mr. Baron Huddleston, in summing up the case to the jury, went fully and carefully into the history of the bell, its casting, and defects; likewise into the history of the former action and of the present. There were three several letters or statements which

the jury would have to consider—viz., (1) the letter of the 31st of October, 1878, in which the defendant had said that Big Ben was a disgrace to its founders; (2) the letter of the 20th November, 1878, in which the expression "oldest and worst of the foundries in England" occurred; and (3) the letter of January, 1879, in which the defendant repeated his charge against Mears, but disavowed any intention of referring to the plaintiff. As to each of these, he would put three questions to the jury:—(1) Were the words libellous in themselves? (2) Were they libellous of the plaintiff? (3) Did they exceed fair comment upon matters of public interest? The jury, after an absence of about three-quarters of an hour, returned an affirmative answer to these questions in respect of the letter of the 20th of November, 1878, only, and awarded to the plaintiff damages £200.

ALLEGED INFRINGEMENT OF GLAZING PATENT.—(Before Lord Rutherford Clark, in the Outer House at Edinburgh, on June 24.)—S. and I.—The Pennycook Patent Glazing and Engineering Company (Limited) v. Mackenzie, Harley, and Co.—The Lord Ordinary was engaged recently hearing evidence in this case, in which the complainers, a Glasgow Company, asked interdict against the respondents, engineers, Hope-street, Glasgow, infringing letters-patent granted to the pursuers in May and November, 1879, for the invention of "new and improved constructions of self-glazing or glass-fixing sheet-metal bars for window-sashes, roof, and frame-lights for green-houses, garden-frames, vineries, conservatories, sheds, and other structures, where glass was required for the admission of light." The defence was a denial of the validity of the pursuers' patent, and, assuming its validity, of the alleged infringement of it. His Lordship has now issued an interlocutor, in which he assizes the defenders from the conclusions of the action, and with expenses. In a note to his interlocutor, he says: The patent is assailed on various grounds. But after the proof, it was evident that the only important challenge depended on the allegation that, before the provisional specification was lodged, the patentee had himself published the invention by exhibiting the patented articles at the show of the Glasgow Agricultural Society on 7th, 8th, and 9th May, 1879. In the opinion of the Lord Ordinary, the allegation has been proved. If the witnesses for the respondents are speaking the truth, it is plain that the patent is bad, and the Lord Ordinary sees no reason to doubt either their accuracy or their honesty. After the evidence of the respondents was closed, the complainers asked for an adjournment to lead proof in replication that they had received explicit notice on record, and that they had entered on the point in their evidence-in-chief. The Lord Ordinary refused the motion. He did not think it right that the complainers should have an opportunity of seeking out the evidence with which they should have been prepared at the beginning of the case. If the Lord Ordinary is right, so far of course there is an end. But even if the patent were valid, he is of opinion that there has been no infringement.

STATUTES, MEMORIALS, &c.

THE SCOTT MEMORIAL.—The memorial to the late Sir George Gilbert Scott, in the form of a brass, is now being laid over his grave in the nave of Westminster Abbey. The Dean will uncover the same on Wednesday next, the 13th July, at 12 o'clock, and it is hoped that a few of Sir Gilbert's old friends will be present. The memorial has been erected by public subscription. The brass, already illustrated in our pages, was designed by Mr. Geo. Edmund Street, R.A., and has been executed by Barkinton and Kraal, of Regent-street. The marble work was undertaken by Messrs. Farmer and Brindley.

NEW STATUES.—A new statue of Mr. Gladstone, executed by Mr. Albert Bruce Joy, will very shortly be sent to the foundry at Thames Ditton, and when cast in bronze, will be set up in the east end of London. It is presented to the citizens of London by Mr. Theodore Bryant, of the firm of Bryant and May, and is over 9ft. in height. Mr. Gladstone is represented standing in the act of delivering an address. The costume is the ordinary morning dress of the 19th century gentleman, with the addition of a loose overcoat, thrown open in front. The work has been seen by a great many people, and last week Mr. Joy was honoured by a visit from the Prince of Wales. Sir Stafford Northcote, Mr. Bright, Mr. W. H. Smith, Lord John Manners, and other Members of Parliament have also inspected the statue, for which Mr. Gladstone sat a few weeks ago.—The Harvey Centenary Memorial statue, in bronze, which was sent to the South Kensington Museum for the *consecrazione* of the Harveian Society, has now returned to Mr. Joy's studio, where it will remain until the unveiling, which will take place at Folkestone (Harvey's birthplace) on the 6th of August, during the great international meeting of medical men which takes place in London this year. This statue is also of colossal size.

Our Office Table.

A PRIVATE visit was paid to the Channel Tunnel experimental works at Abbot's Cliff, on Saturday week, by the chairman of the South-Eastern Railway Company and a party of scientific and other gentlemen. Very satisfactory progress was found to have been made with the boring operations since the last visit, the heading having been advanced to a total length of upwards of half a mile. The tunnel is kept perfectly free from any accumulation of water by the pumps, and a good average rate of advancement in the boring is maintained. There is no alteration in the nature of the strata. The work at the new shaft at Shakespeare's Cliff promises to be even more successful, a very superior boring machine being used. The progress of the work is considered satisfactory.

The annual meeting of the members of the Association of Municipal and Sanitary Engineers and Surveyors is being held at Birmingham, yesterday, to-day, and to-morrow. At noon, yesterday, the election of officers and other association business was transacted, after which the president delivered his inaugural address. The outfall sewage-works and the sewage-farm at Salford were then inspected, and also the intercepting works in Montague-street, both of which were explained by the borough surveyor. The annual dinner took place in the evening at the Queen's Hotel. To-day there will be a discussion upon the local works visited the previous day, and papers, which will be read. To-morrow the Corporation Gas and Water Works will be visited and inspected.

We announced, recently, that Mr. T. Roger Smith was a candidate for the appointment of Professor of Architecture at University College. Mr. Roger Smith has been appointed, and at the same time the council of the college have marked their sense of Professor Lewis's past services by appointing him Emeritus Professor.

We may once again remind readers that the Parkes Museum of Hygiene International Medical and Sanitary Exhibition is to be held at South Kensington, from July 16th to August 13th. The opening ceremony takes place at the Royal Albert Hall on Saturday, July 16th. The President, the Right Hon. Earl Spencer, K.G., will take the chair at 4.30 p.m., supported by the Right Hon. Earl Granville, K.G.; the Right Hon. John G. Dodson, M.P.; Sir James Paget, Bart., D.C.L., LL.D., F.R.S.; and Mr. John Eric Erichsen, F.R.S.

THERE is every reason to believe that the Fine Art Exhibition to be held in the New Infirmary, Bolton, during the approaching autumn will be a great success. About a thousand pictures, including many important works by well-known artists, have already been promised, also the loan of collections of objects of interest, which will be exhibited in some of the smaller rooms. Among these will be examples of the best old and modern china, both English and foreign, old armour, tapestries, and manuscripts. The Science and Art Department, South Kensington, are also sending a valuable contribution, which will fill one of the large rooms. Any further offers of the loan of articles for exhibition should be made at once, as the committee are busy with the classification of the various departments. The exhibition will be opened in September, remaining open for about three months, during which time, among other attractions will be a number of musical and other entertainments.

The thirtieth annual meeting of the Birkbeck Building Society was held yesterday (July 7th) in the Theatre of the Birkbeck Literary Institution. The report presented to the meeting stated that the receipts for the year ending 31st March last were £7,117,563, or an increase of £1,137,831 over those of the previous year, and the total for the commencement of the society, £56,912,588. The deposits reached the large sum of £5,789,088. The gross profits earned by the society amounted to £108,721, of which £89,759 have been appropriated to the payment of interest on shares and deposits, discount, and expenses of management, leaving a net profit of £18,962, which, added to the previous balance, £14,281, up the total of undivided profits to £33,243. The dividend for the year ending 31st March last was 10s. 6d. per share, or 10s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 21s. 12d. per share, or 21s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 32s. 6d. per share, or 32s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 43s. 12d. per share, or 43s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 54s. 6d. per share, or 54s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 65s. 12d. per share, or 65s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 76s. 6d. per share, or 76s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 87s. 12d. per share, or 87s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 98s. 6d. per share, or 98s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 109s. 12d. per share, or 109s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 120s. 6d. per share, or 120s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 131s. 12d. per share, or 131s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 142s. 6d. per share, or 142s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 153s. 12d. per share, or 153s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 164s. 6d. per share, or 164s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 175s. 12d. per share, or 175s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 186s. 6d. per share, or 186s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 197s. 12d. per share, or 197s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 208s. 6d. per share, or 208s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 219s. 12d. per share, or 219s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 230s. 6d. per share, or 230s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 241s. 12d. per share, or 241s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 252s. 6d. per share, or 252s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 263s. 12d. per share, or 263s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 274s. 6d. per share, or 274s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 285s. 12d. per share, or 285s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 296s. 6d. per share, or 296s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 307s. 12d. per share, or 307s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 318s. 6d. per share, or 318s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 329s. 12d. per share, or 329s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 340s. 6d. per share, or 340s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 351s. 12d. per share, or 351s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 362s. 6d. per share, or 362s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 373s. 12d. per share, or 373s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 384s. 6d. per share, or 384s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 395s. 12d. per share, or 395s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 406s. 6d. per share, or 406s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 417s. 12d. per share, or 417s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 428s. 6d. per share, or 428s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 439s. 12d. per share, or 439s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 450s. 6d. per share, or 450s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 461s. 12d. per share, or 461s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 472s. 6d. per share, or 472s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 483s. 12d. per share, or 483s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 494s. 6d. per share, or 494s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 505s. 12d. per share, or 505s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 516s. 6d. per share, or 516s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 527s. 12d. per share, or 527s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 538s. 6d. per share, or 538s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 549s. 12d. per share, or 549s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 560s. 6d. per share, or 560s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 571s. 12d. per share, or 571s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 582s. 6d. per share, or 582s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 593s. 12d. per share, or 593s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 604s. 6d. per share, or 604s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 615s. 12d. per share, or 615s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 626s. 6d. per share, or 626s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 637s. 12d. per share, or 637s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 648s. 6d. per share, or 648s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 659s. 12d. per share, or 659s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 670s. 6d. per share, or 670s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 681s. 12d. per share, or 681s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 692s. 6d. per share, or 692s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 703s. 12d. per share, or 703s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 714s. 6d. per share, or 714s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 725s. 12d. per share, or 725s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 736s. 6d. per share, or 736s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 747s. 12d. per share, or 747s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 758s. 6d. per share, or 758s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 769s. 12d. per share, or 769s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 780s. 6d. per share, or 780s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 791s. 12d. per share, or 791s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 802s. 6d. per share, or 802s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 813s. 12d. per share, or 813s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 824s. 6d. per share, or 824s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 835s. 12d. per share, or 835s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 846s. 6d. per share, or 846s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 857s. 12d. per share, or 857s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 868s. 6d. per share, or 868s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 879s. 12d. per share, or 879s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 890s. 6d. per share, or 890s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 901s. 12d. per share, or 901s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 912s. 6d. per share, or 912s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 923s. 12d. per share, or 923s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 934s. 6d. per share, or 934s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 945s. 12d. per share, or 945s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 956s. 6d. per share, or 956s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 967s. 12d. per share, or 967s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 978s. 6d. per share, or 978s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 989s. 12d. per share, or 989s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1000s. 6d. per share, or 1000s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1011s. 12d. per share, or 1011s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1022s. 6d. per share, or 1022s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1033s. 12d. per share, or 1033s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1044s. 6d. per share, or 1044s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1055s. 12d. per share, or 1055s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1066s. 6d. per share, or 1066s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1077s. 12d. per share, or 1077s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1088s. 6d. per share, or 1088s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1099s. 12d. per share, or 1099s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1110s. 6d. per share, or 1110s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1121s. 12d. per share, or 1121s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1132s. 6d. per share, or 1132s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1143s. 12d. per share, or 1143s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1154s. 6d. per share, or 1154s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1165s. 12d. per share, or 1165s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1176s. 6d. per share, or 1176s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1187s. 12d. per share, or 1187s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1198s. 6d. per share, or 1198s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1209s. 12d. per share, or 1209s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1220s. 6d. per share, or 1220s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1231s. 12d. per share, or 1231s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1242s. 6d. per share, or 1242s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1253s. 12d. per share, or 1253s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1264s. 6d. per share, or 1264s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1275s. 12d. per share, or 1275s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1286s. 6d. per share, or 1286s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1297s. 12d. per share, or 1297s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1308s. 6d. per share, or 1308s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1319s. 12d. per share, or 1319s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1330s. 6d. per share, or 1330s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1341s. 12d. per share, or 1341s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1352s. 6d. per share, or 1352s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1363s. 12d. per share, or 1363s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1374s. 6d. per share, or 1374s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1385s. 12d. per share, or 1385s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1396s. 6d. per share, or 1396s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1407s. 12d. per share, or 1407s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1418s. 6d. per share, or 1418s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1429s. 12d. per share, or 1429s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1440s. 6d. per share, or 1440s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1451s. 12d. per share, or 1451s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1462s. 6d. per share, or 1462s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1473s. 12d. per share, or 1473s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1484s. 6d. per share, or 1484s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1495s. 12d. per share, or 1495s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1506s. 6d. per share, or 1506s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1517s. 12d. per share, or 1517s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1528s. 6d. per share, or 1528s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1539s. 12d. per share, or 1539s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1550s. 6d. per share, or 1550s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1561s. 12d. per share, or 1561s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1572s. 6d. per share, or 1572s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1583s. 12d. per share, or 1583s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1594s. 6d. per share, or 1594s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1605s. 12d. per share, or 1605s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1616s. 6d. per share, or 1616s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1627s. 12d. per share, or 1627s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1638s. 6d. per share, or 1638s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1649s. 12d. per share, or 1649s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1660s. 6d. per share, or 1660s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1671s. 12d. per share, or 1671s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1682s. 6d. per share, or 1682s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1693s. 12d. per share, or 1693s. 12d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total of 1704s. 6d. per share, or 1704s. 6d. per £100, which, added to the previous dividend of 10s. 6d. per share, or 10s. 6d. per £100, makes a total

THE BUILDING NEWS.

LONDON, FRIDAY, JULY 15, 1881.

VARIATIONS AND ADDITIONS.

ONE of the responsibilities incurred by the architect is that of ordering alterations and additional works, and there is no other part of a building contract which causes him so much uneasiness and anxiety in the adjustment of the accounts. An employer places implicit confidence in his architect; he believes, and not unreasonably, that the plans and specifications have been prepared with every regard for the completeness of the building, notwithstanding probably his own inability to see that certain requirements have been duly incorporated in those documents. It happens frequently that each party has put too much confidence in the other. The architect believes his plans represent his client's wishes in every essential point. The employer, full of expectation, thinks his professional adviser could not have misled him, while the builder interprets the meaning of plans and specifications in a sense different from both, and with an evident desire to conform so close to their letter, that it is better to omit what is not clear than to do too much. A contractor is not much given to inference, though in every well-drawn contract he is enjoined to carry out all work which, in the opinion of the architect, may be fairly inferred from the plans and specifications, even though not clearly specified. The shortcomings of the architect, and the close-shaving of the contractor, rarely reach the anticipations of the employer, so that all three are occasionally disappointed. It is much to be regretted that clients who have little or no knowledge of building, and cannot read a set of plans, do not consult someone who can advise them, or, at least, take the trouble to read one of those guides addressed to laymen who are about to dabble in bricks and mortar. Want of the plainest knowledge of the subject has led to the bitterest disappointments, and it is such lack of experience which has given the old adage such point that "Fools build houses, but wise men live in them." If clients made their wants intelligible, and architects took a little more trouble in explaining the effect of their plans, and were to read their specifications over to their clients, there would not be so many of those troublesome things called "extras" to face.

As so much depends on the written contract, however, it may be as well to see how the usual clause introduced to meet alterations and additions stands, and whether it really is the instrument it pretends to be in protecting the employer. It may be postulated (1) that necessary "extras" should be ordered; and (2) that they ought to be paid for. In effect the usual clause runs thus:—"That no extra work is to be executed without the authority of the architect in writing, or in any plan or drawing expressly given and initialed by him. Any variation made in carrying out the works is not to vitiate the contract, but the value of such variation is to be ascertained by measurement, unless a price may have been previously agreed upon." There is generally a reference made to a schedule of prices, according to which all additions or omissions are to be valued, though, curious to say, the latter are generally estimated at a lower rate. It has been objected, and not without reason, that this clause places the entire control of extras and variations in the architect's own hands, and that the employer is kept in

ignorance of them till he is called upon to defray their expense. It also enables the architect to strike out matters which the employer had sanctioned: to vary the dimension and design. As we know, in some cases this power may be wielded in a manner detrimental to the proprietor: some things may be set off against others, as, for instance, things may be struck out to make room for omitted work. Let us suppose an instance by no means uncommon. There is a deficiency discovered in the quantities; let us say that the flooring has been found short, or the kitchen-dresser has been omitted. The contractor informs the architect of the fact, but he does not like to give another order, so he arranges with the contractor to omit, as a set off, the espagnolette casement fastenings, or some other fitting which the employer had particularly desired. When the house is finished the client finds the omission, and gives another order for the very thing he has already paid for. In many contracts these occurrences are not uncommon, though they frequently lead to unpleasantness and not a little embarrassment on the part of the architect. Somehow or other also things ordered as "extras," unless valued at once and their cost ascertained, grow to large proportions at the end of the work. Tendering at the beginning and valuation at the conclusion of a job are vastly different transactions with some builders, and an "extra" which has been strongly recommended by the builder with the assurance that it will only cost a few shillings, and add greatly to the convenience and comfort of a house, often comes to as many pounds.

Sir Edmund Beckett, in his "Book on Building," very strongly urges the adoption of a clause which makes it necessary for an architect to obtain the consent of the employer before an extra is ordered, and we may quote it here, as many readers have probably not seen it. "The contractors shall also execute all such alterations and additional works as shall be ordered by the architect with the consent of the committee, or by the committee. But if the contractors shall be of opinion that any such alteration or addition will cause additional expense, they shall not be bound to execute the same without an order in writing from the committee, stating the price which is either agreed on or certified by the architect as the proper sum to be allowed for the same, after giving credit for the value of any omissions which have been ordered, and such order shall state also the extension of time (if any) which is to be granted by reason thereof. And neither the contractors nor sub-contractor under them shall be entitled to recover from the committee, or any member thereof, any more than the said sum of £—, together with the amount of the sums contained in all such orders as last aforesaid; nor shall this clause be held to have been waived in consequence of anything to be done by the committee or any member thereof, except an express waiver in writing, and then only as to the particular things included therein. The contractors shall, if required for the valuation of extras, produce the bill of quantities with the prices thereto attached on which their tender was based." This form of clause would obviate probably some of those disputes which at present arise between architect and builder, and architect and employer, and the chief objection we entertain towards it is that no trivial alteration could take place without first obtaining the employers' consent. If employers were constantly at the works there would be no difficulty, but they are not, and it is not improbable to imagine an addition which is essential to be made, but which cannot be ordered without delay, because an authority in writing has to be obtained from a committee. Nevertheless, the advantage of an employer

knowing as the work proceeds what the cost of an alteration or addition will be, and to have the price stated beforehand, cannot be questioned.

It is equally for the builder's protection that he should obtain written instructions in every case where any additional cost is incurred, for legal decisions have made it clear that if by a contract a written order is required for extras or additional works, the want of such an order will be fatal to the contractor's claim for either, unless indeed, as in the case of "Russell v. Bandeira," he can succeed in proving that the additional work was not within the contract, or that it was *dehors* the contract. As regards the architect's authority, of course it is generally assumed that he is an agent of the employer authorised by him, and if only impliedly so authorised it is sufficient to prove the agency, as was decided in the case of "Wallis v. Robinson."

Extras and additional works are sure to arise in the performance of contracts of large amount, and the main duty of the architect ought to be to guard himself from the imputation of having caused them by neglect or omission, or of playing into the hands of the contractor. It may be said, to the honour of the profession, that many architects are anxious to clear themselves from the last charge, and that when extras arise no attempt is made to set them off against omissions rather than they should appear in their real light. The main question we have raised is, however, whether an architect should have unlimited control over deviations and extras, while the employer remains powerless. No one will for a moment hesitate to admit that an architect ought to have control over all works executed in a building, and that it would be an absurd and suicidal policy to allow an employer to order extras or variations when he so felt disposed. No contract could be carried out under such a rule, as the architect's authority would be so much interfered with; he would be constantly brought in conflict with the contractor, and in many cases the alterations would so completely alter the original plan that the contract would in effect cease to exist. Is it not desirable, however, to limit the architect's power to order alterations and extras? He may sometimes find it necessary to the advantage of the building to order additional work, or to increase, alter, or diminish the quantities or dimensions, or alter the character of the works. So far, these deviations would appear to be reasonable so long as they did not entail upon his client increased cost, and they ought to be able to be made without vitiating the contract, and subject to all the stipulations and conditions therein contained. But it often happens an architect requires something done as a variation which may entail an extra, and in this case the contract might very well give the contractor the option of reserving the question of his right to be paid till the conclusion of the work. It is not fair to leave the question an open one without an order in writing, as then the contractor may either have to pay for it, or if not he puts down a lump sum for a thing at a guess, which is saddled upon the employer.

The following clause, taken from the general conditions for building contracts as settled between the council of the R.I.B.A. and the London Builders' Society, may be quoted as a well-considered attempt to place the matter upon a fairer footing: "No extra work is to be executed except upon the express order of the architect, to be shown by any instruction or subsequent approval in writing, or by any drawing, plan, or account, signed or initialed by him. Provided always that if the architect shall require the contractors to execute any work as a variation which he may decline to order as an extra, the contractors may reserve the question of

their right to be paid for the same until the final settlement of accounts. No charge for day-work is to be allowed as such, unless the authority for the work shall expressly direct it to be done as day-work, or unless the work cannot, from its character, be reasonably valued by measurement. All vouchers for day-work to be delivered to the architect within 14 days following the week in which the work may have been executed. Any variation made in carrying out the works is not to vitiate the contract, but unless a price or schedule of prices be previously agreed on, the value of all variations is to be ascertained by measurement or otherwise. All omitted works are to be deducted at prices not exceeding those contained in the estimate on which the contract is based, and all additional works are to be valued at fair measure and value prices."

Increased security would be afforded if the contract required the production of signed instructions for any extra work, countersigned by the employer or chairman of committee, as the case may be; and it is only in the interests of architects if they would endeavour to seelaw their own independence of action can be secured without appearing to grasp a power which places their own employers at their mercy.

SUNKEN FLOORS.

SO few of the floors constructed in new houses are equal to their work, that the attention of architects and builders might be profitably called to the subject. In going over some of the newly-erected houses in the suburbs of London, it is not infrequent that one finds dwelling-house floors which have sunken so much in the centre as to destroy the comfortable assurance that they are safe. These instances occur chiefly in houses erected by speculative builders, who seem to be under no regulation of any kind in respect of floor-timbers. We have noticed serious deflection in the floors of a house rented at over £100 per annum, the consequences of which are cracked ceilings below, opening crevices between skirting and floor, and an uneven surface which makes every table shaky, and prevents large pieces of furniture like sideboards and book-cases being placed against the walls without a considerable propping underneath their front supports. Numerous books on the strength of materials have appeared, but the builder seems to regard such knowledge as merely theoretical, and is generally guided by the sizes of other timbering which he has found answer. He does not always seem to understand the well-established theorem that the strength of two pieces of timber of equal length is not always in proportion to the area of cross-section. Many practical builders have a conviction that if a timber as a joist has a larger cross-section than another it must be stronger. Thus they fancy a piece of timber 8in. by 3in., which equals 24 square inches in sectional area, cannot be so strong as a piece 5in. by 6in. which has 30in. in area. The fact is, the smaller piece is the strongest of the two if both are placed upon edge, as everyone knows who has studied the principles on which the strength of beams depends. It is easy to convince the most practical of this seemingly inexplicable fact. If two beams of like size are placed side by side, the two will resist twice the amount of one of the pieces. This is so self-evident that experiment is not needed to establish the fact; in the same way, three beams will resist three times as much as one, and so on of any number. In plain English, when lengths and depths are equal, a beam of 6in. in breadth will bear three times as much as one of 2in. in breadth. It may be shown by experiment quite as readily, that the

strength increases more rapidly with the depth. In point of fact, another law of proportion is observed—namely, that having two beams of the same breadth and length, but of different depth, the strength increases more rapidly than the depth: thus it is found a beam 9in. deep bears more than three times as much as one only 3in. deep. These are very simple statements derived from facts and experiments, and no complex conception of the resistance of certain fibres on both sides of a neutral axis, or equations in algebra are required to establish them.

In dwellings the load on a floor is chiefly made up of furniture, though this is generally placed, at least the heavier articles, round the walls of rooms. The space occupied by tables and other objects in the centre of a room reduces the available standing area, and thus, for all ordinary floors, 70lb. per superficial foot may be calculated for as the full load in extreme cases. Rules founded upon the resistance of beams to rupture are, however, of little use, as the floors may be seriously affected by deflection, and deflection is directly as the cube of the length. In regarding stiffness, the load per foot has been given by one authority as 90lb. per foot, including weight of materials; and the rule involving several dimensions is expressed in the formula

$$c^3 = i b d^3$$

from which, by inversion, the distance from centres, the length, the breadth, and the depth of beams may be found. Thus, the first of these will be generally found the most convenient in practice; which may be expressed by

$$c = \frac{i b d^3}{p}$$

in which c denotes distance apart from centres of beams, l the length of beam, both in feet, i , a coefficient for the wood used, and b and d the breadth and depth. It makes all the difference to place joists an inch nearer, though builders like to give as much interval as they can, for economy's sake. Instead of joists being placed 12in. apart, it is oftener to find them 13in., or even 14in., and the consequence is a scantling which has been found to answer in a well-built house, fails when it is introduced with a greater distance or interval. Then, the modern speculative builder's floor is seldom properly stiffened by cross-bridging; there is only one row, instead of two, or more. Of course, no practical man will deny the advantage of bridging his floor-joists; it helps wonderfully to prevent deflection under a concentrated load, for the joist immediately beneath the load is relieved of direct strain, and the joists on each side take a share of the weight. Generally, it may be taken that a properly-bridged floor is capable of sustaining, without mere deflection, twice as much load as the same floor without bridging, so that the cost of the introduction is amply repaid. It is a misfortune the Building Act does not deal with floors as it does with walls, by laying down certain scantlings for the guidance of builders, as a weak deflecting floor in course of time tends to render the house unstable, by acting injuriously upon the walls. Builders might be willing to follow regulation scantlings for their joists and rafters who could not be induced to calculate for themselves, who would scorn the idea of studying moments of resistance, or who would never be able to work out a formula.

THE WATER QUESTION.—XI.

QUANTITY RUNNING OFF THE GROUND.

THE sites of reservoirs, formed by making an earthen embankment across the stream from one hillside to the opposite one,

vary much in respect of the quantity of water capable of being impounded by embankments of the same height, and in the area of ground covered with water. The following examples are of actual sites of reservoirs, and commence with a depth of water of 20ft. at the site of the embankment, running out to nothing at the upper end of the reservoir; proceeding then with depths of 28ft., 36ft., 44ft., 52ft., and 60ft. of water at the greatest depths, with the corresponding areas of water-surface and the average depths. The height of embankment stated is the height in the middle, or at the deepest part of the bank, whether that be in the middle of the length or not. The quantity of water impounded is stated in millions cubic feet, and the area in acres.

Height of bank, 21ft.; top of bank, 4ft. above top water-level—

CAPACITY. Mill. c. ft.	AREA. Acres.	Average depth of water.
6½	16½	9.5ft.
10½	23½	10.3
15½	31½	11.4

Height of bank, 33ft.; top of bank, 5ft. above top water-level—

13½	21½	14.1ft.
21	31½	14
28½	41½	14.4

Height of bank, 41ft.; top of bank, 5ft. above top water-level—

21½	35½	18.8ft.
34½	47½	16.7
45½	55½	19.9

Height of bank, 49ft.; top of bank, 5ft. above top water-level—

22	34	21.6ft.
53	50	20.6
68½	76½	20.5

Height of bank, 57ft.; top of bank, 5ft. above top water-level—

46	44½	23.7ft.
75½	75½	23.9
95½	94½	23.9

Height of bank, 66ft.; top of bank, 6ft. above top water-level—

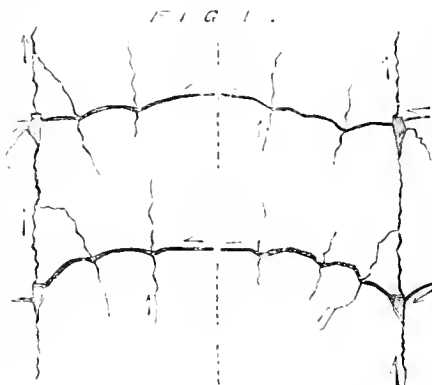
62½	49½	29.1ft.
105½	96½	25.1
134	110½	27.8

The capacity proper for any given situation must be determined on the basis of a certain quantity of water flowing from a known area of ground, as an acre or a thousand acres, constituting a part of the whole of the area appropriated, or from which the water to be dealt with flows; and that quantity varies with the position in which the works are to be constructed. A reservoir for the purpose of storing or regulating the flow of water off the ground may be made either in the extreme upper part of a river-basin—that is within the few thousand acres of drainage ground contiguous to the main watershed—or it may be made lower down towards the valley, wherever, indeed, the most favourable sites exist, although these will seldom, if ever, be far down the valley; for a favourable reservoir site is one in which the opposite hill-sides approach each other at a spot where an embankment may be made, and where the ground above the site of the embankment widens out, so that with a comparatively short bank a large quantity of water may be impounded.

The facts which have already been adduced of the variable quantity of flood water per acre of the drainage area, according to the position of the place of observation on a river with respect to its being in the upper or the lower portion of a river-basin, show that the cubic capacity of the reservoir per acre of its drainage area must be different in the two cases, notwithstanding that the same depth of rain may fall in either position for a short time; and the cause of difference between the two cases is that in the one the heavy rain may extend over the whole of a limited drainage area, while in the other it would extend over part of the area only. This is found to be so by observation of effects within the areas of

5,000 to 8,000 acres belonging to reservoirs in the upper parts of river-basins, for where there are two or three streams within such an area, divided by subordinate watersheds, it is frequently observed that one of the streams is much more swollen than another. The quantity resulting from a very excessive rainfall in the upper part of a river basin is 30 cubic feet per minute per acre of the drainage ground, or 500 cubic feet per second from 1,000 acres. This is equivalent to $\frac{1}{4}$ in. depth of water over the ground running off in an hour. It may fall in less time—say, in half the time—and with a continuous rainfall of the same intensity, the flow off the ground in a given time bears a greater ratio to the depth fallen in the same time, but the rainwater never runs off as fast as it falls. From the examples formerly given it may be seen that a heavy rainfall of three or four inches in as many hours, or even in less time, takes place occasionally; but it does not run off as fast as it falls, nor does it, with the same intensity, extend over any large tract of ground. Where the ground is of a porous kind, as some of the stratified formations are, it may become saturated with water during long-continued wet weather before the rainstorm begins, and yet the water does not run off so fast as it falls, for where the ground becomes saturated in this way it is comparatively flat, and the depth of water may be seen to increase where it falls, which is a proof of it; and even where the ground consists of hard, bare, and impervious rocks, and the surface is steep, the time of falling of the rain is not so long as the time of running off. We have not a sufficient number of exact observations of the comparative times of falling and running off of a given amount of rainwater on different kinds of ground and forms of surface to deduce from them any rule for each; but on the whole, and for an average kind of ground, an approximate quantity would be two-thirds of the inch depth in an hour running off in that time. An acre = 43,560 sq. ft., and 1 in. in depth of water over that area = 3,630 cubic feet, falling in the hour, and if two-thirds of that quantity run off in an hour, the rate of flow would be 40 cubic feet per minute. The question then arises how much of this during the same time will the river carry off without overflowing, after the shoals which have accumulated have been removed, benches of rock across the bed excavated, and small and unnecessary weirs taken down. The difference between these two quantities is that which has to be dealt with in the way of storage or regulation. If a river be examined and its capacity for carrying off flood-waters be ascertained in every reach, the quantity so found, deducted from that which proceeds immediately from the rainfall, would show the true quantity to be dealt with by storage or regulation in every case. The number of observations which have been adduced is small, and the information to be derived from them is sufficient only for an indication of the basis of calculation; but such as they are, they point to the probability that, approximately, the river may be reckoned upon to carry off one-half of the greatest quantity flowing off the ground, and that, of 40 cubic feet per minute per acre proceeding from a rainfall of 1 in. in an hour, 20 cubic feet per minute would pass off at once to the river, and the other 20 accumulate in the reservoir until the river-flow had begun to subside, or had subsided to any given level; but in the practical working, the flow of water would regulate itself to about 20 cubic feet per minute per acre of the drainage ground, and that rate of flow would extend over twice the length of time that the whole quantity would have done without the intervention of the reservoir, and is the quantity which the intermediate conduits must carry off to the reservoir. In viewing the position of such

works for the storage and regulation of the flow off the ground of excessive rainfalls, from any point on the line of watershed, there would be seen the track of a channel running along the hillside, following the contour of the ground, and nearly level; open in some parts and covered in others, or, according to the formation of the ground, wholly covered or wholly open. The conduit would descend, with but a slight fall, right and left from a line dividing the intercepting conduits on the hillside, to the place of storage, the distances being greater or less according to the situation, but may possibly average 1,000 yards each way from such a dividing line as that mentioned. The following sketch shows the position in a general way.

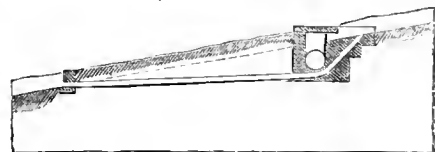


These intercepting conduits would convey the flood-waters, but not the ordinary run; otherwise the fields and small streams would be deprived of the necessary water for cattle. The conduit would pass under the streams it would cross, and the openings to admit the flood-waters would be so arranged that they would not also admit the ordinary run of water which would continue in its own course. Each such place on the line of conduit would be fenced off from the intrusion of cattle, and the occupier of the land would keep the fencing good; no other attention would be needed. Earthenware pipes would form the best conduit. If the average distance apart, down the hillsides, of these intercepting conduits, were 200 yards, and if the average distance from their upper ends to the reservoir were 1,000 yards, there would be inclosed 40 acres of ground, from which would proceed $40 \times 20 = 800$ cubic feet of water per minute. With a fall in the conduit of 1 in 200, a 2ft. pipe would carry off this quantity of water as a maximum; and if the length were divided into four portions, the diameter might be reduced successively from the lower end upwards to 20in., 15in., and 12in., or to a smaller size at the upper end. Unlike the requirements in the case of sewerage pipes, these need not be particularly well jointed. As between butt-joints and sockets, the socket joints are the better; but they need not have any jointing material. In sewerage works, the joints are too often defective in this respect, in which it is of the utmost importance that they should be perfect; but for the purpose of conveying flood-water to a reservoir it is not necessary that the joints should be watertight. The pipes should be strong, although they will not be laid at great depths below the surface: an average depth of 4ft. will be sufficient; but, nevertheless, a good strong pipe is advisable, at least, for the larger diameters. When a conduit crosses a stream of water, the arrangement would be as in the following sketch.

Through pasture fields the conduits may be open, with flat slopes which will not hinder grazing, such as 4 to 1; but the inclination, longitudinally, would be less than that of pipes, and should be limited to one which will not cause a greater velocity than

2ft. per second. Such a channel would be one having a bottom width of 3ft., and side

FIG. 2.



slopes of 4 to 1, the water at its greatest depth running 1ft. deep at the lower end, with an inclination of 1 in 1,370, and at the middle of the length of the conduit running 5in. deep with an inclination of 1 in 1,000; the depth diminishing and the inclination increasing from this point upwards towards the end.

JAMES WOODFORD, CARPENTER AND CHARTIST.*

MORE Chartist than carpenter, certainly, as far as his history as told by Mr. Henry Solly enables us to judge, must the hero of this story have been, and yet his Chartism was of such a character that no honest man or good workman need have been ashamed of it. Attached throughout his life to the moral force section, of which that admirable Cornishman, William Lovett, was the head, and opposed to the noisy party who followed the firebrand, Feargus O'Connor, till he was found out, James Woodford tells in a quiet, unostentatious way the story of a movement which has yet to be estimated at its true worth. We have had, during the past decade, some experience of the bitterness of party spirit. We know and feel, many of us, how much there is yet to be done, all in its own good time, before we may "rest and be thankful"; but we cannot fully realise what must have been the terrible state of things in England in the early days after the accession of William the Fourth.

In February, 1837, James Woodford gets his first experience of a Chartist meeting.

The King had just died—a new Parliament was being summoned—the nation was in a ferment. O'Connell, Roebuck, Wakley, Joe Hume, Leader, Col. Thompson, Sharman, Crawford, and other leaders of the Radical Party, who had stood up in the late Parliament against overwhelming odds on behalf of the rights of the people, were present, and, amidst vociferous cheering, denounced the Whig Ministry, with Lord John Russell at its head, exposed the treachery of the middle classes towards the working men, by whose aid they had got the Reform Bill, and claimed a new reform which should put an end to the wrongs and sufferings of the lower classes. Speaker after speaker eloquently denounced the existing state of things as a sham and a shame, demanding immediate redress. I was amazed beyond telling, and completely carried away by the enthusiasm of the speakers and the crowd. But there was one among them who struck me, when I first saw him on the platform, as more worth noticing than all the rest, for I felt sure he was a working man. When I found from my friends I was right, and that he was only a journeyman cabinetmaker, I looked up at him with a sort of awe and delight. For, thinks I, what a wonderful chap you must be to be sitting there with all those nobles and famous speakers, and going to speak yourself, too. I shouldn't wonder. Sure enough he did speak, and as well in one sense as the best of them; for he knew just what he wanted, and what we working men wanted, and he went at it in a plain, quiet, but very determined way, that made you feel he'd hold on like grim death, come what might, till he got all he asked for. He was a tall, good-looking young fellow, with a lot of long curly brown hair, and all the workmen round me cheered him till the roof rang again; but there were others of our class I could see didn't like him so well. And that's just what I've noticed ever since. If one working man ever gets above his mates and is cheered and clapped, there are a dozen or two thousand very soon out of temper, and run-

* James Woodford, Carpenter and Chartist. By HENRY SOLLY. In Two Vols. London: Sampson Low and Co.

ning him down—as jealous as monkeys in the Regent's Park gardens at feeding time—and all of thinking they have as good a right as he to be put up on a platform, or stuck in some important office, and be cheered and battered and clapped.

"What's the young fellow's name?" I asked; "he's a rare good 'un, whoever he be"; and then I heard a name which was pretty well known through England two or three years afterwards, though, as he was only a working man, and a pioneer in great and noble movements, who made roads for other men to pass over to victory, while he seemed only beaten at almost every point, folks don't know so much about him nowadays as about some general who has won a battle in India.

"Well, who is he?" I asked of my friend the engine-fitter.

"Who is he?" replied Mr. Rofford, rather slowly, "why, I take it that's William Lovett, the Cornish lad, and by — I wish there were five hundred like him."

Lovett, of course, became Woodford's idol, and exercised over him the salutary influence he fortunately exercised over many thousands. Woodford's comrade, David Roberts, however, who figures to some tune in the story as political delegate, orator, lover, and what-not, is less sensible, and makes much misery for himself accordingly. His love-story is a very chequered one, but comes out much better in the end than such a fellow had any right to expect, and the opinion of most readers will, we expect, be that, if Maggie Thatcher had given her sweetheart his dismissal early in the first volume, and settled down comfortably with Woodford, who loves her after his own sober fashion—that dull, matter-of-fact sort of passion, in fact, which ethereal enthusiasm, ever ready to change the object of its own raptures, sneers at, but seldom understands in all its unselfishness and true devotion.

Some idea of the view taken by working men with regard to the whole share of the blame for bad work, which many are so ready to lay at *their* door, may be gathered from the following anecdote of

Another good fellow that used to crony with us, Jem Bart, who took to me because my name also was Jem. He was but a young chap, not used to town when he first came, so I could give him a wrinkle or two. He lodged with us at Mrs. Taylor's, and when I first knew him he hadn't been regularly apprenticed, and was what is called an "impr'ver" at a large cabinet-maker's shop in the West-end. Well, one Saturday night he comes home regular down in the month—had got discharged, and no mistake. "What is it for, Jem?" says I. So then he told me how he had always tried to do his best, but the foreman said he was a deal too slow; they wanted work turned out sharp and quick, and "he didn't ought to spend such a lot of time over it." "And at last he said I'd better go and try to get a situation in some amateur gentleman's workshop, where they only did fancy work, and where there were no customers. So," says Jem, "I'm blowed if ever I'll take pains with my work again, 'cept to get it out of hand and done with." "Ay, but," I replied, "there are other firms in the West-end besides ————, and at some of them you will find good work is cared for more than fast work, if I've not rightly." Next week he went round to them all, but trade was slack, and there were more men being turned off than taken on; and, as he had never joined a Trades' Society before he was discharged, he had no box to come upon, and the poor fellow was very hard up. We made a little box for him; but, of course, that didn't last long.

By and by, Woodford, in the course of his work, finds his way down to Eastleigh, in Southamptonshire, where he converts a young person to Chartism, and ultimately gets sentenced himself to two years' imprisonment on a false charge of poaching and assaulting gamekeepers. From this unjust punishment, however, he is released by the confession of a criminal. His subsequent married life is a good deal of a failure, and must be traced by the reader himself. Davy Roberts, who acts as a sort of chorus to the end of the chapter, finishes his career as a failure, and is left a failure. The story is a good deal of a failure, and is a failure in many respects. They are both becoming better

off in every way than during any previous portion of their lives. Woodford himself ends his story with the following sensible reflections:—

I have now become an employer in a pretty large business, but I haven't forgot the days when I was a journeyman, and I believe I've tried to do what little I could as an employer to help journeymen and apprentices according to what I should have liked masters and foremen to have done for me. You may sometimes see journeymen, when they become employers, as I think I said somewhere before, act the tyrant worse than any who have always been what's called gentlemen. But then, again, I've seen workmen turn against an employer who has done all he possibly could for them (sometimes doing it at his own cost), and treat him shamefully. There are faults to be mended on both sides, and sometimes I think we want a whipping all round. But, then, there's a deal to be done, also, it strikes me, as to mending the political machine. Looking back, and after thinking of our Chartist days, I can see, or fancy I see, how politics have got to do with most of our troubles, apart from moral or religious matters; and that's why, among other lesser reasons, I've written what my friend has made into this tale. Noble-hearted Lovett has been taken to his rest since I began writing about him. His faithful and worthy ally, Bembridge, sleeps in Kensal-green cemetery, after having helped more than one clergyman to see that they must try to establish the kingdom of God on earth, and not merely prepare men for it, as they say, in heaven. Many other of Lovett's best supporters have also passed away; and I wanted English workmen to let me help them to remember some of the lessons which the labours and suffering, failures and successes of all these true patriots should teach us.

Brother working men, let me ask you, as the last word I shall write, to beware of selfish, unscrupulous leaders, and their thick-and-thin supporters. Many years' experience have told me (though, as I have not much book learning, I may be wrong) that nothing keeps the world back so much as jealousy and back-biting among leading men and their partisans. I don't think the devil does half so much harm by his straight-going sinners, as by his sneaking, backbiting, jealous saints. There are always plenty of good folks trying to remedy wrongs; and they would soon do it if they didn't quarrel, and envy, and hate one another as they seem to do. It is all these dirty tricks which strike down the good men and true, who ought to be leading the way, and give unworthy men power to do mischief and hinder good. I saw it said somewhere, once, that "half the time of the wise is spent in correcting the errors of the good," which may be very true, and shows how careful politicians, philanthropists, clergymen, and everybody else ought to be, not only to desire to be of use, but to learn the best way of being so. But I'm quite sure half the strength of both wise and good is lost in resisting the egotism, ambition, and envy of those who get the credit of being honest and able, when they're neither.

So that's the moral I learnt from the Chartist movement as it went on forty years ago in this old England of ours. And I hope and pray my hard-headed, and warm-hearted, and often long-headed brothers of the journeyman class won't let the labours, and sufferings, and failures of the great true-hearted chiefs of that movement, nor the errors and sins of those who ruined it, be altogether forgotten. Heaven help us all, say I, to know and to follow those only who are worthy to be our leaders, and Him most of all who, by self-sacrifice, showed us what a leader should be.

THE ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS.

THE annual meeting of this association was held—as briefly reported last week—at Birmingham, on Thursday, Friday, and Saturday, last week. The Past-president (Mr. A. W. Morant, of Leeds) temporarily occupied the chair at the opening of the proceedings.

Mr. THOMAS COLE (secretary) read the annual report, which stated that 25 new members had joined the association this year, three members had died, and the total membership now numbered 1204. The report urged the members to make every effort to increase the roll of the association. The report was adopted, and Mr. Morant, in vacating the chair, introduced his successor, Mr. W. S. TILL, the president-elect for the ensuing year.

PRESIDENTIAL ADDRESS.

Mr. TILL then delivered his presidential address, in which he expressed a hope that

during this the third visit of the association to the borough some useful information might be gained by the members, and that the objects of the association—viz., the dissemination amongst the members of that knowledge and practice which fell within the department of an engineer or surveyor engaged in the discharge of his duties under the local and public Acts of Parliament—might be attained. It had, therefore, occurred to him that a brief description of the borough, together with information as to its streets, night-soil and sewage works, would be the most interesting subjects for him to address the meeting upon. The borough of Birmingham had an area of 8,420 acres. Its lowest point, which was at Sillley, where the sewage-works were situated, was 290 feet; and its highest, which was on the Hagley Road, was 610 feet above mean sea level. The population in 1861 was 296,076; in 1871, 342,505; and in 1881, 402,296; whilst the rateable value at the present time was £1,528,000. The area unbuild on was about 2,400 acres, so that the population per acre was 66. In the borough there were 187 miles of highways repairable by the Council, and with the exception of some fifteen miles which were paved with wood and granite, the whole of the carriageways were macadamised. There were in addition about ten miles in length of private roads. The average cost per square yard per annum of cleansing, watering, and macadamising the carriageways for 1880 was 5d.; the maximum cost of any one street for that year was 4s. 3-35d.; whilst the first cost of making was about 2s. 3d. per square yard. Woodpavement was first laid by the Improved Wood Pavement Company in Moor-street, in 1873. There were about 30,000 square yards of wood pavement in the borough; that in Bull-street was laid in 1874, and this had not yet been interfered with, but now required relaying. The company were paid 14s. per yard for this, as well as several other lengths; they maintained the same free of charge for one year and for fifteen years thereafter for the sum of 9d. per square yard per annum; the maintenance money being payable at the expiration of the sixth, eleventh, and sixteenth year on the surveyor's certificates that the works were in good condition. The first lengths of granite pavement now in existence were laid in Broad-street and Lawley-street in 1862. The Council in 1872, with the view of reducing difficulties connected with the treatment of the sewage at Sillley, decided upon the introduction of the pail system for collecting night-soil, and at the end of last year there were about 32,000 pails in the borough, estimated to supply about 250,000 persons. There were about 1,000 water-closets, and the remainder of the population was supplied with the old form of combined privy and ashpit. The contents of the pails and ash-tubs used in connection therewith were collected weekly, and conveyed to wharfs within the borough situated at Rotten Park-street, Shadwell-street, and Montague-street. The contents of the old privies were removed as often as required, and sold after being roughly sorted, whilst the contents of ash-tubs were screened, mixed with the faecal matter, and sold as manure. At Shadwell-street Wharf, some four or five years ago, the Council erected one each of Fryer's four-celled destructors and carbonisers, and also two of his concretors; the two former performed their work in a satisfactory manner—the destructor reducing six boat-loads of rubbish, or about 150 tons, to 25 tons, and the carboniser turning out a very fair charcoal; but owing to continual complaints by the General Hospital authorities, whose hospital was only separated from the wharf by the canal, the use of the whole of these had to be abandoned, and the mixing of screened ashes and excreta was now only carried on there. The number of pails delivered at Montague-street wharf was about 17,000 per week; the contents thereof were estimated to weigh about 160 tons, whilst the average quantity of ashes collected weekly from the premises where these pails were in use averaged 505 tons per week. The cost of the night-soil department in 1880 was £12,096 17s. 5d., of which £27,196 2s. 2d. was for collection, &c., of pail contents, and the remainder for the removal of old night-soil; the receipts for pail contents were £5,702 3s. 1d., and for old night-soil £1,992 8s. 7d., or a total net cost to the borough of £35,296 5s. 9d. The systematic drainage of the borough of Birmingham was commenced in 1852 by the construction of the Hockley Brook and the River Rea main

intercepting sewers, under the superintendence of Mr. Pigott Smith. The total length of sewers now under the care of the Council was about 175½ miles. The history of the treatment and disposal of the sewage had until recently been one of difficulty and opposition. In consequence of proceedings instituted by Sir C. B. Adderley, the Public Works Committee, which had then the matter in hand, presented a report to the Council in June, 1871, recommending the acquisition of from 2,000 to 2,500 acres of land down the Tame Valley; but this being considered too costly the Corporation, on the recommendation of the Sewerage Committee, which was specially appointed for the purpose, promoted a Bill in Parliament in 1872 for the purchase of 800 acres of the same land near Kingsbury, about eight miles below the present outlet. This bill, after a lengthened opposition in Committee was thrown out on the third reading in the Commons, owing to the opposition of the landowners in the neighbourhood. To satisfy the requirements of the Court of Chancery the lime process was at once adopted and more land was obtained at Saltley, and four additional sets of subsidiary tanks were constructed, to which another large tank had recently been added. The order of sequestration was discharged in 1875, and in 1877 the United Drainage Board was formed. On this Board now devolved the duty of treating and purifying the sewage delivered by the various constituent authorities at the outlet works. To meet the additional strain thus brought on the works the Board last year entered into negotiations for the acquisition of 867 acres of land in the neighbourhood of Castle Bromwich, to be used for irrigation with the effluent from the tanks. The Board was met in a friendly spirit by the landowners, and terms satisfactorily arranged. A Local Government Board inquiry was held in April of this year for power to borrow £188,000, for purchase of land and works, and the requisite permission was recently obtained. The area of the present Saltley Farm is 272 acres, of which 170 acres is freehold. The subsoil is generally of a gravelly nature, with a little clay in places. The three large tanks and sixteen smaller ones have a combined capacity of 43,310 cubic yards, or about 7,300,000 gallons. The amount of sludge deposited in the tanks during 1880 was 178,400 cubic yards, or about 490 cubic yards per day, and required an area of 53½ acres of land for digging-in the same, or rather more than one acre per week. The average dry-weather flow of sewage was about 13 million gallons per day, the population actually contributing that amount being roughly estimated at 450,000, being about 29 gallons per head. A little over 13 tons of lime were used per day, the lime being slaked and ground with water under edge runners. The sludge was lifted from the tanks, run into beds about 8 yards square to a depth of about 18 inches, and allowed to drain for a week or two: it was then dug into the land and covered with the soil. The thorough drainage of the land greatly facilitated the operation of dealing with the sludge. The sludged land was very favourable to the growth of cabbage, kohlrabi, and mangold—as much as 60 tons of the latter being obtained per acre. No nuisance arose from the present method of dealing with the sludge, as was sufficiently proved by the fact that there were nearly 3,000 houses within half a mile of the farm boundary, no complaints being made by the inhabitants thereof as to the operations now carried on. The cost of dealing with the sludge during 1880 (*i.e.* lime, labour, repairs, rent, taxes, &c., but exclusive of interest and sinking fund on capital) was £12,356, or about 1s. 4½d. per cubic yard of sludge intercepted. The new farm at Saltley was not yet laid out, but it was intended to connect it with the Saltley Farm by a conduit about 2½ miles long and 8 feet internal diameter. It was proposed to lay it out for broad irrigation, except about 40 acres intended as an intermittent filter-bed for use in cases of emergency. About 648 acres would be freehold, and the remainder leased for long periods. Mr. Till concluded by expressing his willingness to do all he could in behalf of the objects of the association.

Mr. Pritchard moved a vote of thanks to the past president, which was seconded by Mr. Lynde, and carried.—On the motion of Mr. Morant, seconded by Mr. Ashmead, a vote of thanks was accorded to Mr. Till for his address.—Several suggested amendments of the rules were considered, and it was resolved that mem-

bership should be limited to the chief officers of Corporations and sanitary authorities, and that members who, after 1881, cease to hold any public appointment shall be eligible for re-election, but disqualified from holding any office under the association.

Later on the members proceeded in omnibuses to inspect the sewage farm at Saltley. There they were met by Alderman Avery (chairman of the Birmingham Tame, Rea, and District Drainage Board), who conducted the party over the works, and explained in detail the nature of the various operations. After luncheon, the members visited the Montague-street wharf.

DINNER.

In the evening the members dined together at the Queen's Hotel. The president of the association was in the chair. After the introductory toasts, the Vice-Chairman (Mr. Lewis Angell), in proposing the "Municipal Institutions of the Country," referred to a previous meeting of the association held in Birmingham, and said that that meeting was one of the most successful they had had. He remembered that on that occasion the chair was taken by a Mayor of Birmingham, who had since become President of the Board of Trade. They were extremely gratified with the reception the association had met with on the present occasion. At Saltley they had been received by Alderman Avery, and at Montague Street by Councillor R. F. Martineau, both of whom manifested such an intimate knowledge of the operations they so kindly undertook to explain, that it might very well have been concluded they were engineers scientifically describing their own works. Nothing could have been more clearly and lucidly explained in every possible detail. It was well known that Birmingham was a place in which the inhabitants took an intense interest in their municipal affairs, and that being so, one could hardly be surprised at the success which had been achieved.—Councillor R. F. Martineau, in responding, said that the Birmingham Corporation, partly benefitting by the success and great deal more by the failures in other places, had got upon what they believed to be the right lines. Upon these they intended to continue, and see whether it might not be in their power, by perfecting the details of their system, to make their mark on the history of this great question, and possibly to aid others in removing one of those great difficulties in which our civilisation had placed us. Councillor Sam. Edwards proposed "Success to the Association." He referred to the inexcusable indifference of so many of the middle classes to the great question of sanitation, and expressed a hope that, through the work of such an association as this one, by the holding of conferences, the dissemination of right and left of useful knowledge, and the establishment in great cities of health classes—the time was rapidly approaching when an intelligent public opinion would be formed, and what was of still more importance, would be carried out. At present many wealthy people seemed anxious only to build large and showy houses, and furnish them luxuriously, without paying any attention to those sanitary arrangements which, after all, were of such vital importance. By the exertions of inspectors of nuisances and other municipal officers the humbler people were well looked after, and he really thought that those who required attention now were those who thought they knew so much, but proved by their practice that they knew so little. Mr. C. Jones (general hon. sec.), in responding, spoke of the advantages of the association both to the members and the public generally.—The other toasts were "The Visitors" and "The Officers of the Association."

THE BIRMINGHAM CORPORATION SEWAGE WORKS.

The proceedings were continued on Friday, in the Council Chamber, under the presidency of Mr. W. S. Till.—In the morning a discussion took place upon the Birmingham Corporation works visited the previous day.—Mr. J. Lemon (Southampton) protested against the continuance of the intercepting works at Montague Street, which he described as one of the most disgraceful exhibitions of sanitary work he had seen. He hoped the Corporation would see their present folly, and at no distant date altogether remove the Montague-street abomination. The system of sewers existing in the town was fully capable of removing by water-carriage the whole of the

excreta of the borough with more efficiency and less nuisance. The present system was likely to spread disease, and was, therefore, revolting to every sanitarian. He was at a loss to know why the Corporation carried it on, and he felt it his duty to call upon the members to speak, openly and fearlessly against one of the most abominable systems in this country. Mr. Gledhill (Hockliffe) said that, with regard to the disinfecting of the material collected, he should be very sorry to recommend his Board to follow the example of Birmingham.—Mr. E. B. E. Clark (Hove) also spoke in condemnation of the system in Birmingham, while admitting that it obtained its greatest possible advantages in this town. In Liverpool and other large towns the water carriage system was carried out in its entirety. This was proof that the system could be used by poorer classes anywhere. It was difficult to understand why the pan system was continued.—Mr. J. Lobley (Hanley) made some remarks on the same subject, and was followed by Mr. C. Jones (general honorary secretary), who said he also must protest against the association, directly or indirectly, sanctioning the interception or pan system they had seen in operation in Birmingham. He regarded the system as crude, rude, and absolutely bad.—Mr. G. Jennings (Rotherham) said he believed the water-closet system, properly carried out, was by far the cheapest and the best in the end.—Mr. Lewis Angell, one of the past presidents of the association, said the Birmingham plan of interception was filthy, dirty, degrading, and demoralising in every possible way. It was opposed to all decency; it necessitated a disgusting occupation for a number of persons, and afforded means for the dissemination of disease. He believed the members of the association would be wanting in their duties as engineers if they did not give expression to the views they held on the subject. He believed the water-carriage system would prevail in the end.—Mr. E. Pritchard (district hon. sec.) said he did not approve of the system of interception and removal.—Mr. Lynde (Manchester) also condemned the pan system, and spoke in favour of the water-carriage system.—Mr. Gordon (Leicester) said the operations at Montague-street were, at all events, carried on without any apparent nuisance to the neighbourhood.—Councillor R. F. Martineau, at the request of the Chairman, offered some observations in the way of reply to the criticisms of the previous speakers. The chief objections to the pan system, he said, appeared to have been summed up in the words, "dirty, disgusting, and demoralising." He understood that that was a pretty accurate account of the general feeling of the meeting. He hoped that those effects had not extended to the committee which had had the management—but he did not know to what other class of people they might be considered to extend. The members of the association must recollect the circumstances of Birmingham under which the pan system was adopted. He thought that as engineers they would appreciate the enormous cost which would have been necessary in obtaining sufficient land to treat properly the whole of the sewage, if there had been no other system than water-carriage. Compared with the old ashpit, which it superseded, the pan system was certainly not to be condemned as dirty. The most careful precautions were taken to ensure cleanliness and prevent effluvia. He had had no experience of the water-closet system as applied to large towns, but thought that it would be exceedingly difficult, if not almost impossible, in the poorer quarters of towns to keep them in such order as to prevent smells arising from them. Even in the best-regulated households they often became a great nuisance.—At the close of the discussion a vote of thanks was accorded to Alderman Avery and the members of the committee for their kindness and courtesy to the association.

THE SANITARY SUPERVISION OF DWELLINGS.

Mr. Lewis Angell read a paper on "The Sanitary Supervision of Dwellings," in which he submitted the following propositions:—That a more efficient and extended supervision of the sanitary and constructive details of all dwellings is necessary; that such supervision should be conducted by the responsible officers of the local sanitary authority, and not left to private commercial enterprise; that it is just and expedient that fees be imposed on all new buildings to provide the cost of such supervision. In con-

clusion, he expressed greater hope in education than in officialism. If sanitary science were taught in our schools, if organic germs received some of the attention devoted to the Greek particle, if our youth were taught to avoid vitiated air as they would false quantities, if elementary hygiene were recognised as of equal importance with simple equations, many a good and useful life would have been saved for the commonwealth. But now, in the selection of a house, more attention was given to a dado or a cornice than to the cistern or sink. The canon laws of house-sanitation were very simple and easy to observe. There should be no connection between the house and the sewers excepting for sewage; the soil-pipe should not by any chance ventilate itself into the house; all other drains or pipes from cisterns, baths, lavatories, sinks, &c., should discharge into the open air; the drinking-water should have no connection with the closet. These were cardinal rules, the neglect of which nearly everyone could discover for himself. There were of course other matters, some of which were more difficult to detect. Sanitarians were few and the population was large; the population was also careless, and it was not until an unexpected, cruel, and irreparable death had smitten a family with deep affliction that conviction was forced upon the survivors, and alas! when too late, they recognised preventable causes, and adopted the simple precautions and protections which at present were almost exclusively the privilege of the occupants of walled houses and guilds.

In the discussion which followed, Mr. E. B. Elliot-Clark said that great difficulties had to be encountered before an effectual supervision could be exercised throughout the country. Supervision, if it was to be effectual, must be exact and impartial. If coercive laws were to be carried out, no discretionary powers should be left in the hands of local authorities or officials. —Mr. J. G. Lynde (Manchester) said that a system of supervision embracing most of the points recommended by Mr. Angell had been in force for several years at Manchester. A certificate was given by the city surveyor to the effect that the by-laws had been complied with before a house could be occupied. This was done without any cost to the builders, and he thought the system of fees objectionable. —Mr. Ashmead (Bristol) said that supervision had been exercised in the town he represented for many years, and a special charge was made to builders for the certificates that the conditions had been complied with. —In the course of further discussion, the President said that, practically, there were no by-laws in operation in Birmingham until 1876, when a building surveyor was appointed. With reference to receiving fees, he did not like the idea of receiving them; still it was a matter of impossibility to prevent the receipt of fees. With regard to the charge for street buildings, they charged 5 per cent. for extra expenses of supervision. —Mr. Angell having replied to the discussion, a vote of thanks was passed to him.

RIVERS CONSERVANCY.

Mr. R. Vawser (Manchester) then read a paper on "Rivers Conservancy." He said that the Bill for the improvement of rivers and the prevention of floods, which had passed the House of Lords, contemplated extensive engineering works for ameliorating the condition of flooded districts. It provided that any Sanitary or Conservancy Authority having jurisdiction within any part of a river basin, or contiguous thereto, could initiate proceedings for the establishment of a Conservancy Board for their district, and that different classes of property should contribute towards the expense in different proportions; the lowland, which it might be presumed would derive the greatest benefit, being taxed at the highest rate. The powers of the Board would include the cleansing, repair, and maintenance of all existing watercourses or outfalls for water and others improvements. After further reviewing the Bill, the speaker said he believed that the powers proposed to be given to the Local Government Board to group the various authorities, and to fix the boundaries of the conservancy districts, would prevent an injustice where a district free from floods was sought to be taxed for the benefit of the surrounding districts. The proportion of expense which the lowlands, middlelands, and uplands would have to bear was a fair subject for discussion. The Bill provided

that the highest rate payable in the uplands should not exceed one tenth of the rate payable by the district which paid the highest general rate. He believed that the provision limiting the liability of the uplands to a small share of the expense was a wise and fair arrangement. The Bill was a general one to set up machinery by which provision might be made for the interests of each separate river basin or locality, and such would not necessarily be applied in its entirety to parts of the country or conditions for which it is entirely unsuited. The Bill provided that an urban authority in districts with a population of not less than 25,000 might be constituted a conservancy board within its own district; but he believed that that provision could not be extensively adopted without loss of efficiency. The anxiety of some districts to be exempted from the operation of the Act was difficult to understand, because it could not be applied in any district until put in force by provisional order, and it was quite competent for any person to oppose such order, and if good cause could be shown why the Act should not be adopted it would not be put in force. The works of any authority for sewage or waterworks purposes were specially protected by the Bill. He invited the members of the association to an expression of opinion on the Bill, in the hope that it might contribute to the chance of the Bill becoming law during the present session, as he believed the Bill was drawn with a due regard to all existing and vested interests, and contained all the essential elements of a most useful measure, and as such deserved the earnest support of sanitary authorities. —Mr. Parry contended that the application of the Bill would be useful in the case of an urban authority. —Mr. Mackie (Glasgow) considered that the Bill would be of great advantage, and hoped it would become law. —Mr. Clark considered that if they were to have conservancy boards with the various other boards that were in existence, matters would become very complicated. He thought it would be better for the Legislature to wait until they dealt with the whole question of county government, and considered that county boards would better deal with the subject. —Mr. Lemon (Southampton) differed with the previous speaker as to the matter being in the hands of county boards. In some cases floods were caused by the boundaries between the counties, and he did not see how county boards were going to exercise their powers in such cases without amalgamating. A conservancy board would be useful, because it would provide for a number of districts acting in common for the general good. —The President said he could give an illustration of the necessity of a conservancy board. The borough of Birmingham was bounded on one side by Aston Brook, which separated it from the populous suburb of Aston. The owners of property had, wherever they could, built into the watercourse, and left very little room for the flow of water. Through the deposition of brick ends and rubbish, the bed of the stream had been raised three or four feet above its natural level, and the Local Board of Aston and the Corporation agreed to cleanse the stream and deepen the bed. They applied to the Local Government Board for power to borrow the money, and the reply was that they had no power to do it. He had therefore to go before the county magistrates to get their order, and the sum of £22,000 or £23,000 had been expended in widening and deepening the brook. There was now some difficulty for the Aston Board to pay the excess of cost. Another stream running alongside the borough and through an urban portion of the borough was the River Rea, which also required cleansing. There was to be a meeting of the three outside parties next week, to see if terms could be arranged to do the work. Some body like that which the Rivers' Conservancy Bill provided for would furnish the necessary means for doing the work. A vote of thanks was then passed to the reader of the paper.

PRACTICAL NOTES ON PLUMBING.—V.

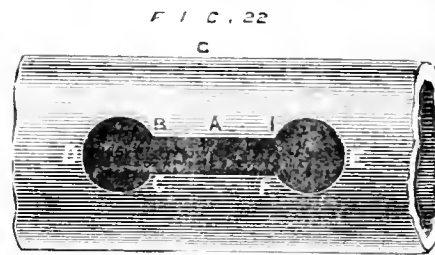
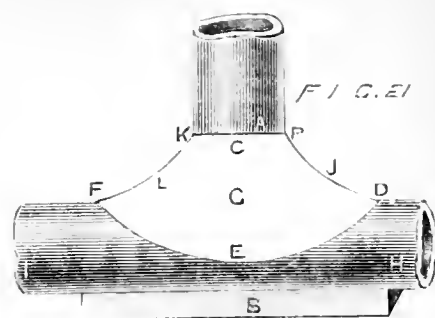
By P. J. DAVIES, H.M.A.S.P., &c.

BRANCH JOINTS (PREPARING).

THESE joints are made the same as the finished joints, Fig. 21. Proceed as follows:—For small pipes take a half-inch gimlet,

* All rights reserved.

and bore a hole (taking care not to let the gimlet enter the lead on the back part of the pipe or joint) in the pipe at the point where the joint is



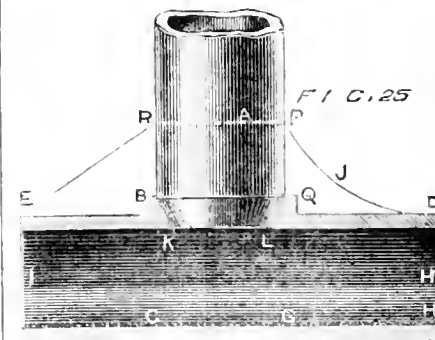
required, as at E, Fig. 22. For larger pipes, see "Soil-pipe Branches."

BOLT, OR TOMMY.

The bolt, or as it is sometimes called the "Tommy," is shown in Fig. 23. Insert the

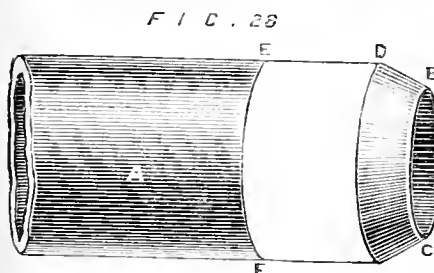
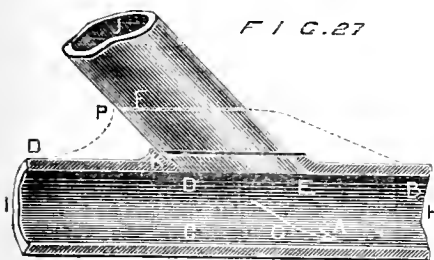
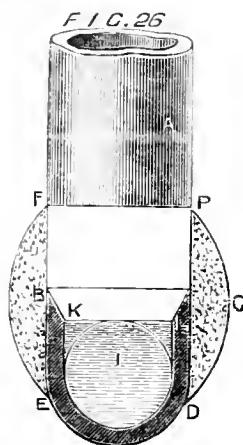


point A in such a manner that you can with the hammer knock the lead up so as to raise it, as shown at the sections, Figs. 24, 25, 26, and 27.



This is worked by striking the bolt at B or D in an upward direction. The object for raising this part of the leaden pipe is to prevent the spigot, or male end of the pipe, interrupting the passage of water way through the pipe. Having the pipe worked up to the right shape or size—see Fig. 28, prepare the male end by rasping it off as shown. Next soil and shave it, but do not shave this male end too high, as the joint will not look well. The male end should not be shaved more than an inch from D to E.

Fig. 24 shows the female part prepared and shaved; the side shaving line D E F is shown at Fig. 21, and care should be taken to shave it truly, and to this shape, low enough also to get



a good body of metal at the side G, as you will be sure to get plenty at J Q. The side of this joint, when finished, should look like that shown at G, Fig. 26, which in a great measure owes its shape to proper shaving.

Fig. 25 represents the branch-joint in section, showing that the male end should not be dropped below the water-way of the main-pipe, for, so sure as it is, it will always be a nuisance as regards noise, to say nothing of checking the flow.

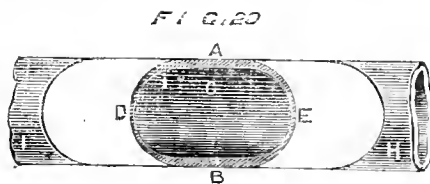
Careful examination of this diagram will show you the thickness of the solder at the solder line R E, a point where nine-tenths of the plumbers cause a thorough waste of the solder by bringing this line straight, instead of curving it as at the line P J D. Notice in this diagram, at Q, that the lead is turned up square; it should be rapped off as at B. Caution: When hammering up the sides of branch joints with the bolt, be careful not to injure the sides or bottom with the bit, or to leave a burr turned bottomwards into the pipe at K L.

SLOPE BRANCH JOINTS FOR WASTES, &c.

According to theory all branch joints should be fixed so that there will be an easy sweep for the water, and, indeed, it should be when possible, always put into practice; but circumstances will not always allow this. All wastes and branches of soil-pipes should enter in this manner.

Fig. 27 shows this kind of branch joint, which is prepared as follows:—Work the hole to the shape of the above figure, *i.e.*, much longer than you did for the square branch, then take your male pipe and offer it into its place, and to as near the angle as you can; whilst in its place scribe it to this shape (lines will be given for the setting out of this work when we come to soil-pipe work and fixing); take it out and rasp it off as at E, Fig. 27, then soil and

shave it, as also shown in this Fig. Take care that you shave the under part P D far enough back; otherwise you will be pinched for room



when wiping, and the joint will look ill-made, and probably the solder will be parted, especially if worked a little cold.

SOIL-PIPE BRANCHES.

In cutting the pipe for large branch-pipe work, such as 3in. or say 4in soil-pipe, the lead should be differently cut, whether for slope or square branches. It is best done as follows: First determine the length of the branch as from D to E (Fig. 22), by placing the end of your prepared male part on E D, or by lines struck to the angle and size of the pipe. Having the length, take a small red-hot iron (but here put a piece of paper inside your pipe to catch the hot lead) and burn the two holes E D and the slot C F to about this shape, leaving a little at point E D just to turn up and look like that at K (Fig. 27), and also like that at D E (Fig. 29). Next rasp off the corners B C F I; then just warm the lead about the hole, with shavings, &c., and take your bolt or dummy (dummy is a piece of cane having a lump of lead run round one end, with plenty of rosin to keep it firm; the rosin should be run in when the dummy is cast on, or a short piece of 1/2in. iron pipe is very handy, in which case you must tin the iron—a system that will be explained in a future chapter), and work up the sides to the shape of Fig. 24, or if on the slope, to the shape of B D E, Fig. 29.

(To be continued).

THE SCIENCE AND ART OF SANITARY PLUMBING.—V.

WATER-CLOSETS AND SOIL-PIPES.

THE last but one of the series of lectures on plumbing to plumbers was given by Mr. S. Stevens Hellyer at the rooms of the Society of Arts on Wednesday night; Mr. J. Rogers Field, B.A., C.E., occupied the chair. In his opening remarks, the lecturer said that as joints, joint-making, and traps had occupied so much time, he proposed to deviate somewhat from the original programme, and should confine attention that evening to the consideration of water-closets and soil-pipes, and in his next, the final lecture, to house-drainage and ventilation, entirely dropping the subject, "The Art of Lead Laying." Having quoted from "The London Art of Building," published in 1743, a schedule of the prices then current for plumbers' work, which were considerably higher than at present, the lecturer traced the history of the water-closet. According to the records of the Patent-office, no patent was taken out for a water-closet till 1775 by Alexander Cumming, although special licenses for protecting inventions had been granted since 1617. Although, therefore, the presumption was that no w.c. other than of a simple nature was in use up till 1775, this first specification clearly established the fact that water-closets were in use, that soil-pipes were well known, and that these w.c.'s were fixed "upstairs"—*i.e.*, in various parts of the house. Another patent was taken out in 1777 by Lemuel Prosser, also a London plumber, for an improved w.c., which seemed in construction to be about as bad as a pan-closet. About six months after this, in 1778, Joseph Bramah, of Cross-court, Carnaby Market, Middlesex, cabinet maker, took out a patent for his invention of the now well-known valve closet. The great advantage of Bramah's closet over Cumming's was that the former was made with a valve which seated itself against the bottom of the basin by a cranking arrangement, whereas the latter slid under the bottom of basin. From Bramah's specification it was clear that traps were used in his day and that they were offensive; that soil-pipes were fixed without ventilation, and that such pipes emptied themselves

into drains, and the drains into cesspools. Mr. P. J. Davies, in a letter to the BUILDING NEWS, had said that Bramah "knocked the siphon trap on the head," but if they turned to the diagram, enlarged from his specification, the audience would see that Bramah himself used a siphon-trap on the overflow-pipe of his w.c.

With regard to siphon-traps stopping up, as alleged by Mr. Davies, it could only be from bad flushing. Mr. DAVIES at this stage of the lecture, rose from the body of the meeting and explained his meaning, frequently interrupted by and as often interrupting Mr. Hellyer, until the Chairman ruled that no discussion could take place during the lecture. Upon this, a second plumber rose in another part of the hall, and asked how plumbers were to answer Mr. Hellyer. A previous chairman (Dr. Corfield), in checking discussion, had said that plumbers could point out any errors they thought he made in the professional papers, and now Mr. Hellyer answered those letters in the room. Mr. Hellyer with some warmth said that whatever Mr. Davies might write in the BUILDING NEWS he should not reply therein; Mr. Davies was not worth smoke. In lecturing there he was not responsible to the BUILDING NEWS, but only to the National Health Society, and he should not write to that paper. After some further controversy, Mr. Hellyer promised to allow Mr. Davies ten minutes at the close of the meeting to reply to any remarks he might have made about his views. Continuing his lecture, Mr. Hellyer said although Bramah by his invention tried to shut offensive smells out of closets, many inventors and manufacturers had since tried and still tried with success to make closets which had large "containers" for generating and holding bad smells. Bramah's closet had been since improved in many ways. The basin-valve had now an india-rubber seating, instead of one of metal, and the water-box was now made of iron instead of lead; but Bramah's aim was to "shut out bad smells," whereas men are to-day looking for closets to be self-cleansing and for the drainage to be wholesome. The difficulty of getting the slider of the one closet and the crank metal-valve of the other always to seat themselves, and of getting them to stand rough usage, led to the invention of the pan-closet, which was improved by William Law, of Soho, in 1796, and further modified in 1826 by William Downie, senr., of Exeter, who reduced the size of the container. Some reasons for the large sale and extensive use of the pan-closet were, the lecturer thought, that there were no valves to get out of order, and it would stand rough treatment well. But it was the most unsanitary water-closet, and ought never to be used. At his (the lecturer's) factory they were making some at that very moment, for people would have them, but he never allowed one to be made if he could help it. No matter what the material of the container might be, the pan could never be a wholesome closet, on account of the corroded excrementitious matter which adhered to it. The surface exposed to foul deposits was about 5ft. super., against the 9in. or 10in. of a valve closet; and whereas the latter could be easily washed out, the former could not be effectually cleansed. In selecting self-cleansing water-closets, great care should be taken. No water-closet should be fixed which would not allow a flush of water to cleanse any part of it which could become fouled by usage. He would not in that lecture refer to any man's work in closet, nor to his own, but would simply lay down the rule that no w.c. should be fixed which would not allow of being thoroughly cleansed and its trap washed out every time it was used. The second subject, soil-pipes, he would divide into five heads, *viz.*:—(1) Materials: their sanitariness and durability; (2) sizes; (3) position—outside or inside; (4) disconnection from drains and ventilation; and (5) traps for securing lead soil-pipes in position. Firstly, then, of what material should soil-pipes be made? Looking at the question from a higher platform than trade interest, he would answer lead, especially for this climate. Although stoneware or earthenware pipes might be more durable, the soundness of the joints could not be relied upon an hour, the connections with the w.c. branches and the w.c.'s would be difficult, and the sockets would form ledges for the filth to accumulate upon. The only material that came into competition with lead for soil and waste pipes was cast-iron, but lead was more durable, more compact, and more wholesome. Iron was a

material which, used in pipes, deteriorated from without and within under the corrosion and rust, whereas lead was practically only acted upon on the inner side, and that to a far less extent than cast iron. If constantly painted, cast iron might stand; but this involved constant expense and care, and any failure to fully protect the back of pipe would involve danger, added to which, rust might go on beneath the surface of paint. Except in urinal wastes, the accumulation of filth upon leadwork was very slight as compared with iron. The latter material had certainly one great advantage, that the carpenter could not drive his chisel or nail into such a pipe, and so endanger the health of the inmates, and further, the action of hot-water on thin lead-pipes was very injurious, except where slip-joints were used, and these were of course inadmissible in soil-pipes. As to the second head, the size, it would be remembered that 15 or 20 years ago it was common for plumbers to fix, under the direction of specifications, 6in. soil-pipes to take the branches of four or five w.c.'s, and with many architects and builders, as well as plumbers of to-day, 5in. and 4in. were the general sizes, and that too for only one water-closet. The smaller the size of the soil-pipe the more efficiently was it flushed each time the closet was used, and there was no reason why it should be so much larger than the outlet of the w.c. into it. In private houses he considered a 3½ in. lead soil-pipe quite large enough to take a tier of three water-closets—supposing the soil-pipe to be ventilated at top and bottom, and each trap to be ventilated as well. A 4in. soil-pipe, when of lead, and made by hydraulic pressure, was large enough to take the branches from several more w.c.'s, and a 4½ in. soil-pipe was ample to take a tier of six double closets. The author had had 3½ in. lead soil-pipes fixed to take tiers of three w.c.'s, and had never known the smallest inconvenience therefrom; indeed, they were cleaner to-day than 4in. pipes fixed close to them. The third point was the position of soil-pipes—outside or inside. He gave his voice in favour of outside, and in all new houses he would insist on their being placed externally. There was no danger from frost if no water was allowed to stand in the pipes, but if water leaked into pipes from a closet valve during the winter it would, of course, become clogged up. The discharging ends of the pipes should be carried below the ground-level out of the reach of cold sweeping winds, and it was unwise to take rain-water into soil-pipes, for the sun would often melt the snow at the top, but the trickling water would freeze again below. If there was a good supply to the w.c. and if it was well looked after, there was not the smallest fear of freezing up in this country. The action of the sun on outside lead-pipes was often injurious, stretching the material between the tacks, bending it out of shape, and weakening it. Where no slip joints could be introduced, lead pipes should be kept in an angle, or in some other way out of the direct rays of the sun. Another reason for this was that when the pipes heated, the excrement might partially dry upon the pipes, especially where the w.c.'s were used with but little water. This point told also to a certain extent against internal soil-pipes. The risk of getting soil-pipe air into the house was so minimised by putting the pipe outside that it was worth while to do this, and after providing sufficient ventilation to run the risk. This brought him to his fourth head, the ventilation of soil-pipes and their disconnection from drains. Till within the last few years the size of ventilating or air-shafts to soil-pipes was 1½ in. to 1½ in., on 4, 5, and 6in. pipes, but in every good job the present custom was to carry up the soil-pipe full size. He was afraid to say the smallest word in disparagement of so good a rule; but it sometimes happened that a w.c. was wanted on the ground-floor of a very high building, and then it seemed an expensive arrangement to fix 5ft. or 6ft. of 4in. air-piping to ventilate 7ft. or 8ft. of 4in. soil-piping. In such a case he should fix 3½ in. soil-pipe, disconnect the soil-pipe from drain, or give it foot-ventilation, and if windows would not allow the termination of the air-pipe just above the soil-pipe, he should be satisfied with a 2in. air-pipe going up to roof—ventilating the trap of w.c. not with a branch-pipe. When a soil-pipe did not exceed 6ft. or 8ft. in length, and it was disconnected from the drain at its discharging end, and the w.c. was well supplied with water,

there was no necessity to fix a long length of air-pipe on the top. An air-pipe should never stop just beneath a roof-cornice, or there would be no escape for the contents except under the eaves. Generally soil-pipes were fixed, even in these enlightened days, with inefficient ventilation—i.e., they were not ventilated at the bottom as well as at the top, and consequently there could be no air-current through them. This was exemplified by a simple experiment with a stoppered glass tube. Whether soil-pipes were fixed externally or internally they should empty themselves into a drain outside the house, and when practicable the discharging ends should be exposed to the atmosphere. Where the pipe was carried up to ridge full size, there was no danger of offensive smell coming out at the grating enough to annoy anyone. Where such traps, from force of circumstances, would have to be fixed immediately under or near a window or door, seal over the top of trap, and take a fresh-air induct-pipe into its side. The fifth and last point as to soil and waste-pipes was the tacks for securing them in position. Single tacks should not be used, as neither so secure nor durable as pairs. A pair of tacks had double the strength of a single tack, for they had a greater grip of the surface, and they were also much stronger than a double tack. Tacks should be cut from a heavier quality of sheet-lead than the soil-pipe—say 1lb. per foot super. heavier. All those fixed on a stack should be cut out together to one size, and after feathering one of the edges with a rasp, each tack should be soiled about 3in. on the soldering face, and an inch on the opposite face. They should be shaved about an inch wide, and all the tacks should be fitted on the pipe so that they may be soldered on in one heat. In fixing a pair of tacks, pour the solder on each alternately, and then wipe them quickly one after the other. He would advocate the use of tacks on small air and waste-pipes, and these tacks were better than wall-hooks for fixing certain service-pipes, especially which might have to be removed to get at the fittings. In conclusion, the lecturer briefly touched upon general waste-pipes, urging that, instead of reducing such pipes to very small dimensions to get good flushes through them, it was better to increase the entrance way into such pipes.

The CHAIRMAN said such lectures must be of great benefit to the plumbing trade, as showing the principles on which fittings should be devised and made. The lecturer had omitted to mention that the Local Government Board's code of model by-laws, which were not, by the way, in force in the metropolis, the use of pan-closets was prohibited. He had recently seen a remarkable case of false disconnection at a watering-place; the soil-pipe was cut off beneath the floor of kitchen from direct contact with the sewer, and the result was to create a nuisance. Of course disconnection was useless, unless it took place in the open air. In the severe winter of 1879-80 he sent out a large series of questions as to the action of frost on soil-pipes fixed up externally according to his recommendations, and in over 100 replies there was but one which stated that the pipe was frozen up, and this, on investigation, proved to have arisen, as Mr. Hellyer had remarked was generally the case, from a leaky w.c. valve allowing water to dribble down the inside of pipe. Mr. Hellyer's desire appeared to be that plumbers should keep their minds open and free from prejudice, and he had himself set a very creditable example in this respect. On the cover of the first and second editions of his "Sanitary Plumbing in Sanitary Houses," Mr. Hellyer illustrated his patented three-dip trap; yet in his last lecture he had shown its defects, and had said that he could not recommend its use. The Council of the National Health Society were endeavouring to arrange for an evening's discussion on Mr. Hellyer's views.

Mr. PULLEN pressed that the last proposal—which had been received with loud applause—should be made definite, but the Chairman could not promise that. Mr. Pullen proceeded with great vigour to say that Mr. Hellyer's ideas of traps were all wrong, and that he could prove that the O-trap was better than either the S or U-trap. Interrupted by cries of "Question," he exclaimed that he was not talking to Bend and Dent's men, but to plumbers generally.

Mr. P. J. DAVIES said Mr. Hellyer had omitted to notice that in Bramah's closets a O-trap was always fixed underneath. He was proceeding when Mr. HELLYER held up Bramah's specification, and said he could not agree with a man who talked so, to which Mr. DAVIES retorted that he knew he could not, and the Chairman had to interpose between the lecturer and Messrs. DAVIES and PULLEN, who were all speaking at once, the latter exhibiting a model of a O-trap, which he said he would wager 5 to Mr. Hellyer's 1, was self-cleansing.

Mr. CHAS. GOSLING, of Pimlico, said he had been surprised to hear the lecturer say his firm still made hundreds (Mr. Hellyer: A few, only a very few) of the old-fashioned pan-closets. He should have thought that so large a firm could well afford to decline to execute orders for an article which one of its members had that evening entirely condemned as unsanitary, or else that they would label them "Bad; unfit for use."

Mr. HELLYER explained that the order came from an hotel where both proprietor and architect wished for pan-closets, and as his firm were taking the contract for plumbing-work, what could they do?

Mr. GOSLING: Refuse to supply or fix, certainly.

Another plumber said his specimens of plumbing work had been refused admission to the Sanitary Appliances' Exhibition to be opened on Saturday, because he had, in accordance with Mr. Hellyer's conditions, sent in under motto. It had cost him about £5 to prepare, and the loss of time and hire of conveyance to take to South Kensington, and he felt it wrong that it should be excluded on such a plea.

Mr. HELLYER regretted that red-tape should have intervened in such a matter, and promised to see Mr. Judge and get all competition plumbers' work sent to him (the speaker) shown. If necessary, the motto system should be abandoned. The would-be exhibitor said as that was the great guarantee of fairness, he should still decline to append his name to his work, and the meeting, which had been thinning during the after-discussion, broke up while Mr. Pullen was protesting against the attacks on the O-traps.

RESTORATION AT ST. ALBAN'S SINCE 1877.

THE following—taken from the *Herts Advertiser* is a report of the paper read by the Rev. Canon O. W. Davys, before the St. Alban's Architectural and Archeological Society, at their meeting reported in our last number.

On the 11th October in the year 1877, I read a paper on "The Restoration Works in St. Alban's Cathedral, finished, in progress, and to come," some portions of which may be in the recollection of the members of this society, and of others then present; my paper to-day will be in some sort a continuance of the same subject, for, as I formerly stated, it seems to devolve upon a secretary of the St. Alban's Architectural Society, founded as it originally was, for the especial study and care of a church which in interest (as one of my oldest architectural friends, Mr. Stewart, the historian of Ely, well wrote to me lately) "has not a companion," to report from time to time on its condition. It also seems the duty of such an officer to comment on the means taken for the preservation of so important a fabric, and the measures accomplished, or in contemplation, for the restoration of the several parts of the most vast of our existing Abbey Churches, and their adaptation to new uses in the Cathedral of one of the dioceses, the establishment of which will take a foremost place in the Church History of England, during the reign of her present Majesty. It may be asked why so long a period as four years has been suffered to elapse, during which so much that is important in the modern history of our Abbey has taken place, without any official report being made to this society; the fact has been that several "burning questions," as they have been called, have arisen in the course of the restoration works, and we thought it better to let them burn themselves out before commenting on them here. On a subject of very deep general historical and architectural interest, namely, the design of the west front, or rather the west fronts, of St. Alban's, as they were planned by the Norman and Early English architects, I read a paper before the Royal Archeological Institute, at their Lincoln meeting last year, which has since be-

come known through its publication in the *BUILDING NEWS* and other papers. I thought it better to read that paper before the most important architectural society we have in England, for two reasons; first, because the subject was one of far greater than local interest, and next because special circumstances made it better just then to take a view of our west front from a distance. In that paper I endeavoured to show, first what the west front of Paul of Caen, the great builder of the whole Norman structure, probably looked like when completed, and secondly how on the same ground-plan, which is nearly a fac-simile of the noble west front of Wells, John de Cella began and William de Trumpington continued, a grand Early English front containing, what no other English west front contains, the three magnificent porches seen in the great west fronts of France. I was able, from remains both of ground-plan and elevation, assisted as I had been, in some of my earlier researches, by Sir Gilbert Scott, to trace that west front up to the belfry stage of the side towers, which was probably as high as the work of the Early English architects rose. So far my paper dealt with matters of discovery, not of invention, as they were called in a subsequent article in the *BUILDING NEWS*, which accompanied a drawing of the proposed new front, of which the foundations are now being laid; the upper portions of the towers were perforce conjecturally drawn, as the Early English architects would probably have completed them if they could; but they appear to have been short of money then, as those, who would see them restored now, have found themselves lately. I may here mention that, in very notable instances, the builders of our great Early English Churches had to stop at their towers, the marvellous builder of Early English Salisbury, Bishop Poore, was translated to Durham, before he had completed his wondrous Cathedral of New Sarum, further than the supports of the central tower, and the tower and spire, which now rest on Poore's sub-structure, form, as you know, the grandest of the magnificent steeples of our Decorated period. Westminster Abbey had no towers completed till Sir Christopher Wren tried his hand at fancy Gothic at the west end. The towers of Lincoln are in their upper stages Decorated in the grand central tower, on an Early English sub-structure, and Perpendicular at the west front on the Norman towers of Remigius. Wells, our parallel west front as to ground-plan, has its towers at the west front Perpendicular, and most skilfully are they set on their lower Early English stages, the central tower of the Cathedral being somewhat earlier in date, while at Peterborough we have Decorated spires on the side towers of the Early English west front, and at Ely a Decorated octagon upon an Early English square western tower. It was for the benefit, upon the whole, of future generations, perhaps, that this delay in completing the steeples of our earlier churches took place, for there can be no question that, as decorative art and mechanical skill progressed we got far more magnificent, better proportioned, and more stable towers and spires erected. I should have been content then, and so probably would have been the majority of architects both professional and amateur, if, in the restoration of St. Alban's West Front, the lower stages of the side towers alone had been re-erected, leaving the superstructure to follow, if at all, at some future date. We should thus have got the glorious breadth, which our original architects intended, without striking the skyline with any new forms till after a long period of deep consideration. I was naturally, before the Archaeological Institute, reading a paper which dealt more with the antiquarian than the practical question of the restoration of this beautiful front, but I was attacked, in the discussion which followed, on two sides. A well-known architect asserted that though you might be able to trace the form and details of this front with perfect accuracy, though shafts and mouldings might be found, many of them *in situ* yet, since so much new work must be executed, you could only get a new front after all; to which my natural reply was, that, if this principle was to have so great weight, no restoration of a decayed building on the old lines was possible. Another gentleman flew off in a tangent at the horror of intrusting a restoration like this to one man, however generous; but the general sense of the assembly was evidently with the principles I had laid down, and their anxiety was to see as accurate a restoration of one of the

finest of our English west fronts accomplished as possible. I trouble you with this reference to my paper on the west front, because that must in many ways form a connecting link between my reports to the society of 1877 and 1881. I will now ask you to review with me the principal restoration works, which have been proceeded with since I last addressed you, and let me observe that those works have been both extensive and costly. We have been credited, I fear, by the outside public with being very highly talented in the art of quarrelling. Prose has not been spared to ventilate our grievances, nor poetry to celebrate our triumphs. I little thought, when, in my last paper before you, I spoke of the sunken roofs of our Cathedral, and a discussion subsequently took place on the question of elevating them, in which no less a member of our society than our present High Sheriff took part, that the first notes were being heard of the trumpet call to the great future "pitched battle of the roofs"; there seemed, at that time no immediate prospect of those roofs being touched; but events have moved rapidly. When that great mechanical work, to which I four years ago alluded, of forcing, by hydraulic pressure, the southern Early English compartments of the nave, which were leaning dangerously southward, into the perpendicular, and sustaining them in position by the erection of massive buttresses against the south aisle, and the completion of the vaulting within, was in progress, the decayed condition of the great nave roof became apparent, and measures had immediately to be taken which led in their result to the completion of the high-pitched roof of the nave, which we now see.

(To be continued).

THE CHICHESTER AND MIDHURST RAILWAY.

THE Chichester and Midhurst line of the Brighton Company, opened on Monday, is a continuation and extension of the Mid-Sussex, now absorbed in the Brighton Company's system. The section of the Mid-Sussex, of which the new connection is a continuation, may be said to commence at Horsham. A company to construct a line from Horsham to Pulborough was incorporated in 1857. The continuation to Petworth was purchased by the Brighton Company in 1860. The Mid-Sussex and Midhurst Company, for the construction of five and a-half miles, was incorporated in 1859. In 1868 a company for the construction of a line, of 13½ miles, between Horsham, Dorking, and Leatherhead, was incorporated. The Chichester and Midhurst Company, for a line of about twelve miles in length, was incorporated in 1864. The works were in part constructed by Messrs. Dearden and Buxton, contractors, but were stopped in 1866. In 1868 an Act was obtained authorising the abandonment of the project, and in 1873 another for its revival. The works for the revived line were commenced in 1878 by Mr. Thomas Oliver, of Horsham, contractor.

The new station at Midhurst—which is an ancient borough, and a market town—is, like all the others, in old English style, half-timber framing, built in red brick with Portland stone dressings, coved cement panels with floriated designs under the eaves, some of the gables faced with red tiles, and the windows filled with lead frosted cathedral-tinted glass. The roofs have terra-cotta finials and ridges. The entrance front elevation includes a porch partly open at the sides. A projecting portion of the front contains the stationmaster's house, with gable, mullioned windows, &c. The station buildings, which are on the up side, are 130ft. long; the platform on the down side is much longer, and has a large covered waiting shed. The roofs of the platforms are supported upon cast-iron columns and iron brackets. There is a subway under the line affording communication between the two platforms. The roof which is segmental, has 1ft. 5in. of brickwork and the invert 9in. The internal dimensions are from floor to crown 8ft. 5in.; width at floor 7ft., at spring of arch 8ft. The old station at Midhurst, which is at some distance beyond the new one, will be appropriated to goods traffic. All the stations on the new line, although varying in size, are alike in general style and character, and the description of the Midhurst station may be taken as applying to them.

From the station at Midhurst the line passes round a ten-chain curve, laid with a cheek rail. For the first three miles there are only two short cuttings, the remainder being on embankments of various heights. The cuttings referred to are not deep, and are through sand, of which there is an abundance in the district. It is sharp, and of excellent quality for building purposes. The line then passes for two miles over a chalk bank, till it reaches Cocking tunnel. The chalk from this tunnel and from the cutting beyond was taken for a lead of as much as three miles, between extremes of cutting and tipping. The tunnel is under Cocking-hill, which is at the summit 92ft. above the tunnel. Immediately before entering the tunnel the line is carried by a short embankment, 56ft. high at the deepest, across the Crypt ravine. The road to Chilgrove crosses under the line in the same locality. The tunnels are egg-shaped, 17ft. 6in. from side to side at the widest, and 8ft. 6in. from the rail level to the crown. They are of five-ring brickwork, and present elevations at the entrance in red brick, with white brick facings, and Portland stone caps and copings. The pilasters at each side are 4ft. on the face. They have entablatures, and rise considerably above the line of the panelled parapets. Cocking station is about two and a-half miles from Midhurst, and is 110ft. above the level of the preceding station. This station is near to the South Downs, the ridge of high land that extends from Lewes and the Valley of the Ouse on the east to Winchester, Salisbury, and the Valley of the Avon on the west. The Cocking tunnel is about 600 yards from the station, and is 788 yards long. It is on a gradient of 1 in 60 rising from Midhurst.

The headings of all the tunnels were driven at the bottom or formation level with shafts. At the Cocking tunnel a heading large enough for the passage of an engine and waggons was continued through the cutting at the south end of the tunnel, to open a way for the chalk to be carried to the tip at the north end. The making of the tunnel gave some trouble, from the looseness of the chalk and its liability to fall, especially after wet weather. About half-a-mile beyond Cocking tunnel the line reaches its summit—203ft. above Midhurst and 287ft. above Chichester. The line has risen by various gradients and pieces of level continuously from Midhurst; in like manner it now falls continuously to Chichester. At four and a-half miles from Midhurst, Drove tunnel, 710 yards long, is reached. The highest ground over it is 6ft., but between this and another ridge there are only about eighteen inches of ground between the natural surface and the brickwork. Before reaching the tunnel there is an embankment 28ft. at the highest part, followed by a deep cutting. The ascending gradients are 1 in 250, 1 in 160, 1 in 942, level, 1 in 105, 1 in 74, 1 in 88, level at Cocking station, and 1 in 60, which is the steepest on the line, and level at the summit; the descending gradient through Drove tunnel is 1 in 385. There was no engineering difficulty to encounter in making this tunnel; the chalk, firm and dry, is more intermixed with flints than at Cocking.

At five and a-half miles from Midhurst, and three miles from Cocking, Singleton station is reached; here the most important works upon the line have been carried out, heavy and costly, because of the nature of the ground, but chiefly from the accommodation that will be required by the visitors to Goodwood races. There are four lines of rails in the station, and sidings that extend for half a mile to the north, and a quarter of a mile to the south of the station. There is room in the sidings to accommodate fourteen trains of twenty carriages each, or upwards of 1,000 passengers. There are five water-cranes in the station, and an engine turntable, 45ft. 6in. in diameter. There is a large goods shed at one end of the station, 60ft. long by 30ft. wide, with sliding doors, verandah over loading dock, line of rails through the shed, and an office at one end. There are refreshment-rooms on both sides of the line. The next three bridges, which are over the line, are 25ft. wide between the parapets. The siding ends before West Dean tunnel, 441 yards long, is reached, the centre of it being about six miles from Midhurst. It is on a curve of thirty chains radius, and a gradient of 1 in 75. It is 112ft. below the highest part of the ground over it. At about a quarter of a mile beyond the tunnel the line passes under the Chichester high road by a tunnel bridge 10 yards long.

Lavant station, eight and three quarter miles from Midhurst, and three and a quarter miles from Singleton station, is on the west side of the line, close to the Chichester road, and adjoining Mid-Lavant Churchyard. After leaving the station the line again passes under the Chichester road by a wrought-iron girder bridge. This bridge has a skew span of 27ft. 4in. and a square span of 25ft. 11in. by 11ft. 6in., wrought-iron girders, with lin. tie bolt and arches in cement. Then follows a long shallow cutting in gravel, with slopes of $1\frac{1}{2}$ to 1; the cuttings through the firm chalk have slopes of $\frac{1}{2}$ to 1. From the cutting south of Lavant gravel was taken for ballast for the whole of the line. About a mile from Lavant Chichester cathedral and spire come into view, and a run of another mile brings the train to Fishbourne signal-box, where the road to Fishbourne crosses the line. From this point the new line runs alongside of the South Coast line of the Brighton Company for about three quarters of a mile, and forms a junction with it at Chichester station, which has been considerably enlarged and the platform lengthened to receive the Midhurst trains. A new goods shed, 115ft. long by 35ft. wide, has also been erected here.

The descending gradients from the level at the summit are—1 in 100, 1 in 385, 1 in 75, 1 in 60, 1 in 254, 1 in 75, 1 in 94, 1 in 272, 1 in 694, 1 in 81, 1 in 186, 1 in 76, level, 1 in 76, and practically level at Fishbourne crossing. The curves are very easy throughout, that at Midhurst station being on the shortest radius. The works, exclusive of cuttings, embankments, and stations may be thus summarised:—Three tunnels and a tunnel bridge, aggregating 1,965 yards lineal; one wrought-iron bridge under, and seven wrought-iron bridges over the line, fifteen brick arch bridges under, and three over the line; four bridges, or arches, with cast-iron bridges under the line for the accommodation of cattle, one over for the passage of the Lavant, and an ornamental bridge. The under bridges are built for a single line with a width of 11ft. between the parapets, except at Cocking, and three bridges near Singleton station, which are built for a double line, and are 25ft. between the parapets, which are 4ft 6in. high, with red or blue brick coping. All the over bridges are built for a double line, and one, north of Singleton station, has three lines of rails. All the brick bridges are single arch, with wing walls, newels, pilasters, and stone caps. At formation level the bases of cuttings are 19ft. for single, and 30ft. for double line.

The new line was laid out by Mr. F. D. B. Minter, engineer-in-chief of the Brighton Company; the works were executed under the supervision of Mr. Horace J. Mannering, as resident engineer, with Mr. J. Phillimore as clerk of the works. The stations are from the designs of Mr. P. H. Myres, of 21, Abingdon-street, Westminster, and Preston, Lancashire.

HARBOUR WORKS AT EAST LONDON, SOUTH AFRICA.

THE important works which have been in progress for several years at the mouth of the Buffalo River, South Africa, under the direction of Sir John Coode, are rapidly approaching completion.

Up to January 31 of the present year, besides wharves, sidings, and other collateral works, Sir John Coode states that the work done is represented by 3,150 lineal feet of training bank and breakwater on the east side of the embouchure of the Buffalo, by 1,550 lineal feet on the west bank, and by 1,230ft. of breakwater. The expenditure, including a sum of £50,000 for plant, workshops, and appliances, amounted on December 31 last to £306,964; but Sir John Coode fairly argues that the enterprise should be credited with the value of the considerable reclamations of land already and still to be effected by its prosecution. On the eastern bank an area large enough for a considerable township will be reclaimed, and here no doubt in the future the principal business in connection with the port will be transacted.

The further extensions proposed are the lengthening of the southern breakwater 290ft. from the point contemplated in 1877, the lengthening of the east breakwater 1,050ft., and the running on of the western training bank by 220ft. The gross estimated cost of the entire work is £521,200, and of the ultimate results to be derived from this outlay, Sir John Coode writes as follows:—"For some time past I have

considered that such an extension would be absolutely essential for the permanent formation of the channel, having regard to the rarity of the occurrence of freshets and to the almost incessant action of the surf. The proposed eastern arm will train the currents both entering and leaving the harbour, and place the entrance in a depth of over 22ft. at low water. Thus placed, I do not apprehend that the sand disturbances during gales will affect the depth, except to a limited extent, and there would thus, on the completion of these works, be sufficient water for heavy-draughted vessels to go into and out of the river at all times."

THE ARCHITECTURAL ASSOCIATION EXCURSION.

THE following is the outline of the programme as arranged for the excursion of the Architectural Association, which will commence on Monday, the 15th of August, and continue throughout the week. Mr. Aston Webb, the newly-elected president, will conduct the party, the number of which is limited to forty. On Monday, the opening day, Worcester Cathedral and adjacent buildings, including the Commandery, will occupy the whole day. Tuesday will be chiefly devoted to Tewkesbury Abbey, visiting the very interesting half-timbered house of Seven End on the way, with a half-hour's stay at Hanley Castle. Wednesday will, like the previous and two following days, be a carriage day, with Ombersley, Westwood House, Droitwich, Hadsor, and Mere Hall, as the places to be visited. On Thursday, Great Malvern and Ledbury, with its old timber market-house, will occupy the excursionists' attention, with 45 minutes' stay on the way both at Madersfield and Little Malvern. The half-timbered church of Besford, the most interesting of its kind in the county, is down for the first visit on Friday, when Evesham and the Abbey of Pershore will be seen. The concluding day, Saturday, will, like the first, be devoted to Worcester itself, including the churches of St. Andrew, St. Alban, and Holy Trinity, where the old Guesten Hall roof has been reused. The Guildhall, a veritable Queen Anne building, lately restored and added to by the late Sir Gilbert Scott, R.A., in conjunction with Mr. H. Rowe, F.R.I.B.A., the city architect, will also be visited. The head-quarters of the party will be the Star Hotel.

FRESCO PAINTING.

LEON BATISTA ALBERTI, the great Italian architect, in his well-known "*De Re Edificatoria*" (lib. vi) describes three varieties of *intonachi* for the walls; the first or rough coat is prepared to adhere strongly to the wall, and this coat supports the after-coats. It is a kind of rough-cast, and is called *zinzaffato*. The second coat is prepared with lime and clean river-sand laid on with a rough surface for the final *intonaco*, and is called *arriccato*. The lime is to be slaked in a covered trough with clean water added by degrees, till it is greatly in excess of the lime; the whole is then worked up with a spade until free from lumps. When this is done the fluid mass is covered up and left for three months or more to mature. A rough wall with joints, having projecting stones to form a key for the first coat, is recommended, and the first coat, or *zinzaffato*, is better applied when the wall is built. Messrs. Audsley, in their Dictionary, add that it was a custom with the artists of the fifteenth century to enlarge their original designs on the second coat with a pencil dipped in red colour (*rosaccio*), as by this means they could judge of the arrangement and scale. When amended, the red lines were traced on paper, which probably formed the full-sized cartoons. The *intonaco* was then spread over the *arriccato*, and the painting proceeded with. This process has been proved by examination of frescoes when the *intonaco* has fallen off. In the preparation of new walls for fresco painting much trouble, disappointment, and failure might be saved if the walls were built rough on the inside, and the coats of plaster laid on in the manner above described. Much failure has arisen from the lime not having been kept long enough, or the fact that it has not been well manipulated. The materials require to be evenly compounded and spread, and the sand well cleansed from saline and other impurities.

ALBERT HALL MANSIONS.

WE supplement our remarks on these mansions last week by a few words on the interior arrangements. The floors of each block provide suites of principal apartments, the other rooms of each set being in the basement and mezzanine floors. Taking one of the principal sets, we find on the ground-floor two suites of principal rooms, a vestibule and entrance-hall on the south side, common to the suites, a private hall and entrance, a dining-room, 28ft. 6in. by 16ft. 6in., a drawing-room of the same size, two bedrooms and a dressing-room, a w.c. and sink being placed in the lobby. There is to each set a stairs to basement and mezzanine floors; in the former is the kitchen, scullery, a bedroom, and cellar; and in the latter, three good bedrooms, with bath-room, w.c., and closets. The adjoining set of apartments is similar. On the first floor the suites are arranged on much the same plan; the dining-room is 23ft. 6in. by 17ft., the drawing-room 28ft. 6in. long by the same width, and these lead from a large inner hall, with entrance. These rooms front the park, and the projection of the front of drawing-room gives a balcony on the dining-room front. There are two bedrooms, a dressing-room, with conveniences, and stairs to mezzanine, where the kitchen is located. A service lift is provided. We may add the other two blocks are similarly planned, each pair of sets have staircases common to the whole block, besides private stairs. The rentals of each set range from £600 on the ground and first floors, to £150 on the third. The fourth-floor sets are to be let at £150, and the small flats at the top at £80 per annum. These mansions are let on lease only for 7, 14, or 21 years. Mr. Norman Shaw, R.A., is the architect, and Mr. J. Hussey, of Kensington, is the builder.

DRAUGHTS IN DWELLING-HOUSES.

DR. JAMES EDMUNDS, the Medical Officer of Health for St. James's, Westminster, in a paper contributed to the *English Mechanic and World of Science* on "Taking Cold," gives some particulars of some alterations introduced into a house under his direction with the view of avoiding draughts. He says:—

Last autumn, a gentleman residing in St. James's consulted me about a house which he proposed to purchase and move into, because he had never been well in his own. He had been for years a martyr to "bronchitis," and had always had his doctor in the house; although when away from his own residence he got on very well. In his house I found (1) no provision for the entrance of fresh air; and I pointed out that when fires were going, each of which carried up the chimney several cubic feet of air per minute, the same quantity of air must come into the house from outside, and that if he did not make provision for its entrance, it would be sucked in through the drains, or by down-draughts through other chimneys. In the first case he would be poisoned by sewer-air; in the second his house would be defiled by a sooty atmosphere; and, taking a lighted taper, I demonstrated that air was coming down certain cold chimneys, and bringing with it a stream of blacks, the heavier of which formed a deposit all round the fireplace through which the cold descending current came. It was the same with certain drains and waste-pipes, of which some are practically always left open. Now, dwelling-houses in winter are virtually supplied with foul air through the sewers, or with dirty air through the cold chimneys.

By a simple contrivance with the fanlight of the street-door and one of the lower sashes in the basement, I made a natural entrance for clean pure air to the central staircase. The "suck" of the chimneys was properly met; thenceforth the atmosphere of the house was all that could be desired and an obvious improvement in the cleanliness of carpets, curtains, &c., was observed. Further, to make each room supply itself more or less directly from the outer air when that was desired, I had the narrow bead at the bottom of each window-frame replaced by one from two to three inches in height—in fact, to come up nearly to a level with the opening for the window-glass. By this simple device (which also can be seen at any time in general action at the London Temperance Hos-

pital) the lower sash can be raised an inch or more, and thus, without any direct indraught at the bottom of the sash, the "suck" of the fireplace is met by an indraught at the top of the lower sash, the indraught being directed upwards and striking the ceiling obliquely so as to be fairly diffused through the room instead of striking upon persons sitting in the room. This arrangement is one that can scarcely be improved upon for ventilating an apartment, and it answers perfectly, subject only to the proviso that in very cold climates it is a better plan to supply each room entirely from the general staircase, the staircase being itself properly supplied with fresh pure air, which is warmed at the point of admittance by passing over steam-heated iron or copper tubing.

In cities like London the air should come in through a loose layer of cotton wool (like wadding ungazed) spread out between wire-work of an area adequate to admit sufficient air. The area of the wire-work should be about twice that of the sum of the areas of the largest number of chimneys that work together in the house during the winter months. The layer of cotton wool (or sheet of fine cambric) will need changing every now and then, according to the amount of soot and dirt which it has stopped and which otherwise would have been deposited upon the carpets of the house and in the bronchial tubes of the persons living in it. It is indispensable that this opening for the ingress of air be at the lowest point in the house, such as the hall-floor, or even at a basement window, as then the air does not find its way in unless in response to the "suck" of the chimneys; its ascent through the house is slow and uniform, and it is never felt as "draught." On the other hand, if a similar opening be made in a staircase-skylight, or the upper sash of a window be drawn down, the cold air comes in quite independently of the presence of "suck" in the room. The warm indoor air simply drains out of the house, and the cold out-door air simply drains in. This, which is a very general notion of "ventilation," simply wastes the heat inside the house, and causes a down-rush of cold raw air upon the inmates, a down-rush which takes especial effect upon those who are but thinly clothed upon the top of the head.

I found also (2) that a beautiful elliptical stone staircase in the centre of the house was lighted above by a large skylight. Openings in this skylight had been made for "ventilation," with the effect which I have described already, and which told upon the gentleman who, like myself, had lost his thatch, so that every time he passed out of his warm dining-room or drawing-room he began to sneeze, unless he put on a hat in order to pass through the staircase. The skylight also was constructed of one layer of thin window-glass, and the result was that even when these "ventilation" openings were closed up, there were mysterious draughts in the staircase (convection currents), which no one could understand, and which equally gave him cold. In fact, a gentleman of large fortune, in command of every comfort, and in one of the select residences of the West-end of London, had of late years found his London life one perpetual coddle and conflict with fits of sneezing and catarrh. Yet the cause of these mysterious draughts was very simple when pointed out. The warm air inside his staircase ascended in virtue of its lightness, and rested in contact with the under surface of the cold thin glass of the skylight. By this contact it was chilled, and thereupon becoming condensed and heavier than the lower strata in the staircase, it descended as a cold current, which, striking the head of my client, produced in him attacks of sneezing and catarrh, which never affected the well-thatched heads of the house-keeper or servants, and which, therefore, were set down altogether to constitutional tendencies to "bronchitis" on the part of the owner of the house.

This also was perfectly remedied. What I ordered was as follows:—The ventilation openings were sealed up, the lappings of the glazing were putried up so as to keep out cold air and blacks, and then a second horizontal skylight was set in beneath the other, it also being made air-tight, and there remaining an air-chamber between the two. The second skylight was glazed with thick sheet-glass; and with ornamental colouring it became a great addition to the house artistically. This arrangement practically proved non-conducting, so far as heat was concerned, and the "convection

currents," which had previously made the staircase impassable—even when all the "ventilation" openings were closed—were entirely stopped.

As a practical fact, these comparatively inexpensive devices saved this gentleman from the worry and expense of changing his residence. The atmosphere of the house is now sweet and clean; the warmth of the house does not radiate through the thin staircase skylight on cold nights. He is delighted with his residence; and the whole of last winter he passed in town without once getting fixed by his old enemy the bronchitis, and without once calling in his doctor.

Skylights ought never to be put up unless double or double-glazed. Double-glazing answers perfectly if the sashes are grooved out for glass on each side, and are then glazed with an air-space of $\frac{1}{2}$ in. or more between the panes of glass. The glass must be put in with its inner faces perfectly bright and clean, and the glazing should be done on a cold dry day so as not to include watery vapour, which, in cold weather, will condense inside the air-space and cause mistiness. This double-glazing with air-space makes a window almost as warm as a brick wall, and not only keeps up the temperature of a room in winter and saves firing, but it keeps the room cool in hot weather, and it makes the temperature more uniform throughout the apartment. With ordinary thin glazing in winter the inmates are always being chilled on that side which looks towards the window, and baked on the side which is towards the fire, and no sooner do ladies leave the dining-room than the gentlemen instinctively move up to the fireplace and proceed to bake the cold side of their persons. Double-glazing our window sashes would save all this trouble, and this device also may be seen in general use at the Temperance Hospital. So much for alternations of temperature, and for the methods of obtaining a continuous current of properly-tempered air through our houses in winter, without such currents striking the persons of the inmates, and thus giving them "cold." Such a current is *ventilation*—a current which strikes the person is *draught*.

In summer the problem of ventilation is a different one, inasmuch as there is no motive power at hand, such as the "suck" of domestic fireplaces. Open windows and doors must ventilate ordinary houses in summer. But in large buildings, such as crowded chapels, theatres, &c., the only method is to force fresh air into the centre of the building in such direction as not to strike the persons of those who are in the building. This must be done by a mechanical blower. Drawing air out of the building does not answer, inasmuch as the building is then supplied through windows, doorways, and objectionable channels, and the incoming current is sure to strike upon someone. On the other hand, if air be forced through a suitable trumpet-shaped tube into the central space of a large chamber, it need not strike upon any one, and the air finds its way not in, but out, through the doors, windows, &c. No better illustration can be given of the ignorance which prevails upon this subject, even in high places, than the theatre of the Royal Institution, where eminent scientists and aristocratic amateurs are herded together every Friday night under such physical conditions as to mutually poison each other. If a door be left ajar, there enters a draught which cuts like a surgical instrument, and which, acting upon the perspiring skins of the half-poisoned audience, must produce a regular crop of physicians' fees. I am sure that the illustrious professor of physics who presides over such matters there would rejoice at the results if every Friday night he would simply set one of his experimental gas-engines to work a blower which would discharge through a suitable shaft of not less than a foot in area, a stream of fresh, pure air upwards in front of the lecture table. No one could by any possibility be inconvenienced by a stream of air rising like a refreshing fountain into the centre of the theatre; the atmosphere would be kept perfectly sweet, and all the draughts which now cause so much unmusical growling in the neighbourhood of the doors, would go out into the empty lobbies, instead of piercing their way into a perspiring audience. The medical profession would suffer in pocket, but many eminent scientists would escape serious "colds," and "the aristocratic place out" (to use the words of Mr. Matthew Arnold, if I remember

rightly), instead of leading people to believe that ventilation is an insoluble problem, would teach a practical lesson in hygiene, which popular preachers and theatre-managers would not be slow to profit by.

ROYAL ACADEMY ADMISSIONS.

THE following are the Royal Academy admissions for July, 1881, to the Architectural Schools:—

TO UPPER SCHOOL.—F. B. Bare, W. Bucknall, J. F. Curry, B. Dicksee, E. G. Hardy, W. F. Lethaby, G. H. Shackleton.

TO LOWER SCHOOL.—G. Blizard, G. C. Horsley, H. H. Kemp, A. Kent, A. Leslie, H. W. K. Martin, H. G. Nixon, H. Read, T. Sims, J. A. Slater, R. E. Smith, C. H. Stock, W. Toogood.

PRIZE-WINNERS.—G. W. M. Addison, R. T. Blomfield, W. M. H. Burdett, F. Dickenson, H. Field, E. A. Jackson, F. Johnson, G. E. L. Lawrence, T. MacLaren, G. T. Oakesholt, S. Gambier Parry, F. Sanders, A. D. Smith, Kiugo Tatsuno, Thomas Ward.

CHIPS.

From specimens submitted, we think the testimonials accompanying them are well deserved, and that any readers desiring rapidly and correctly lithographed bills of quantities, plans, &c., will do well to employ Mr. J. L. Allday, of Colmore-road, Birmingham.

The parish-church of North Elmham is to be reopened on Wednesday, the 3rd August, after complete restoration of the roof, a work carried out by Messrs. Cornish, of that town; the interior of the church is about to be renovated.

The will of Mr. George Smeed, brickmaker, of Sittingbourne, who died on May 2 last, has been proved, the personal estate being sworn under £160,000.

A pair of three bells has just been cast at Reddenhall Foundry, Norfolk, for the parish-church of West Meston, Sussex.

A temporary line of railway from Hull to Eppleworth, near Wickenburg, was opened with public ceremony by the sheriff of Hull on Thursday week. It forms the first section of the Hull and Barnsley Railway, and includes an embankment two miles long, and several permanent bridges and a viaduct at Eppleworth. Messrs. Lucas and Aird, of London, are the contractors; Messrs. Shefford and Bohn, of Hull, the engineers, and Mr. J. Abernethy, F.R.S., the consulting engineer.

A brass eagle lectern has just been presented to Rottingdean Church, Brighton, which, we believe, was supplied by Messrs. Jones and Willis, of London and Birmingham.

A new workhouse infirmary has been completed for Worcester board of guardians. Mr. Rowe was the architect, and Mr. J. H. Beard the contractor.

An inquiry was held at Southampton on Thursday, the 7th inst., before Mr. S. J. Smith, C.E., an inspector of the Local Government Board, with reference to an application from the town council for sanction to borrow £1,092 for works of street foot-paving and improvement. The borough surveyor, Mr. W. G. B. Bennett, explained that the footpaths would be laid with Staffordshire blue bricks. The proposal, as reduced to £3,215, will probably be favourably reported upon.

The north porch of Salisbury Cathedral was thrown open on Monday week, on the completion of a restoration carried out as a memorial to the late Dean Hamilton, at the expense of his widow. The work has been carried out from the designs of Mr. G. E. Street, R.A., P.R.I.B.A.

One of the triforium corridors in the north transept of Hereford Cathedral is about to be filled with stained glass, as a memorial of the late organist. The work will be executed by Messrs. Clayton and Bell, of London.

The Scarborough school board have adopted plans prepared by Mr. John Petch, for the enlargement of Long Westgate school.

The Sussex magistrates received a report with reference to the surveyorships from a committee recommending three names out of 35 candidates, for the post of county surveyor, and two out of 15 for that of roads surveyor. The salary of the former will be 50 guineas per annum, with 5 per cent. commission on all sums above £20, and a guinea and a half for attendance at any bridge; that for the latter £100 per annum, these payments to cover all expenses. No decision was arrived at as to either election.

The new middle-class schools at Canterbury have just been completed. The architect was Mr. J. G. Hall, and the contractor Mr. Cozens, both of Canterbury.

CONTENTS.

Variations and Additions	61
Sunken Floors	62
The Water Question.—XII.	62
James Woodford, Carpenter and Charlist	63
The Association of Municipal and Sanitary Engi- neers and Surveyors	64
Practical Notes on Plumbing.—V.	65
The Science and Art of Sanitary Plumbing.—V.	67
Restoration at St. Albans since 1877	68
The Chichester and Midhurst Railway	69
Harbour Works at East London, South Africa	70
The Architectural Association Excursion	70
Fresco Painting	70
Albert Hall Mansions	70
Draughts in Dwelling Houses	70
Royal Academy Admissions	71
Clips	71
Our Lithographic Illustrations	72
Asphalte	85
Building Intelligence	85
Architectural and Archaeological Societies	85
Archaeological	86
To Correspondents	87
Correspondence	87
Intercommunication	90
Parliamentary Notes	91
Statues, Memorials, &c.	91
Stained Glass	91
Water Supply and Sanitary Matters	91
Our Office Table	92
Meetings for the Ensuing Week	92
Tenders	93

ILLUSTRATIONS.

NATIONAL SILVER MEDAL DESIGN FOR SHIELD.—DESIGN FOR TWO FRIEZES.—ST. NICHOLAS CHURCH, WHITEHAVEN.—CHURCH OF SAINTE MARIE-AUX-ANGLAIS, CALVAIOS.—NEW CRICKET PAVILION FOR THE UNIVERSITY OF OXFORD.—CURATOR'S COTTAGE, CAMBRIDGE.

OUR LITHOGRAPHIC ILLUSTRATIONS.

DESIGN FOR A SHIELD.

THE accompanying design, by Mr. Henry E. Tidmarsh, a student of the West London School of Art, was originally prepared in competition for prizes offered by the Goldsmiths' Company of London. The drawing, which is full-size, measures 2ft. 7in. in diameter, and is intended to be executed in silver repoussé and chased. "Republicanism, as a form of Government," is the subject illustrated. The six compartments around the centre contain representative scenes from the six principal Republics—viz., Greece, The Battle of Marathon; Rome, Junius Brutus condemning his two sons for participating in the rebellion; Venice, The Pope presenting to the Doge the ring with which to wed Venice to the Adriatic; England, Cromwell turning out the remains of the Long Parliament; America, The Signing of the Declaration of Independence; France, The Storming of the Bastille. These illustrate respectively the following qualities in Government: Patriotism, Justice, Prosperity, Order, Independence, and Liberty. These medallions are supported on either side by figures and their appropriate emblems, of the various Arts and Sciences fostered by a good Government. Round the border are small tablets, with the names of the existing Republics. In the centre of the shield is a symbolic representation of the Republic distributing favours equally to all classes, conditions, and sexes. Around this, in large letters, is the motto, "Liberty, Equality, Fraternity." The design was exhibited last autumn, amongst the works sent for examination to South Kensington, from the West London School of Art, and was awarded a National Silver Medal, &c.

DESIGNS FOR FRIEZES.

THE two designs for Friezes are by Mr. Edward Hammond, a student of the West London School of Art, Great Titchfield-street. One represents Orpheus playing in the presence of wild beasts—the rhinoceros symbolising Ignorance; the lion, Procity, &c., &c. This frieze is executed in colour, and will be used as a decorative panel for the front of a piano. The other frieze represents "A procession of the Planets," in which we see Venus, Jupiter, Neptune, &c. This has been executed in colour, and is intended for the decoration of a small cabinet. The above designs have been sent in for this year's National Competition at South Kensington.

ST. NICHOLAS' CHURCH, WHITEHAVEN.

Our illustration shows a south-west view of the new church of St. Nicholas, Whitehaven, now

in course of erection, from the designs of Mr. C. J. Fergusson, architect, F.S.A. Our view is taken from a pen-and-ink drawing, by Mr. E. F. C. Clarke, now in the Exhibition of the Royal Albert Hall of Arts and Sciences. The new church replaces a chapel erected by subscription about 200 years ago. It occupies a magnificent site, in the heart of the town, of some two acres, with streets on three sides of it. The High-street (if we may so call Lowther-street), from which our view is taken, runs along the western frontage, from which the church is set back a considerable distance. The design of the church is a simple rendering of Late Gothic type, and consists of nave, with aisles, chancel, vestries, and organ-chamber.

CHURCH OF SAINTE MARIE-AUX-ANGLAIS.

THIS is an excellent specimen of a small country church, chiefly of the Late Norman period. The details are well-conceived and well-executed; simple, suitable, and unpretentious. Both the name of the church and the style call to mind England—once the insular portion of Normandy. In the north wall of the chancel are two recumbent effigies of the 13th century, and there are still visible remains of wall-paintings in the chancel. It is sad to see how utterly neglected the whole place is. No service has been held in the church for some years, and nobody ever troubles to enter it except, perhaps, a "mad Englishman" or so. Indeed, there is only one house within about a mile, and the church stands slowly rotting away amid the heavy silent trees. In the doorways grow tall weeds, and the only practicable door opens after much resistance and many protests. The wind whistles through the broken windows; the plaster is peeling off; and a few more years will see the last of the paintings on the wall. Neglect and decay force themselves equally on the eye, the ear, and the nose, for the place smells like a dissecting-room. And yet the church is an admirable specimen of its period, still unrestored. Viollet-le-Duc mentions it in his Catalogue of Churches which attain to the dignity of "monuments historiques," (Dict. de l'Architecture, Vol. V. p. 172), and says:—"Petite église du XII^e siècle, composée d'une seule nef avec abside carrée; cette abside seule est voutée; elle conserve encore des traces de peintures du XIII^e siècle." The key is kept at the adjacent Manoir, a charmingly characteristic old place, guarded by the evil-looking dog that was ever seen. The nearest station is Mesnil-Manger.—J. A. G.

OXFORD UNIVERSITY CRICKET PAVILION.

THE new pavilion for the use of the Oxford University Cricket Club is built in the Parks, where a new cricket-ground has been lately formed. The building is designed by Mr. T. G. Jackson, M.A., and contains a large dining-room, a bar, with provision for cooking, a Committee-room, dressing-rooms for the members of the Club, and a room for the players. The principal front faces north to the match-ground, and has four raised terraces for seats, and a verandah, under which is a cellar for keeping the nets and other apparatus of the game. The three gables of this front are of oak timbering, filled in with plaster, and there is a turret for a bell in the roof. The walls are built of rubble stone plastered, with dressings of red brick. The contractor was Mr. A. Estcourt, of Gloucester, and the clerk of works, Mr. E. Long.

CURATOR'S LODGE, BOTANIC GARDENS, CAMBRIDGE.

THE house which we illustrate to-day was built by the Botanic Garden Syndicate, at Cambridge, from the design of Mr. W. M. Fawcett, M.A. It is a small house with two sitting-rooms, kitchen, &c., four bed-rooms, and small bath-room; there is also an office for the curator and the syndicate. It is built of red brick and has bay windows. The barge and cornices are all of wood. The lodge stands near the side-entrance from Panton-street, and this is most used for the general management of the Gardens. The principal aspect is south, and the windows have a good view of a large portion of the gardens.

The new bridge which has been erected across the Dee at Aberdun, in the line of Market-street, was formally opened on Saturday afternoon. It is of granite, and consists of five arches. Mr. Blyth, of the firm of Blyth and Cunningham Edinburgh, was the architect, and Mr. John Fyfe, of Kenney, the contractor; the cost has exceeded £20,000.

COMPETITIONS.

WINDELMERE CHURCH COMPETITION.—We hear that the result of this competition (as far as it is at present decided) is that the selected design is the work of a young gentleman, the son of a local builder, and at present a pupil in the offices of a firm of architects of Carlisle. The matter, however, is in abeyance pending the consent of the firm in question being obtained to the successful competitor being allowed to proceed with it. We hear also that the design of Mr. D. Brade, of Kendal, was placed second, and that of Messrs. Holton and Connon, of Leeds, third. There is considerable dissatisfaction at the result, which was fully anticipated by some from the commencement, and it has led to the retirement of some of the influential members of the committee and subscribers.

FOREST OF DEAN.—Mr. Alfred Smith, of Mitcheldean, informs us that his designs have been accepted by the Forest of Dean School Board for the following works:—Steam Mills Schools, Forest of Dean, Gloucestershire, for 416 children; Joy's Green Schools, for 274 children, and a separate teacher's residence. They have been passed by the Educational Department, and are to be proceeded with at once.

HOTEL ON THE THAMES EMBANKMENT.—With reference to the limited competition to which we referred last week for the erection of a new hotel and residential chambers on the site of the now abandoned National Opera House on the Thames Embankment, the following is a list of the architects who have sent in designs:—Messrs. Francis and Saunders; Fowler and Hill; Verity and Hunt; Hunt and Steward; Isaacs and Florence; and Mr. Ed. Grüning.

CHIPS.

Horncastle's Newspaper List, prepared by Mr. Horncastle, of 61, Cheapside, besides the usual features of such a publication, contains a readable and very intelligently written preface, which should be read by all advertisers.

A stained-glass window, to the memory of the late Earl of Elgin, Governor-General of India, was last week placed in the south transept of Duunfermline Abbey.

The parish-church of Ilanlyfring, in the diocese of St. David's, is about to be rebuilt from plans prepared by Messrs. Middleton, of London and Cheltenham.

A new church is about to be built at Cwmbach, Aberdare, from the plans and designs of Mr. Edwin M. B. Vaughan, A.R.I.B.A., of Cardiff.

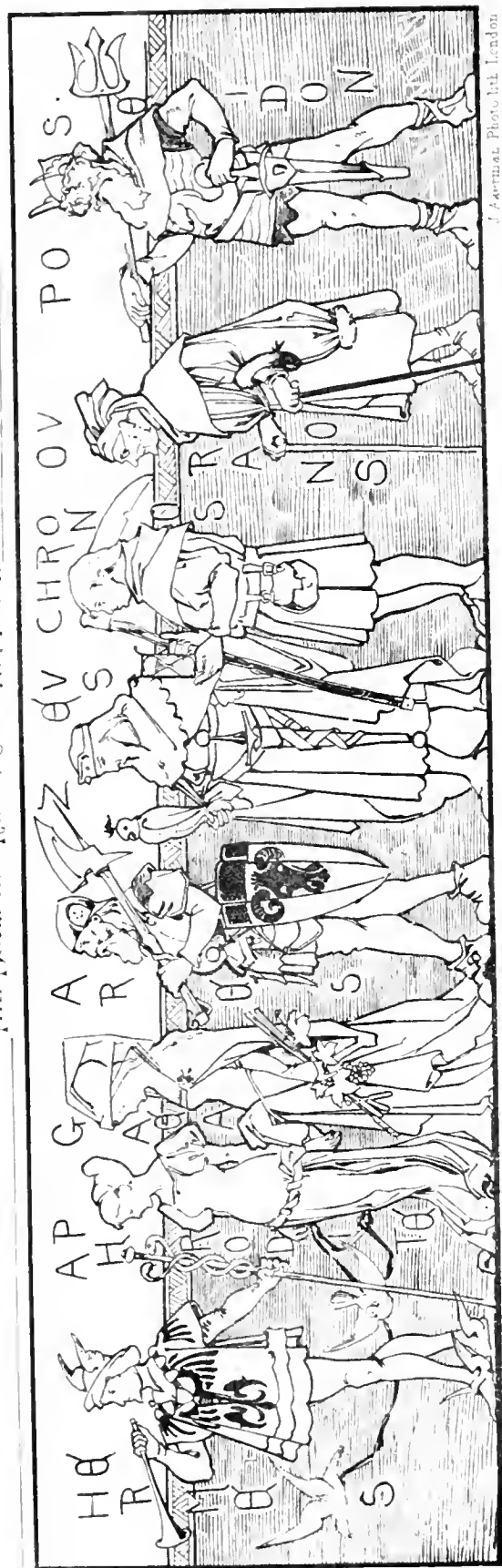
The following works, in connection with the new St. Marylebone infirmary at Notting Hill, were executed by Messrs. Thomas Potter and Sons, of 44, South Molton-street:—Steam boilers, engine, pump, all cold water tanks, main pipes and branches, fire-main and hydrants, hot-water heating apparatus, hot and cold supply to baths and lavatories, 8 hydraulic lifts, drying-closet for laundry, disinfecting closet, wrought-iron external railing, thermohydric stoves for heating wards.

The theatre royal at Wardsend, Halifax, is being enlarged and reconstructed under the supervision of Mr. Richard Horsfall, architect, of that town. A promenade is being provided under the dress-circle, the stage lowered 4ft., the pit enlarged, and new dressing-boxes provided; the alterations furnishing additional accommodations for between 600 and 700 persons.

The Episcopal church of St. Michael, Aberlour, has been formally consecrated by the Bishop of Aberdeen. It is built of Hopeman freestone and Duftown limestone, and consists of nave and chancel 63ft. by 24ft., and 35ft. high from floor to apex of open roof of nave. It cost £1,000, and seats 100 persons. The architect was the Rev. C. Jupp, of Aberlour, the founder of the cause.

Sir Joseph W. Buzalotte, C.E., the Mayor of Devonport, and several members of the Stonehouse local board recently made an official inspection of the tunnel sewer, from Eastern King's Point to the northern end of Durnford-street, just completed at the joint cost of the authorities of the War Department and of Devonport and Stonehouse. The work, which has been in progress for two years, has cost £19,000 instead of £15,000, as originally estimated, the extra cost being occasioned by faulty geological strata.

Mr. John Hocking, C.E., died at his residence at Redruth, on Saturday, aged 75. He was well known throughout Cornwall as a civil and mining engineer in extensive practice, and also as the proprietor of a safety fuse factory.



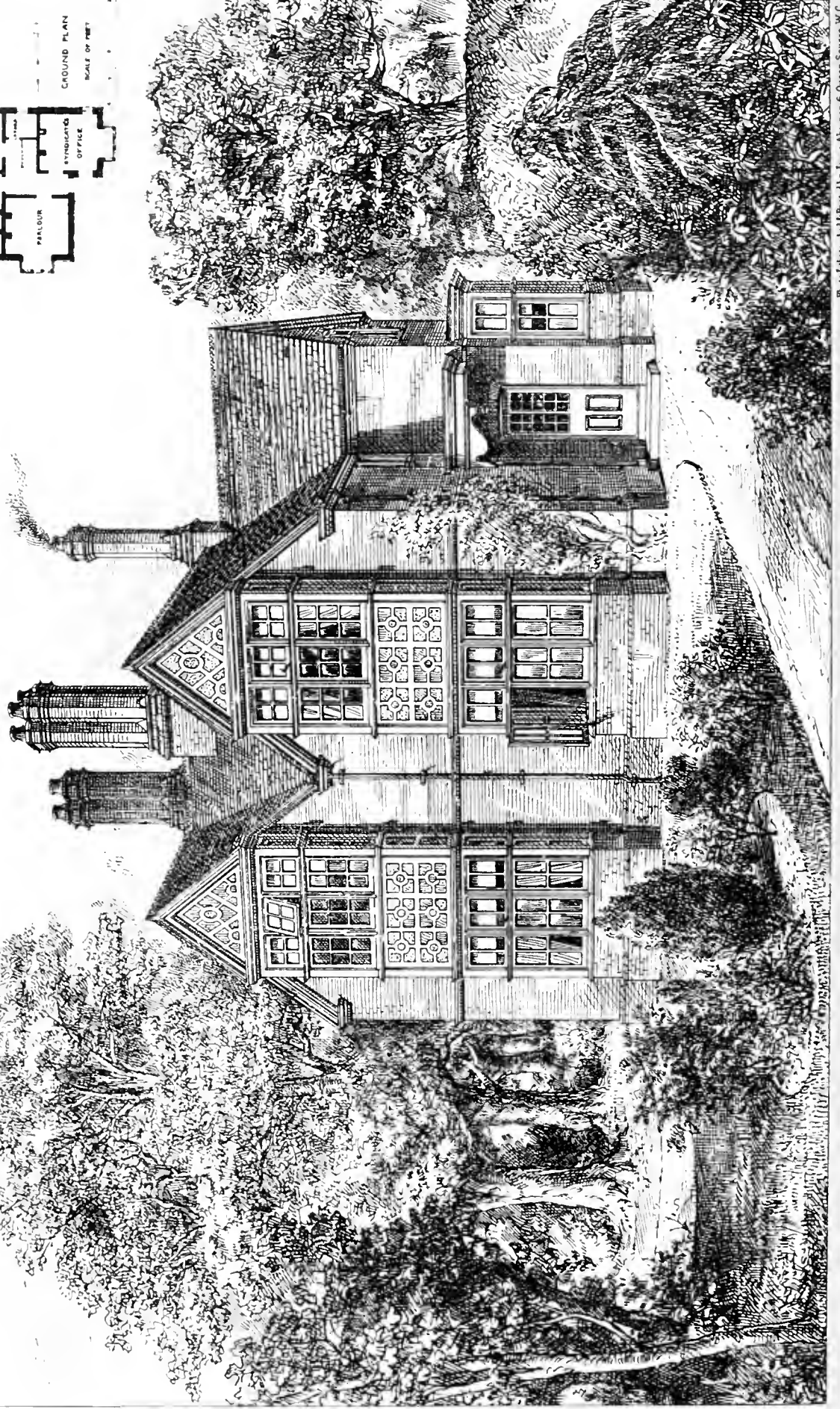
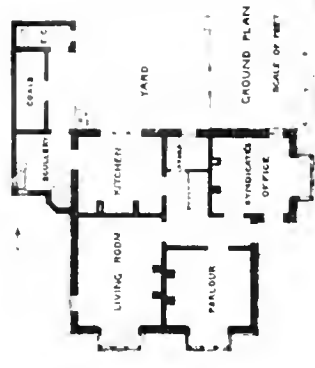


NATIONAL SILVER MEDAL. DESIGN FOR A SHIELD "LIBERTY EQUALITY & FRATERNITY" BY HENRY S. TADMARSH
 ALSO TWO FRIEZE DESIGNS EXECUTED IN COLOUR BY EDWARD HAMMOND BOTH STUDENTS OF THE WIDENING SCHOOL OF ART.



THE BUILDING DEWS. JUL. 15. 1881.

CURATOR'S COTTAGE
 Botanic Gardens CAMBRIDGE
 W. H. FAIRBANKS, M.A.
 ARCHITECT



THE BUILDING JEWS. JUL. 17. 1851.

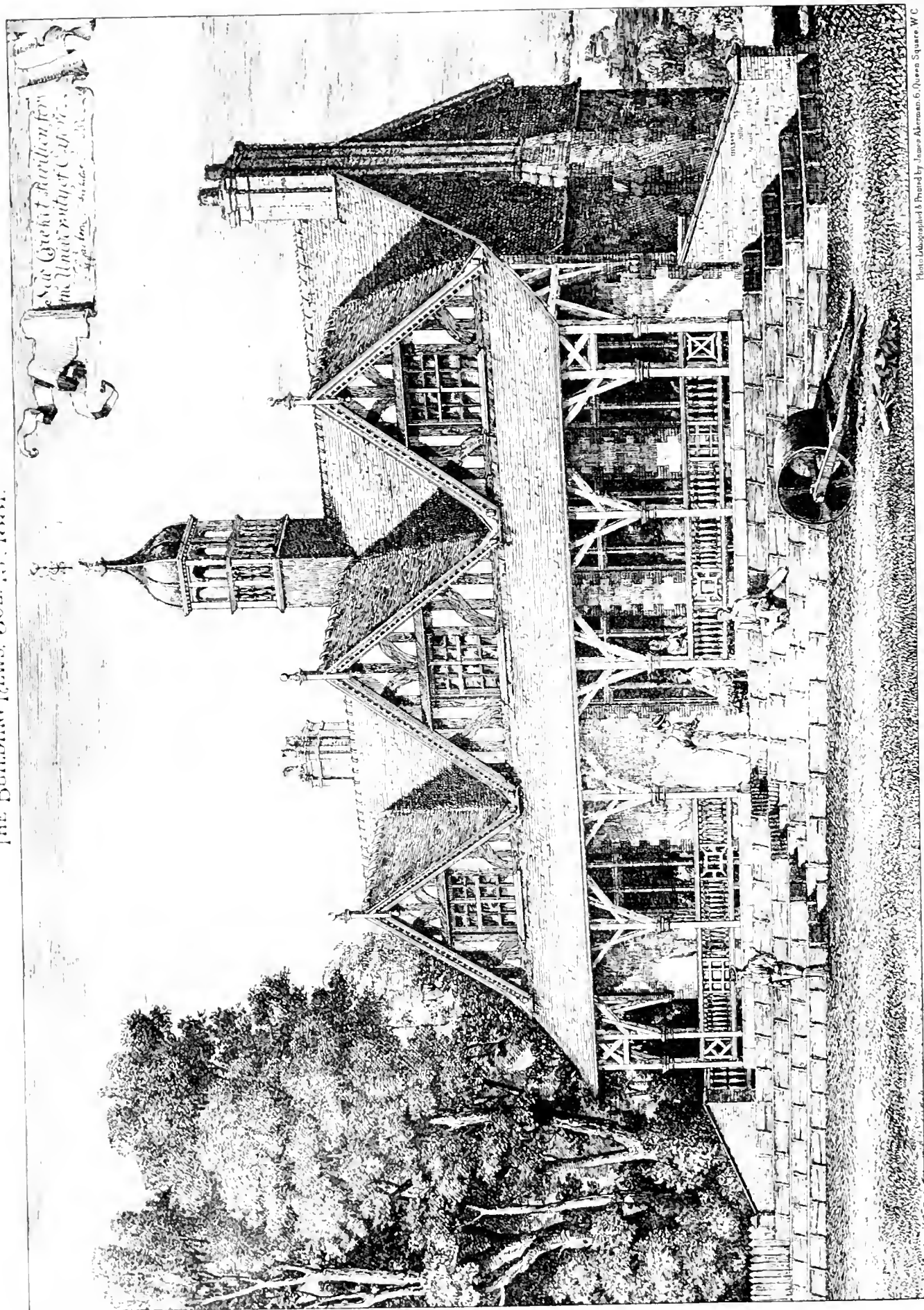
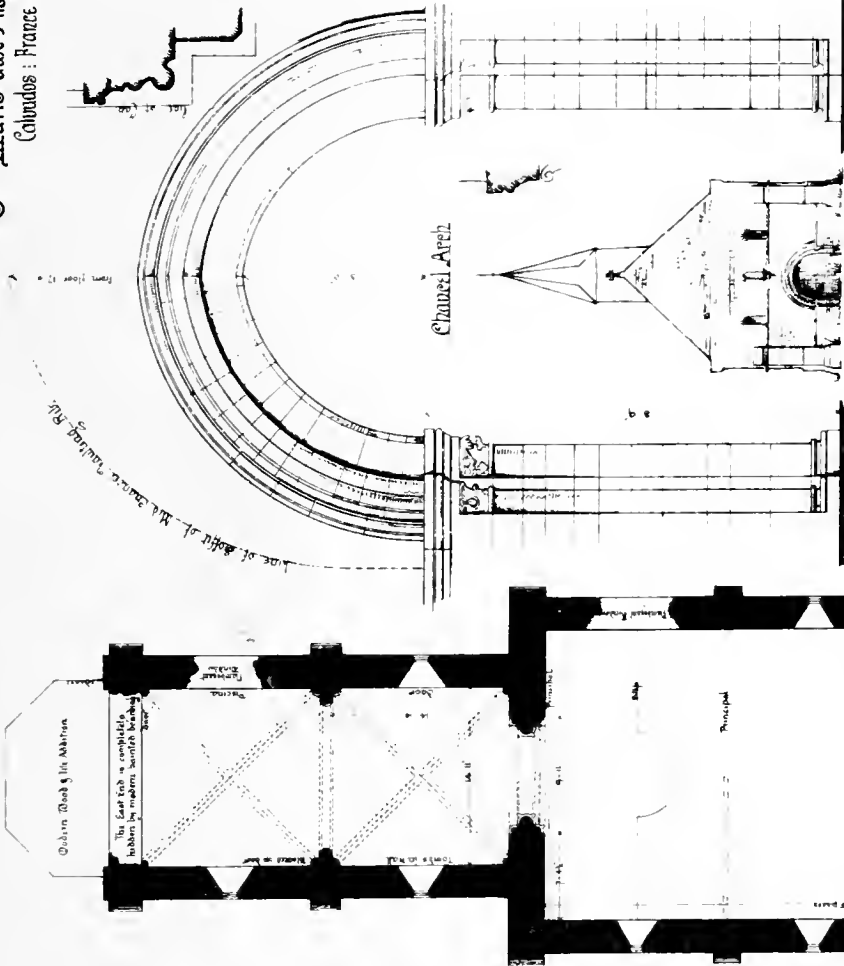


Photo Lithographed & Printed by James Ackerman, 6, Queen's Square, W.C.

Church of
St. Marie-Aux-Anglais
Calcutta : France



Abstract

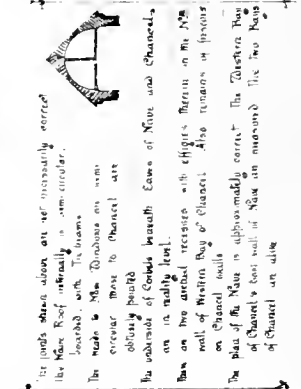
to push them down on an increasingly narrow blue knot, actually a semicircle.

The *made* to Mrs. Tinsdale on some evening more to Channel, I obviously would

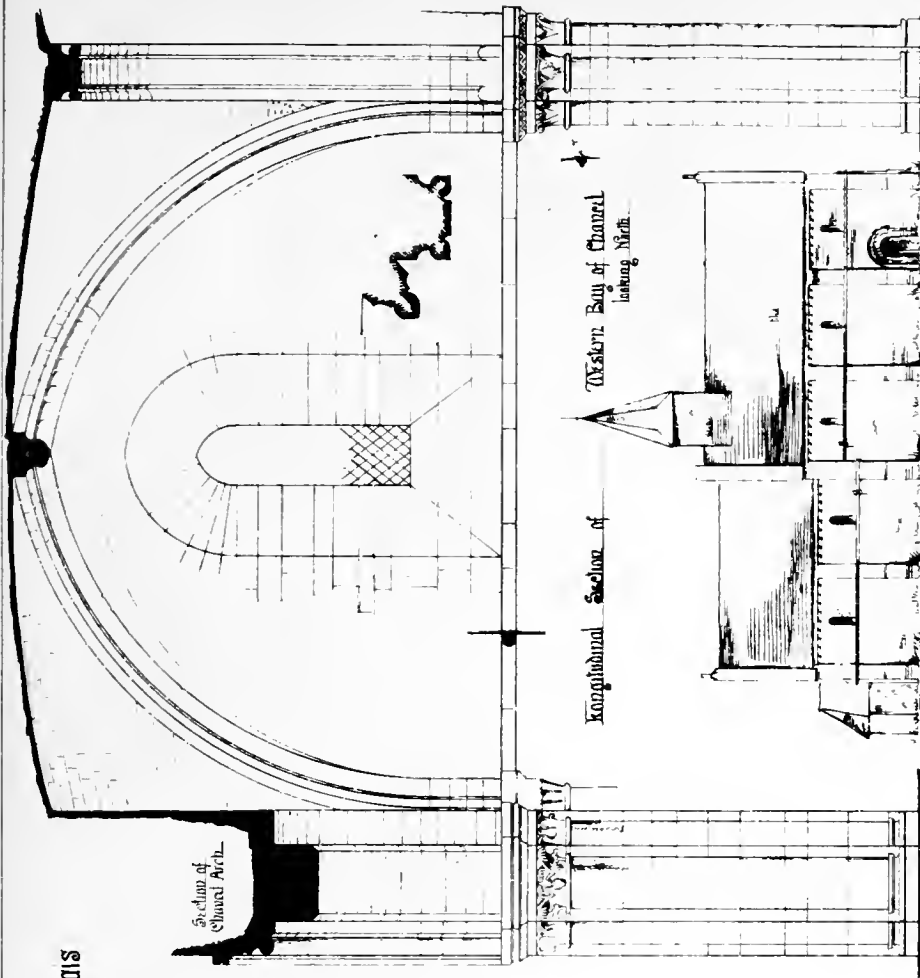
the substance of Corbett's beautiful *Evening of Mine and Channel*.

There are two actual legends with *Channel* in the *YM* wall of Western Day of Channel. Also legends in *History* on Channel walls.

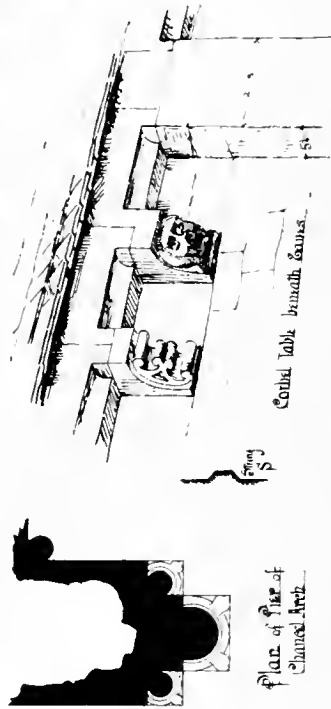
The *place* of the *Channel* is approximately correct. The *Western Day* of Channel's east wall is *Now* an *unmarked* The two *being* of Channel are *also*



M. David, Inc., U.S.A.



Witchey, Gary (North)

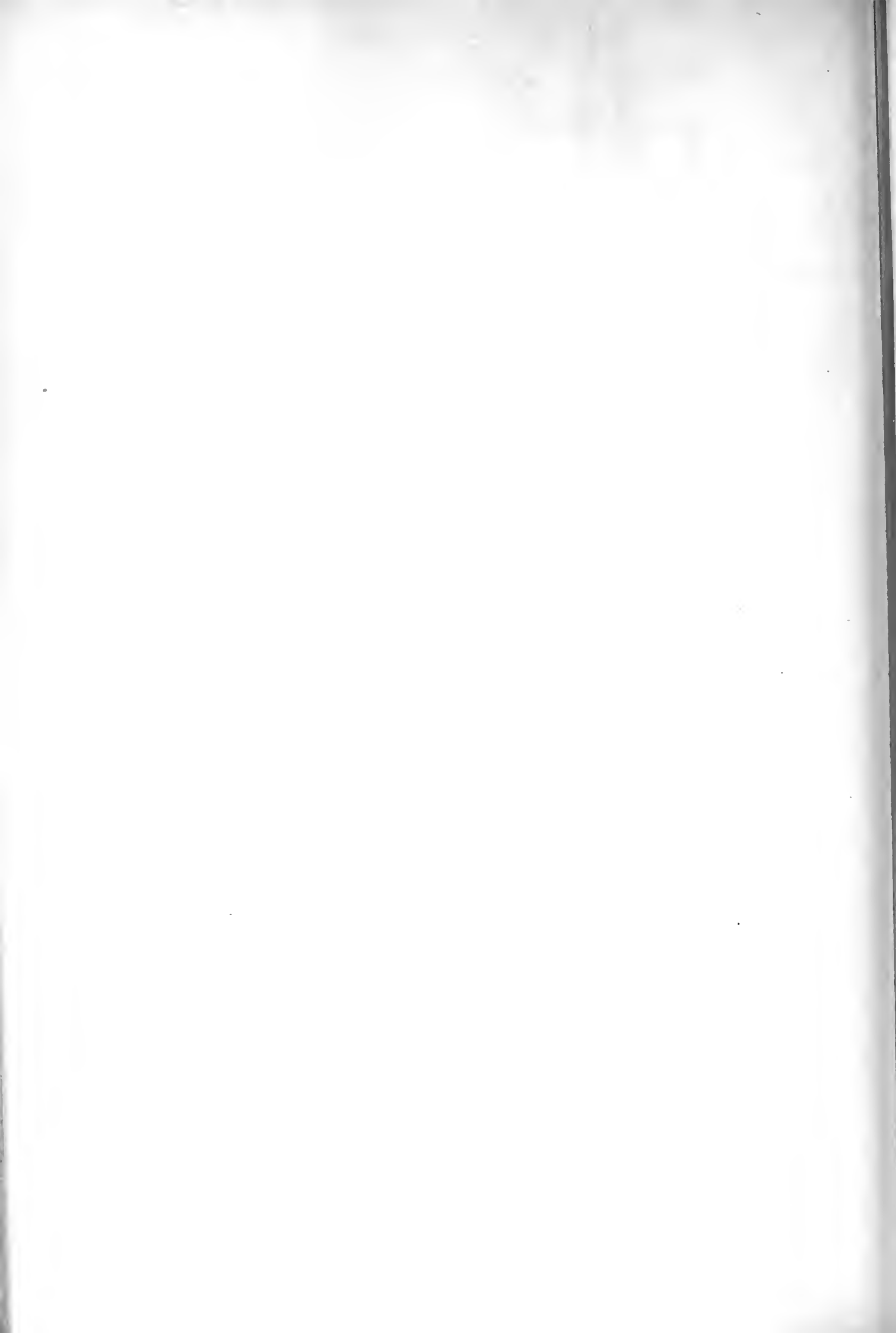


Plan above: Feb

Corbel Table beneath Gables.

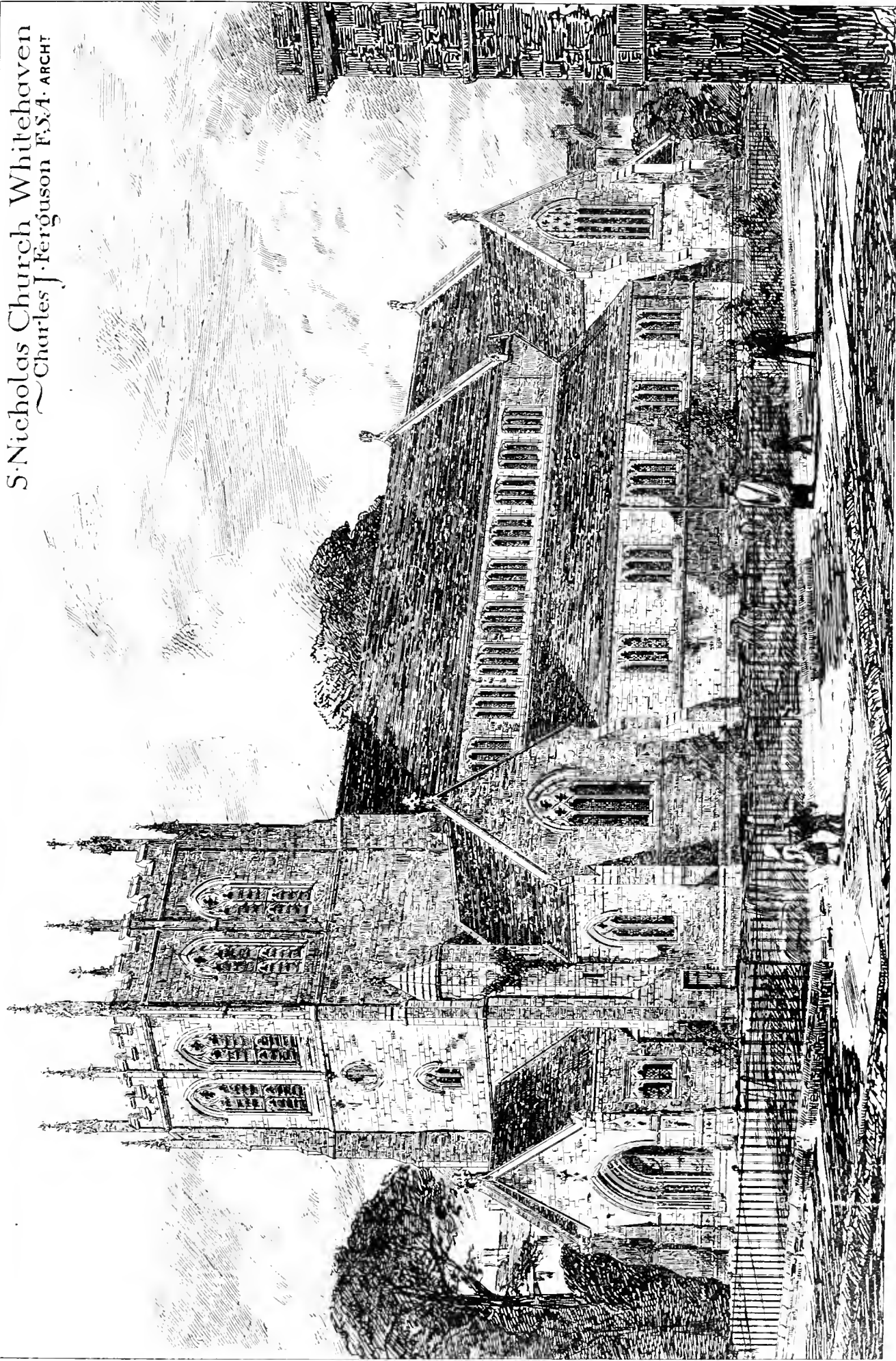
Plan of Pier of
Channel Arch

Phonetic transcription



THE BUILDING DEWS, JUL. 15, 1881.

S. Nicholas Church Whitehaven
Charles J. Ferguson F.S.A. ARCHT



ASPHALTE.

A LECTURE on "asphalte" was read by Mr. E. B. Bell, C.E., before the members of the Balloon Society, at the Westminster Aquarium, on Friday evening. The material was, it was shown, a natural production, consisting of from 5 to 15 per cent. by weight of pure bitumen combined by carb nate of lime. Although its composition was well known, and the components could be derived in abundance, and at moderate cost, asphalte had not yet been artificially produced with success, either chemically or commercially. Its employment was of the highest antiquity, it having been well known to the Egyptians, Assyrians, and Babylonians, although, curiously enough, no allusion to it was made by Roman or Greek writers, nor could it be found in the works of those Classic nations. It appears to have been rediscovered by Dr. D'Eyrinis, who published a work in 1721, enthusiastically advocating its use, not only as a cementitious material, but as a universal panacea in medicine. Dr. D'Eyrinis found out the material while making a geological excursion in the year 1781, the Val de Travers, canton of Neuchâtel, Switzerland, and for nearly a century this was the only mine worked. In 1838 the first footpaths were made in the material at Paris, and the Seyssel mines were opened; but owing to commercial speculations, asphalte lost favour, and it was not till 1854 that the first Parisian carriageway, that of the Rue Bergère, was paved with it. Since 1871 a very large proportion of the streets of Paris, both the carriage and footways, had been laid with asphalte. The first experiment in London was in May, 1869, when 485 square yards of Threadneedle-street were laid with it, and its use had been largely extending. The material was at first used as mastic, boiled on the spot in large cauldons, but latterly it had been found better to use it as a powder, rammed by manual pressure. The present treatment was that the rock was brought to England and stored in the open. It was thrown into a stone-crushing machine, and having been reduced to piece about the size of a walnut, the material fell on to a shoot, from the bottom of which an endless chain of buckets carried the material to the hopper of a Carr's disintegrator, in which it was reduced to powder. It was then heated in cylinders over a coal fire. Each charge consisted of about 2½ tons, and took from two to three hours to attain the requisite temperature, and varied according to the amount of vapour to be driven off, and had to be very delicately regulated. If the material was not sufficiently heated, it would not adhere enough under compression to give the laid surface a hard face. If, on the other hand, it was overheated, the bitumen was fused and little but comparatively worthless limestone left; as a rule, the heat varied from 220° to 250° Fahr., but much was left to the experience of the skilled calciner. The powder was now ready for laying, and owing to its dense, compact nature it would retain the heat for many hours. A concrete foundation having been laid and allowed to set firmly, the asphaltic powder was brought to the street in open carts and spread transversely across the carriageway in widths of from 3ft. to 4ft., in a thickness about two-fifths above the specified compressed section. It should still have a minimum temperature of 115° Fahr. It having been raked with as much regularity as possible over the concrete, the powder was rammed all over with heavy iron, mushroom-headed punners, heated in portable furnaces to a temperature that prevented adhesion. This ramming was the crucial point of the operation, and was at first done very lightly, the pressure being augmented as the material attained solidity. An opening presented itself to mechanicians to devise some mode of mechanical ramming; many plans had been suggested, but at present none had answered. The objection to rollers was that they drove the powder forward in a wave, and the force was not advantageously applied; a steam hammer executed the work better, but the practical difficulty of laying the temporary rails had been fatal to the method. After the surface was compressed by the punners, the surface was seared with a smooth iron, and it was gauged by a long straight-edge, beaten to a uniform level, and the roadway was finally thrown open for traffic as soon as it had cooled to the temperature of the atmosphere. The lecturer then indicated the advantages of the asphalte as a paving material from the sanitary, mercantile, ratepayers', and humanitarian points of view.

He thought all would agree that that material was best for roadways which created least dust and mud, presented the most continuous surface, and retained least damp. Dust in itself, apart from its impure character, was injurious to health, and was rendered worse by the deleterious substances contained in it. Asphalte stood foremost, he held, in its imperviousness to filth and moisture, and hence no exhalations could pass through it from the ground below, nor did it suffer any change under moisture. It was also almost noiseless, and although exceeded in this respect by wood, asphalte had not the peculiar rumbling sound which that material caused. To the mercantile portion of the community it was not only commended by its freedom from dust and mud, but from the absence of vibration, and the minimising of traitle force needed to draw given loads. The unpopularity of asphalte with many engineers and architects arose from the fact that streets were laid with preparations of gas-tar, or pitch and limestone, or clay, which resulted in a soft surface during the first year or two, giving off oils by evaporation, and breaking up after two or three years' wear. The cost of cleansing and watering was greatly reduced by the use of true asphalte. Comparisons made by Lieut.-Col. Haywood, the City engineer, showed that one cart-load of refuse was swept from every 344 square yards of macadam, from every 500 square yards of granite, from 1,666 square yards of wood, whereas 4,000 square yards of asphalte had to be traversed before a load was obtained. The expense and inconvenience of renewal was also reduced. One of the greatest conveniences for a crowded city was the fact that an asphalte roadway once down, the street need never be blocked for repairs. Cheap-side had now been laid for eleven years, and the traffic had never been interrupted for an hour during mending. The watering, again, was reduced to the flushing of the channels with streams of water. The common objection to asphalte was that it afforded a bad foot-hold to horses. In itself, however, whether dry or quite wet, it was not slippery, but when the air was humid and after slight dirt upon the surface rendered it greasy. Lieut.-Col. Haywood had proved by statistics that fewer horses fell on asphalte than on granite, and this was confirmed by much independent evidence. Further than this, horses hurt themselves the less by a fall on asphalte than on granite. It was chiefly on the transition from one material to another that accidents occurred, and the true remedy appeared to be to lay all with the same class of paving. In conclusion, the author showed that amongst the other uses of material were in flooring warehouses and granaries, for which its imperviousness to damp and vermin strongly recommended it.

A discussion followed the reading of the paper, in which the chairman (Mr. W. H. Le Fevre, C.E.), Col. Bryne, R.E., and Messrs. Ford, Burton, Harrison, Piper, Read, Durrant, and others, took part. Some questions were asked as to original cost and outlay of maintenance as compared with other materials, to which Mr. Bell replied that the two should be taken in conjunction, when the balance was slightly in favour, he believed, of asphalte; the first consideration he urged with a local authority should be, What was the best paving material? The discussion turned chiefly on the question of how to reduce the admitted greasiness of asphalte when in a semi-moist state. Flushing with water was said to be a remedy; Mr. Ford, as surveyor of Bermondsey, said he thought he had tried an original cure—viz., that of sprinkling with sawdust, and that the result had been very satisfactory; Mr. Durrant had found ordinary gravel, thinly applied, useful; but Mr. Harrison pointed out that the rounded particles of sand or gravel lessened the grip they afforded; he, as a surveyor, had tried with success emery, sparingly applied, which was, when a road was greasy, well worth its cost, about 2d. per lb. Several speakers pointed out that both emery and gravel cut into and destroyed the asphalte, and had very soon to be swept off as mud, and the meeting was closed with a vote of thanks to Mr. Bell.

The parish-church of Portsmouth, near Kingsbridge, South Devon, has been repaired after restoration from the plans of Mr. J. Pies St. Aubyn, of the Temple, London, at an outlay of £2,000.

Building Intelligence.

BIRMINGHAM.—The Birmingham Liberal Club having so considerably increased as to render a larger building desirable, a committee was appointed some time ago to consider and report upon various sites for the proposed new club-house, and to prepare plans of a suitable building. A meeting of the general Committee of the Club was held last week to receive the report of the Sites Committee. Designs for a club-house, prepared by Mr. J. A. Cossins, the architect of the Mason College, were submitted by the Sites Committee, and were admired for their handsome appearance and for the accommodation provided by the plans. The estimates of cost and of probable income, submitted with the plans, were considered very satisfactory; and the report and the design were approved, and ordered to be presented to a general meeting of the members of the club for consideration.

CARLISLE.—The new Great Central Hotel at Carlisle was opened on Saturday last. The exterior of the building may be described as Queen Anne in character. It is of bold design, and the building is all of the most substantial character. Mr. Westmorland, the proprietor, executed most of the work himself, but he let some portions which may be specified. Mr. Anderson, of Glasgow, executed the plumbing; Mr. Ormerod, of Carlisle, the cement corridors and floors; Mr. Ferguson, of Carlisle, the plaster-work; Mr. Graham, of Carlisle, the iron work; Mr. Waddell, of Carlisle, the electric bells; Messrs. Forest and Son, Liverpool, supplied the ornamental glass; Messrs. Holgate and Fishwick, Liverpool, the bar fittings. The walling stones, of white Lazonby, were supplied by Mr. W. Graves. The stone-carving was done by Mr. Gedding, of Carlisle. Mr. Daniel Birkett, F.R.I.B.A., of Carlisle, was the architect.

DOVER.—A new town-hall and block of municipal buildings are about to be erected adjoining the Maison Dieu Hall, at Dover. The works include an assembly-room 79ft. by 57ft., and 36ft. high, communicating by corridor with the Maison Dieu, and beneath this will be offices for town-clerk, borough-surveyor, and other officials, and adjoining will be a clock-tower. The buildings will occupy the site of the prison, the Kentish ragstone from which will be used for foundations. The estimated cost is about £17,540. The preparation of the plans was undertaken by the late Mr. William Burgess, A.R.A., and the details have been worked out by his chief assistant, Mr. Chappell; the works will be carried out by Mr. Burgess' brother-in-law and successor, Mr. R. Popplewell Pullan.

FULHAM.—All Saints' Church, Fulham, was consecrated on Saturday last. The gas arrangements were carried out by Hart, Son, Peard, and Co., Wych-street, Strand. The pulpit, octagon in plan, Bath-stone base, moulded and figure-carved at angles, and oak top with open carved panels; also altar-table, credence, and sedilia, in oak, were executed by Mr. Eadp. The tiles for chancel and nave were from Godwin's, of Lugwardine, Hereford. The seating in nave and aisles, also transepts, is of pitch-pine, and choir-stalls are of English oak. The architect was Mr. A. W. Blomfield, and Mr. John Vaughan was the clerk of works.

NORTHWICH.—The foundation-stones of a school-chapel, in connection with the United Methodist Free Churches, were laid on Tuesday last, in Penny-lane, Witten, Northwich. The site is on the easterly side of Penny-lane, and the front of the building will be 26 yards back from the lane, thus leaving a good site for a large chapel, which it is proposed to build in the near future. The building will be a neat, plain structure, and will comprise a school-chapel capable of seating 180 adults, two large vestries, and a store-room, with tea-boiler and heating-apparatus cellar underneath. There will be two entrance-porches, for the use of boys and girls respectively. At the rear of the site separate yards and offices will be provided for the scholars, &c. All outside walls will have 3in. cavities, and will be built of brick, with Eddisbury red-stone dressings. The internal woodwork and fittings will be of the best

pitch-pine, twice varnished. The premises will be heated by means of hot water. The inlet of fresh air and the expulsion of vitiated air will be effectually provided for. The plans have been prepared by Mr. S. Hurst, of the firm of Maxwell, Tuke, and Hurst, architects, Southport, and the buildings will be erected under the architect's personal supervision. Messrs. Leicester, Bros., joiners and builders, Northwich, are the sole contractors.

OLDHAM.—New board-schools at Roulthorn, near Oldham, were recently opened. They are Gothic in style, and are built of brickwork with a base of coursed pitch-faced wallstones. The mixed school is 51ft. by 25ft.; there are also two class-rooms 29ft. by 25ft., and 22ft. by 16ft., two infants' rooms, one 28ft. 6in. by 18ft., the other 18ft. by 16ft., and a teacher's room 11ft. by 13ft. The rooms, instead of the usual windows, are lit by large skylights in the roofs, made to open. The architect was Mr. William H. Cooke, of Queen-street, Oldham.

SOBERTON, HANTS.—On Wednesday, June 29, St. Peter's Day, the parish-church of St. Peter, Soberton, was re-opened by the Bishop of Winchester. Soberton church consists of nave and aisles, chancel, with north aisle, south transept or maorial chapel, and western tower. The church had been allowed to fall into an exceedingly bad state, and injudicious repairs, made some thirty years ago, had detracted considerably from the architectural interest of the fabric. The plaster ceilings in nave and south aisle have been removed, the old oak roofs exposed to view and re-tiled. The modern and insecure roofs over north and chancel aisles have been replaced by others of a more suitable character. The walls and windows have been thoroughly repaired, and the latter reglazed throughout. Most of the walls also required re-plastering inside. Floors have been relaid with Minton's and other tiles, and new open seats have taken the place of the pews, which had been made out of a variety of old materials at the time of the previous "reparation." New oak screens have been made, from the architect's designs, and inclose the vestry and the ground or ringing-stage of the tower, and a new half-timbered oak porch has replaced a modern brick one of very poor character. The repair of the tower required much anxious consideration and care, opening into the church in a very unusual way with three arches. The main supporting piers, of weak construction, were being crushed by the great weight of the tower, and it was necessary to rebuild them. Elaborate precautions in shoring and centring were taken the tower supported, and the old piers pulled down and rebuilt in a sound manner. When the temporary supports were removed not the slightest settlement took place. The tower was further strengthened by iron ties, the bells re-hung, a new lead roof provided, and the masonry thoroughly repaired throughout. Mr. Charles Richard Pink, M.R.I.B.A., of Castle Hill, Winchester, and Westminster, was the architect of the work, and Mr. W. Green, of Meonstoke, the builder.

CHIPS

Mr. Rhind, of Inverness, has been appointed architect for the proposed mechanics' hall for Fortree, N.B.

The extension of the Albert Dock at Leith has just been completed, having occupied a staff of 600 to 700 men during the past six years. It occupies 100 acres of waste foreshore formerly known as the Leith-mills. This has been inclosed by a wall one mile in length, built in concrete blocks, weighing 4 tons each. Within this the docks have been dug out, and are divided by a graving-dock placed in the centre of area, and measuring 359ft. by 18ft. The stone employed for quay-breasts and buildings is granite from Craigmillar quarries, beyond Edinburgh. Mr. Scott, of Edinburgh, has been the contractor. The new portion will be opened by the Duke of Edinburgh, and is to be known as the Edinburgh Docks.

A loan art exhibition is to be held at the town hall of Stroud, N.B., in October next.

New premises for the Dorset County Museum are being built at Dorchester on the site of the old George Inn. Messrs. G. R. Crickmay and Son, of Weymouth, are the architects, Messrs. Gay and Son the contractors, and Mr. Storey is the clerk of works.

The Kent and Ashford industrial and fine-art loan exhibition will be opened at Southcote on August 4th. Over 1,000 exhibits have been accepted.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

CUMBERLAND AND WESTMORELAND ANTIQUARIAN SOCIETY.—The thirteenth annual meeting and excursions of this society were held at Kendal on Thursday and Friday last. On the first day Sizergh Castle, the seat of Mr. C. W. Strickland, was the principal item of the programme, and the party were shown over the building by the Rev. James Gibson, of Kendal, being shown the tapestries, family oil portraits, inlaid parquet-work and armour, in which this interesting building is rich. Low Levens Farmhouse and Levens Hall were described by Canon Weston in a paper, and orally by Mr. C. J. Fergusson, F.S.A., of Carlisle, and Mr. Jackson. On the second day, Skelsmergh Hall, Barneside Hall, the ancient Chapel of St. Anne, Grassgarth, a British settlement at Howgill, and the old church of St. Catherine, at Crook, furnished a full day's work.

NORFOLK AND NORWICH ARCHÆOLOGICAL SOCIETY.—The annual excursion of this society was made on Wednesday week to some parishes in the Grimshoe Hundred it had never before visited. Leaving Lakenheath Station about 10 a.m., Hockwold Church was first seen, a paper being read here by the Rev. A. Sutton. The church is a small structure, dedicated to St. Peter. The best features are the square west tower, which was apparently intended to be crowned by a stone spire, and the fine, but now greatly dilapidated, nave roof. St. James's Church, Winton, was next seen, under Mr. Sutton's guidance; nave, chancel, tower, spire, are one uniform style, and all remarkably free from ornamentation. The screen, of curved oak, was restored by a late curate of Feltwell with his own hands, and the thatched roof has been recently replaced by a covering of slate. At Feltwell, the two churches were seen; that of St. Mary, the only one in use, being the first seen; it is a large-aisled structure, with richly treated hammer beam roof, having angel corbels, and a heavy shower afforded ocular demonstration of the bad state of repair into which this fine feature has been suffered to lapse. The other church, St. Nicholas, used as a mortuary chapel, has a round tower, and arches of Transitional Norman character; the chancel was demolished in 1862. At Methwold, the large parish-church, having a magnificent angel-and-hammer-beam roof to nave; and the vicarage, built in the reign of Henry VII., were the chief objects of interest. The vicarage is now partitioned off into cottages, and the oak is whitewashed and broken. The last church visited was St. Andrew's Church, Northwold, where the Rev. C. R. Manning acted as guide. The roof is another good specimen of the Norfolk Perpendicular type, but was repainted and gilded in 1815. Every style, from Early English to Late Perpendicular, is represented in the church, the most remarkable feature being the Easter sepulchre, said to be the largest in the kingdom; it measures 9ft. long, and 12ft wide, and is of clunch; the lower part bears mutilated figures of the four Roman soldiers on guard at the tomb, and above are ornamented niches and three richly-roined canopies.

ARCHÆOLOGICAL.

BOADICEA'S CAMP.—The camp of Boadicea, Queen of the Iceni, has been found. In Epping Forest she may have,

Standing loftily christened
Met and mingling all that heard her in her fierce
volubility,
Yelled and shrieked between her daughters o'er a wild
contumacy.

Morant, in his "History of Essex," has pointed out a certain spot as her camp. The Essex Field Club has been investigating, digging and delving about this place, and the result is to make it as probable as such things can be that Morant was justified in his assertions. General Pitt Rivers is preparing a memoir on the subject.

CANTERBURY.—A discovery has been made in Canterbury of the foundation of a Romano-Saxon church. Recent workmen were engaged in digging a foundation for a disinfesting chamber in one of the cellars of the Kent and Canterbury Hospital, when they came across an immense quantity of human bones, which were piled up to a depth of nearly three feet. These were removed to the hospital cemetery, and in making a receptacle for them the foundation of

the old church of St. Pancras was discovered. The Rev. Canon Rountledge had his attention drawn to the discovery, and he consulted an old Latin volume which he found in the cathedral, written by a Benedictine monk of the fourteenth century, which gives a full description of the church. Under Canon Rountledge's instruction further search was made, and eventually the entire foundation was discovered of a Romano-Saxon church built about the beginning of the fifth century. There were also found an altar, which, it is thought, is the very altar at which St. Augustine celebrated mass, and a tomb in which were bones. The tomb is of a very rude description, consisting simply of a stonework built round the corpse. Mr. Roach Smith has been to Canterbury and examined the foundation of the church and other relics; and when the Kent Archaeological Society visit the city shortly, further inquiries will be prosecuted into this most interesting discovery.

PALESTINE EXPLORATION.—The July number of the *Quarterly Statement*, issued in connection with the Palestine Exploration Fund, contains full particulars of the very remarkable discoveries which have been made in the last few months. First in interest, perhaps, comes Professor Sayce's commentary on the newly-found inscription at the Pool of Siloam. A text which dates from the time of Solomon is indeed a rare monument. There is next a discovery made by Lieutenant Conder, which may prove of even greater interest. He has found, close to the spot where he places the site of the Crucifixion, which is still called the Place of Stoning, a Jewish tomb of Herodian period, standing alone, cut in the rock. "Can this be," he asks, "the 'new Sepulchre in the Garden'?" A drawing and plan of the tomb have been made for the society. Another drawing has been made of the real mouth of Jacob's well, recently uncovered by the Rev. C. L. Birdsey. The well-mouth is much worn by the friction of ropes. It was formerly covered over by a Christian church, and if, as is possible, this church dates back to the second or third century, the stone should be no other than the very stone on which our Lord conversed with the woman of Samaria. Another discovery, only indirectly connected with the Bible, is that of the ancient Hittite city of Kadesh, on the Orontes. Not the least surprising thing about this are the facts that Lieutenant Conder found it from an Egyptian record written 3,000 years ago, and that the old name, though it has disappeared from history since the 13th century before Christ, is still attached to it.

PREPARATIONS are being made at Berlin for an heraldic exhibition, which is to be held there in April and May, 1882. It is intended to be as complete as possible, at least so far as Germany is concerned, in the departments of heraldry, genealogy and family history, and seals. Its success will, of course, depend mainly on the co-operation of the German noble families, whose archives and muniment-rooms must be the chief sources whence its objects will come. It is hoped that foreign countries also will send contributions. Among the classes of things which the committee hope to see exhibited, the following are enumerated:—Heraldic helmets and shields, mediæval weapons, heraldic paintings, and manuscripts; books of descent, arms, letters of nobility; patents and charters having interesting seals; genealogical trees and tales, family records; goldsmiths' work bearing heraldic emblems and ornaments; heraldic devices in various metals; stone, metal, and wood carvings; domestic utensils having heraldic emblems in porcelain, glass, or stone; similar articles in women's stuffs, embroideries, laces, carpets, coverlets, table-linen, curtains, wearing apparel, and robes; tapestry, banners; articles of ivory, leather, mother-of-pearl, &c., having heraldic ornaments, &c. The gem-engravers have signified their intention of sending valuable contributions, and have asked that a special apartment shall be assigned to them. It is expected that the municipal bodies will be prominent and splendid contributors. The city of Breslau has promised to send a series of manuscripts and objects, both genealogical and heraldic, which will be equally important and interesting.

THE ANTIQUITIES OF CARNAC.—A portion of the proceedings of the Archaeological Society of France during their meeting held at Vannes was occupied with a record of the labours

undertaken and carried to a successful issue, after a full period of seven years, in the neighbourhood of Carnac, Brittany, by the late Mr. James Miln, whose book we noticed a fortnight since. The relics exhumed under Mr. James Miln, and at his personal expense, have found a permanent location near the spots whence they were obtained. A museum, which is to bear the name of the Musée Miln, is in course of erection at Carnac, by order and at the expense of his brother, Mr. Robert Miln, the building and the collections which it is designed to contain being vested in perpetual and joint ownership in the Municipality of Carnac and the Philomathic Society of Vannes. This collection, thus liberally presented by Mr. Robert Miln as a memorial of the deceased antiquary, makes the Département de Morbihan one of the richest in prehistoric documents, Vannes already containing two noted depositories—one the City Museum, and the other the private collection, always accessible to students, of M. le Comte de Limur. In recognition of the eminent services rendered by the late Mr. James Miln in the cause of the archaeological monuments special to the Morbihan, the French Society, at their final meeting awarded to him the posthumous honour of their great gold medal, which will be deposited in the Miln Museum at Carnac.

AZTEC CALENDAR STONE.—The *New York World's* correspondent at Mexico reports the discovery of a new Aztec calendar stone. It was found, June 2, by Captain Evans under a dilapidated Indian hut, which stood on the place that once formed the favourite garden of the Texcocoan "Poet Prince" Netzahualcoyotl. It is a stone slab, 8ft. by 6ft., covered with hieroglyphs, and near the centre of it is a clearly cut calendar—similar to the far-famed "Aztec Calendar stone" which is now attached to the cathedral in the city of Mexico. The stone goes to the Mexican National Museum. Further excavations are to be made on the same site, and since King Netzahualcoyotl "the Wise" built his palace on a hillock on which the residence of the sovereign lords of a more ancient nation had stood, it is probable that further researches in that locality may lead to interesting discoveries.

ARCHAEOLOGICAL DISCOVERIES IN OXFORD-STREET.—During the past week, in the course of the demolition of some old buildings at 406 and 407, Oxford-street, a number of objects interesting to antiquaries were brought to light. The premises where the discovery was made are situated in the rear of the north side of Oxford-street, near its intersection with Tottenham-court-road. On Wednesday week, the workmen, on reaching the foundations, came upon a quantity of old armour and weapons—helmets, breastplates, spears, swords and daggers, some very curious in shape. On opening a stone vault, they found also some plate, including church utensils, such as a monstrance and a chalice, the workmanship of which is thought to be of the 14th century. On the base of the monstrance are engravings in old English characters the words "Ave verum corpus, natum de Maria Virgine, vere passum, immolatum in cruce pro homine." The uses of some smaller articles which have been discovered have yet to be ascertained.

An inspector of the Board of Trade has made an official examination of a new line of railway in East Kent, constructed by the South-Eastern Railway Company. It is a single line, ten miles in length, and extends from a junction at Appledore with the Ashford and Hastings branch to a point on the coast within 100 yards of Dungeness lighthouse, passing through Old Romney and Lydd. At present the line is to be used for carriage of agricultural produce and shingle, but it will probably form a link in a new route to Paris, via Haddock, Dungeness, and Le Tréport. Mr. Walker was the contractor, and the cost has been less than £7,000 per mile.

The Limerick county magistrates considered on Thursday last, charges made against Mr. Cox, county surveyor for the Western division, with reference to the mode in which relief works had been supervised and paid for in Lower Connello barony, during March and April, and after a prolonged investigation, unanimously agreed to a resolution declaring that Mr. Cox "had acted in the most culpable manner in signing certificates for payment of works in blank, and entrusting them to his clerk to fill, the county surveyor not having inspected those works."

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING FOR TWENTY WORDS, and Sixpence for every eighth word after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33fr. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Mr. CHARLES WILSON, of 13 and 15, Lighthouse-street, New York City, is authorised to receive American subscriptions at the rate of 6 dols. 40c. per annum.

Mr. R. M. TUTTLE, of Titusville, Penn., U.S.A., is also authorised to receive subscriptions at the same rate.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—J. L. A.—T. M. I.—R. M. M.—T. B.—H. J. O.—F. and Co.—G. S.—J. C. H. and Co.—McG. and Co.—G. P. B.—C. and Son—G. H.—R. H. and Co.—B. S. B.—G. Y. U. S. A.—C. B.—R. B.—R. and E.—T. B. and Co.—J. J.—E. and G.—B. B. and B.—C. of C. O. and L.

CONSTANT READER. The system is good. Apply to the Sanitary Engineering Co., Victoria-street, S.W.

"BUILDING NEWS" DESIGNING CLUB.

DRAWINGS RECEIVED.—Good Luck to Your Fishing, Yarra Yarra, Bonus Hummus, Vignette, X L., Montague, Hamlet, Iota, Walter II., Rev. Jack, Pin-m R-spice, Nitor, Per. Will, Lancaster, Fiat, Ambition, Dornus.

ROBT. REEVE. (Our review of the designs places "Jack's" second in merit, and that opinion is to be taken in preference. "R. R." points out three defects in "Jack's" design, published: 1. the pantry door facing entrance, 2. no bead-room under stairs to enter w.c., 3. gable in front not in centre of window. We illustrated the design for its picturesque spirit.)

Correspondence.

SEWER-VENTILATION.

To the Editor of the BUILDING NEWS.

SIR,—I have read with great interest your report of Mr. Hellyer's lecture on "Traps and Trap Ventilation," and the description of the experiments which visibly demonstrated the possibility of an ordinary C-trap, under ordinary action, becoming unsiphonised.

It is common enough to hear a person say: "I would not have one of those abominable water-closets in my house," and most travellers are well aware that many w.c.'s are found to be extremely objectionable; this has hitherto been attributed to neglect or carelessness; but Mr. Hellyer's experiments go far to exonerate any person, and rather condemn the apparatus; they tend to prove that the C-trap is a danger, instead of a defender; a traitor instead of a treasure.

It is only reasonable to expect that the same orifice which, as is well known, so effectually destroys the action of a simple water siphon pipe, would be equally effective in restricting the siphonic action of a sewer siphon or C-trap, both have a long and a short leg, and in both cases, the smallest crack admitting or emitting the most minute medium of air is sufficient to unsiphonise the tube; hence the one thing necessary to insure the water seal is an opening at the apex of the outlet bend of the C-trap. It also appears consonant with common-sense that sewer-gas would readily and persistently ad-

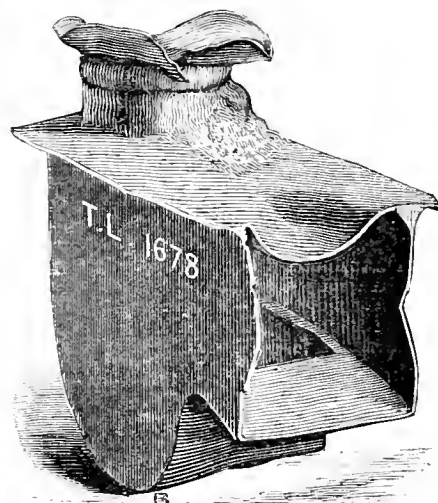
vance up an open and unresistant ventilator pipe, however small it might be, rather than struggle and force its passage through the water seal of an effective unsiphonised trap. I have, during several years, extensively adopted a system of sewer ventilation, founded on these principles, viz., to every inlet of sewage a trap, and to every trap a *compo tube* at its exit bend, and although the sewer system terminates in a large cess-pool where sewer-gas must necessarily be engendered, yet these small $\frac{3}{4}$ tubes have proved thoroughly effective; they can be bent round spouting and other projections, so as to project the orifice well above the eaves, and sufficiently distant from any windows. I am compelled, therefore to conclude that all other expedients, such as fresh-air inlets, full-bore vent-cowls, and other patent complications are, at best, only superfluities.

I am inclined to object to Mr. Hellyer's wholesale condemnation of Mansergh's yard or sink trap. The ventilation is thoroughly secured by a $\frac{3}{4}$ in. ventilating pipe in the apex of the sewer trap. The fact that it is not self-cleansing is not altogether fatal; in many cases it is advisable that a yard trap should be also a collecting trap. There are matters, such as sand, gravel, &c., which it is proper to exclude from the sewers. Mansergh's trap would be improved if it was made larger, more simple, and more easy to be cleansed; the openings inside the body of trap are much confined, and thus interfere with a ready and effective clearing out of the detritus. —I am, &c., MICHAEL DRURY.

Lincoln, July 11.

A BI-CENTENARIAN C-TRAP.

SIR,—Knowing what interest you always take in matters of sanitary work, I herewith



forward you a photograph of an old lead C-trap which, although over 200 years in constant work, is in a very good state of preservation. There is something very remarkable about the make of this trap; the bottom near B is quite $\frac{3}{4}$ in. thick, whilst the other parts are only about $\frac{7}{16}$ lb. lead, showing at once that the old school of plumbers were alive to the fact that traps in those days often had their bottoms punched out. Hence the reason for the extra thickness. I may here mention that this trap was taken out of Southbury Old Church (Sir Christopher Wren, architect). —I am, &c.

P. J. DAVIES, H.M.A.S.P.

SANITARY PLUMBING AND PLUMBER'S WORK.

SIR,—I can understand Mr. Pullen's opposition (he being a manufacturer of the C-trap) to Mr. Hellyer's remarks on the advantages of the C-trap over the C-trap. But your correspondent, Mr. P. J. Davies (whom I greatly respect) I am at a loss to understand, when referring to the article written by him in your last week's issue. I know that Mr. D. has now for some time been advocating the use of the C in the place of the C-trap. But what does he mean in his concluding remarks upon the above subject, when he calls the attention of your

readers to the fact "that we Society plumbers have never disputed that the S trap has the best chance of clearing itself of any foreign substance, such as gravel, sand, &c." It is something new for him to own this, and I am quite surprised at it after reading and hearing his remarks in favour of the much illused O-trap. Now if the S-trap has this advantage over the O-trap with such heavy substances as he mentions, will it not be found still more advantageous and have a far greater chance to clear itself of such lighter substances that will more readily float, and which are intended and supposed to pass into these traps? Any object that partly floats must obtain the full force of the water that is brought to bear upon surface of the dip or inlet side of the trap, and if it will clear itself of sand, &c., it must of a necessity clear itself of soil with a reasonable supply of water; which cannot be said of the O-trap.

I beg to differ from the opinion that the O-trap has the advantage claimed by Mr. Davies, "that it allows the soil to pass to the other side of the trap, &c.": for this rarely occurs with the O-trap unless there should be a good flush of water to force it to the other side, and then it often happens that a part of the soil is left behind in the O-trap, even with a reasonable supply of water. But Mr. Davies does not state the case fairly when speaking of the small-size S-traps having cleansing caps and screws. Haven't small O-traps these screws, and which are more frequently opened? I say the O-trap. Then in both cases it is on account of the inlet being much smaller than the body of the trap, for it rarely happens that these caps are removed where the inlet is about or slightly over the size of the bore of the trap. In fact, it is only in such cases mentioned in connection with lavatory basin washer and plug, &c.

Mr. Davies, I regret to say, is most unfair in some of his remarks relating to Mr. Hellyer, and I am sorry to see a man of Mr. D.'s experience and abilities taking such a wide view of these lectures which, without doubt, are likely to do much good, even to the present class of plumbers. For Mr. Hellyer, I believe, is the first man who has dared to speak to us from a public platform, and the more thanks are due to him for his endeavours, even if he does go too far.

I do not believe in all Mr. Hellyer puts forward from the platform, neither do I advocate the use of his siphon traps, which are certainly constructed wrong, for I believe that the hand or block-made S or half O-traps are far superior to the siphon or O-trap, and are not nearly so liable to wave out, or siphon, as Mr. H.'s patent trap, and considering how cheap they can be made by the proper men, I am surprised that they are not more in use. If Mr. D. or his friends who oppose Mr. H. think that the O-trap possesses advantages which the S-trap does not, why not state them and prove it by severe tests by the side of a blocked or hand-made half S trap. It will be a surprise to me if they can prove anything in favour of their pet trap, excepting that the O-trap is liable to siphon, which is a good fault in a trap, and which, as you know, is easily prevented.

I was greatly disappointed at many parts of Mr. Hellyer's theory, and wish he was more practical; but hope that others well able to keep the light burning will take the subject up, and let us see both sides of the question. I am, &c., Lambeth, July 11. H. B.

BUILDING-STONES.

Sir,—I have been amused with Mr. Masey's strong advocacy of Beer-stone in your columns, to the utter disregard of the merits of many other building-stones; and seeing that he has already been corrected, he does not appear to be a judge of the different kinds of stone when he sees them, and I would recommend the public to verify what he calls "stubborn facts which cannot be explained away" before they take them for granted. What he speaks of at Buckingham Palace as prime Bath-stone is in reality printed Caen. A for man of mine on whose word I can implicitly rely, assures me that he worked through the jobs when the stone was used. Has Mr. Masey fallen into the same error with reference to the house he refers to at Kensington? Kensington being a large locality, he does not give the public a chance to judge for themselves by stating the size of the building. The "ordinary Bath-stone" mentioned was probably badly chosen for the purpose used, as

I certainly very much doubt that good "Box-ground" can have failed, as he states. My experience of "Box-ground" in Bristol is that it is a splendid weather stone. Mr. Masey, I should imagine, was of the same opinion at one time, as I know he specified "Box Ground" for the exterior of St. George's Parish-church, Bristol, when it was reinstated after injury by fire in the early part of 1879. I have used a great deal of "Box-ground" in my time, and all I can say is that if "Box-ground" was used for the exterior of that building, I never saw any in my life. Of this I am positive, and any one can see for themselves by inspecting it. So much for Mr. Masey's judgment of the quality of stone. I am pleased to see the building is in a good state of preservation, but what I mean is that Mr. Masey did not get what he specified. I am afraid one stone being used where another is specified leads to confusion and discredit to meritorious stones. If your correspondent, "Durability," and Mr. Masey would like to see a few instances in which "Box-ground" has successfully withstood the decomposing influences of a densely-populated city, abounding in chemical works, with an atmosphere highly charged with noxious gases, and which is also open to the severity of the Bristol Channel gales, I would recommend him to inspect the West of England Bank (elaborate architecture crowded with sculptured Box-ground), the National Provincial Bank, Wilts and Dorset Bank, London, Liverpool, and Globe Insurance Buildings:—this latter abounds with fine mouldings, elaborately and delicately carved, and statuary throughout, all Box-ground. St. Stephen's Church, the tower of which is the highest in the city, and, consequently, very exposed, is a splendid specimen of Box-ground; it is the richest work of the kind I have seen. All these buildings will be found in an excellent state of preservation.

It is evident that all the kinds of Bath stone harden more or less by exposure as the stone dries. I have often particularly noticed this in the case with Box-ground in the largest and most important buildings in this city. A hard lining is formed on the surface, which, to all appearance, is a sure safeguard against weather. —I am, &c.,

A BRISTOL BUILDER.

Sir,—"Durability" says that "of all the Bath oolites the Box-ground is most affected by the steady action of a south-west exposure to severe storms, a damp climate, or a chemically affected atmosphere." Now, as this controversy has arisen out of Mr. Pearson's proposal to use Bath-stone for Truro Cathedral, and Truro being a quiet market-town without manufactories, the question of a "chemically affected atmosphere" does not apply; but as "Durability" referred to Cornwall, Cornishmen, and Cornish stone, he ought to know at least that we have "a south-west exposure to severe storms, and a damp climate." We are too much exposed on high ground on the verge of the wild Atlantic to escape any storm when Nature puts on her angry mood; and when the vapoury clouds sweep up from the ocean they are sure to break in copious showers on our Cornish hills. And what is our experience of Bath-stone? The mansion at Trehidy has been referred to. It is built mostly of Bath-stone. There the Box-ground used many years ago is as perfect as when erected; but the Corsham stone, used in additions of a later date, are going to pieces with successive frosts. Now mark what "Durability" says—viz., that "Corsham stone is the most lasting." When the Corsham people want a good weather stone for an exposed position, they do not use Corsham stone, but go some miles away for Box-ground!

The statements of "Durability" about Bath-stone are on a par with his knowledge of Cornish stone. He wants Mr. Pearson to use "the materials readiest to hand," and appeals to him in turns by flattery and persuasion, invoking the names of the Holy Catholic Church and the Diety! and, of course, he does not forget to quote Scripture. Does "Durability" know that the old builders used "materials readiest to hand" in St. Mary's Church, Truro—viz., alvan of various sorts and St. Stephen's granite, and Bath-stone, and that Bath-stone has stood for centuries more perfectly than either? The Bath-stone in the old church being somewhat coarse in grain, is, I think, either Combe-down or Box-

ground. The St. Stephen's granite and alvan have gone to pieces where exposed.

After the pathetic and religious appeal of "Durability" for the use of "materials readiest to hand," he at once suggests that we should take ship and sail away to France for Caen stone!

But the climax of the suggestions of "Durability" are not reached until, quoting Scripture, he urges Mr. Pearson to set aside his plans, pull down the work inaugurated by the Prince of Wales, and commence afresh, in order that he may use granite in a simpler form than already described. I presume he means hard granite. It would, of course, be impossible to use hard granite with the means at Mr. Pearson's disposal. To build the cathedral in hard granite would cost £250,000 at least, and so far there is only £40,000 in hand. This stone, says "Durability," is "admirably expressive of the steady, preserving character of Cornishmen, and characteristic of the ruggedness of their country." Indeed! "Durability" will find that however "rugged" we are determined, with Mr. Pearson's aid, to have a cathedral that shall be well worthy of the age, and, to quote the architect's words, "a building in which men shall be compelled to fall down and pray." There is, alas, a spirit of rivalry and jealousy caused by the cathedral and the re-creation of the Cornish Diocese, and it is only too evident that, should the building scheme collapse, it would be hailed with shouts of fiendish delight. But it is not the habit of Cornishmen to play see-saw over their great undertakings, and while secret attacks, however well concealed, continue to be made, Mr. Pearson and his co-workers will not want defenders.—I am, &c.,

JAMES HICKS.

Redruth, 12th July.

Sir,—We do not desire to trespass upon your valuable space, especially upon the subject of stone of which we are the vendors, but must in self-defence, in reply to "Durability," reiterate our former statement, that Box-ground "is a weather stone of great merit and undoubted repute, for durability in the most trying situation." By this it will be seen that we did not and do not overlook the point raised, nor did we intend to convey the limited construction put upon our statement by "Durability." We are pleased to note he concedes it to be a weather stone possessing ability to stand frost. What we mean by "trying situations" include positions in which the buildings would be exposed to the action of south-west or other storms, a damp climate, or a chemically-affected atmosphere. There are hundreds of instances in which "Box-ground" has satisfactorily stood such tests, on the west and south-west coasts, and in the largest towns all over England. An inspection of these buildings would certainly show that the case-hardening process is a distinctive characteristic of "Box-ground," and this fact alone has been the means of greatly extending its use in trying situations. We have found in many cases which have been quoted as proofs to the contrary, that the material was not the kind stated, and in others to have been badly selected, or badly laid. We regret to say that much of the prejudice created against Bath stone has arisen from an improper use of the different kinds for the purposes for which they are naturally adapted: in many instances, one kind being specified and another used, in consequence of the inadequate knowledge of those connected with the buildings. With all respect to "Durability"—whom we doubt not, writes in good faith—we cannot help thinking the instances which have come before his notice must have been where the kind of stone has been badly selected or unfairly used.—We are, &c.,

Box, July 12.

PICCOL AND SONS.

Sir,—My experience of Box-ground, since 1814, is that when well selected and properly used it is one of the best weather stones in the kingdom. What I mean by proper use is, not, as most architects think, that the stone should always be used on its natural bed, for I know for some purposes there are better ways for its use. I could so use Box-ground in almost any position as to vie with any other stone that can be found for building purposes.

I fear that some of the more economical kinds of Bath stone, under the name of "Box-ground" will not stand the London atmosphere. My experience being a London one, I venture

to quote the following buildings, where Box-ground was used and which are still in a good state of preservation.

Inns of Court Hotel, Holborn; Mansions, Victoria-street, "Station End;" extensive buildings for Vickers' distillery, Victoria-street. Kensington parish-church, Lancaster Gate; All Saint's church, Talbot-road, Bayswater; St. Stephen's church and St. Luke's church, Westbourne-park. Chambers: Basinghall-street, City Temple. Large shops: east-end of Holborn Viaduct, opposite St. Sepulchre's; St. Augustine's, Kilburn; St. Jude's, Kensington, and St. Augustine's, South Kensington.—I am, &c.,
PRACTICAL.

QUANTITIES.

SIR,—I beg to inclose (for publication if you see fit) a copy of a letter recently sent by me to Lord Coleridge, who informed me that he had read it "with interest and attention."—I am, &c.,
WILLIAM SIMMONS.

161, Friar-street, Reading,
July 6, 1881.

MY LORD,—In the *Times* report of the recent trial of Evans v. Carte, your Lordship is reported to have said "that (apart from actual contract) it is quite monstrous that the employer should pay for the 'quantities'; that is, that he should pay for what it is the duty of the architect to do. The builders are to make their tenders upon the plans; but, before they do so, they must know the quantities they represent. Why should the architect's employer pay for them?"

My Lord, having an interest in seeing justice done and misapprehension remedied, I will endeavour to explain to you why. The employer should pay for the work because it is done in his service, and is not covered by the 5 per cent. which is the customary payment of an architect for his proper services as such, and which was so, long ere quantities were supplied at all, when tendering was largely a matter of guesswork. It is simply a question of agreement: and where there is no express agreement, the equitable thing is to follow the custom of the country.

Let us take a hypothetical case. Your Lordship goes, we will assume, to Mr. Street, to design you a house and superintend the erection of it by contract, and agrees to pay him the usual percentage for so doing. For this purpose, Mr. Street makes certain laboriously worked-out geometrical drawings, correct to scale, and with all the dimensions figured on them, and the differences of the materials shown by differences of colour, thus accurately delineating the house in every part. He also writes an equally-laboured specification, explaining the drawings, and accurately describing the nature of the materials and workmanship, the times and manner in which the work is to be done, and giving whatever other directions may be necessary. These drawings and specification contain all the information required for the erection and completion of the house. Mr. Street accordingly lays them before a number of builders with a view to procure tenders from them, it being understood that the one who tenders lowest will get the job. Now, before the builders can give tenders, they must each make an estimate, and, to do this, each must "take off the quantities" as the first step; that is, he must calculate, as nearly as human fallibility can, the amounts of material and labour which he will have to use and pay for in building your house as drawn and specified by Mr. Street. After he has made these calculations, he prices out the items according to the current rates for work and material, and the percentage of profit he intends to get.

This reads very smoothly, and if taking off the quantities were a mere matter of hours each builder would do the work for himself and pocket the slight loss of time if he failed to get the job. But, as a matter of fact, the quantity-taking is a very laborious process, and demands great experience, and also involves very considerable expense in assistance, &c. Therefore, these builders who are ambitious of the profit (I fear they would hardly think of the honour) of building a house for your lordship, agree among themselves to employ an experienced quantity-surveyor (and, as Mr. Street himself, unlike many architects, is not a quantity-surveyor, they cannot employ him, but must select some one else) to do the work for

them, on the mutual understanding that the successful tenderer should pay for it at the rate of 2½ per cent. on the amount of his tender. Each builder, therefore, includes that amount in his tender, adding it at the end of his other calculations, and thus it ultimately comes out of your own pocket as employer.

But suppose that, after you have approved of the designs and instructed your architect to ask for tenders, you alter your mind and decide not to build the house, although the quantities have been taken off—how, then, my Lord, who is to pay the surveyor's bill? Not the architect, surely, for the work in question has nothing to do with his proper services to you as architect of your house. Not the builders who gave you tenders; for though the surveyor is their employé and they collectively ordered the work and agreed that one of them should pay for it, still they only did so as your servants, and the money to pay for it was to have come out of your pocket. But you have not fulfilled your (actual or implied) agreement with them and the funds are not forthcoming. By asking for tenders you entailed this work on the builders, and now you leave them in the lurch. Surely, my Lord, justice and common-sense agree that you must pay for that quantity-work, you having gone back from your promise to the builders, under which promise (namely that you would accept the lowest of their tenders) they ordered the work. Were it to be decided otherwise, and the builders to be held liable, the whole trade would (very naturally) at once strike work on such terms, and insist on being in each case specially exempted from any such risk before they would tender at all. Or, again; if, still more absurdly, Mr. Street were held liable, and made to pay for this work out of his fees received for other services, and which were the usual payment of those services long before quantity-taking was done with any care, and while tendering was still very much a leap in the dark, or the work was paid for on a charge sent in after it was done, then the only effect would be that architects throughout the country would increase their charges by the amount of two and a half per cent. and insist on having a legal guarantee for that increased amount from each employer before they began work.

Well, my Lord, the account I have given you above represents accurately what takes place with regard to quantities for any building, except only that, in practice, because it would not do to have the builders lay their heads together and tender by common consent, so that one of them should secure your job at greatly over the value, and pay the others for tendering above him, they are not called together and introduced to each other as competitors, and invited to appoint their quantity surveyor; but the latter is nominated by the architect (or yourself if you will meddle in a matter of which you cannot be expected to know anything), and each builder, without knowing who are his competitors, accepts this surveyor's work and agrees to pay for it in case you accept his tender and pay him. This plan still further increases your moral liability for the quantities in case of abandonment of the design, and ought to make you legally liable *directly* to the surveyor, instead of indirectly through the builders, with whom you have, as it were, broken faith.

There is one other point which it may be desirable to clear up. If, in the course of this laborious process of quantity-taking (and your Lordship would be surprised to find how laborious and tedious it is) it should happen, as with even the most careful and experienced surveyors it now and then does, that some of the material or labour gets overlooked or omitted from the quantities and estimates (tenders) based on them, it is evident that every tender will be so much the lower, and that if the selected builder is to be made to carry out the building, as drawn and specified, for the tendered amount, he will suffer a loss, and you will have got a portion of your building presented to you *gratis*; and this you will still do even though the builder should recover his loss from the unfortunate surveyor, who, at most, ought only to be liable to a fine. Therefore, to make the matter square on all sides, it is growing more and more the practice to "make the quantities a part of the contract"—that is, to agree that the contractor shall only be held liable to execute under his contract the works actually included in the quantities on which his ten-

der was based, and that you, the employer, should pay the additional value of any work thence omitted, even though shown and described, or implied, in the contract drawings and specifications; while, on the other hand, if too much work has been taken in the quantities, you are entitled, on the discovery of the excess by your architect during the progress of the works, to have the value deducted. Of course, if the surveyor has been careless or incompetent, and has utterly misled you as to the cost of the house, you have your remedy against him in the usual way, and can punish his fault, though not profit by it or by his misfortune.

Pardon my saying a word with regard to another disputed matter about which I am not sure if your Lordship has yet had to decide. I mean with regard to ownership of drawings from which a building has been erected. These are usually retained by the architect as owner of the copyright, but cases have occurred in which the employer has claimed them. A former Chief Justice, giving judgment in one such dispute, said "Why should not a man have what he has paid for?" and to that question there can be no reply but "Why, indeed!" Only the fact is, that the employer cannot justly be held to have paid for the architect's drawing further than as they concern the building of his house. Having the house, he has what he paid for. The design and superintendence are that for which he pays the architect, and the drawings are merely means which the latter uses to convey his ideas. I reply, then, to the former Chief Justice, "Why should a man, having what he has paid for, have also what he has not paid for?" Having got, for instance, the lithographed copies which you ordered, do you expect to get the lithographer's stone into the bargain? or, having bought a book, do you consider you have paid for the author's manuscript?"

Apologising for the length of my letter (which ought to need no apology having justice as its aim),—I am, your Lordship's obedient servant,
WM. SIMMONS.

161, Friar-street, Reading, June, 1881.
The Lord Chief Justice of England.

WINDERMERE CHURCH COMPETITION.

SIR,—Your correspondents of last week are not the only competitors who have been treated with "silent contempt." But perhaps they are not aware that the successful architect is the son of the principal builder in Windermere, which may perhaps account for the silence of the committee.—I am &c.,

ANOTHER OF THE FOOLISH.

TENDERS—A CORRECTION.

SIR,—In your edition of Friday last, under Tenders, you publish under Dartmoor, construction of reservoir at Kennick, Mr. Little surveyor; Kraus, contractor; amount about £3,000. This is all incorrect.

I beg to say the engineer is Mr. H. M. Brunel, C.E., of 23, Delahay-street, Westminster, and the amount of my contract is £9,440. I will thank you to correct same in your next.—I am, &c.,
A. KRAUS.

Colston-street, Bristol, July 13.

INSIGNIFICANT TENDERS.

SIR,—The following surely deserves a little notice, as showing how far the mania for competition may go.—I am, &c.

Newcastle-on-Tyne.

G. C.

TWO JOINERS AND OTHERS.—The Long Benton School Board is prepared to receive TENDERS for the following WORK at the Walker West (Mixed) School, viz.:—Alterations to Raised Platform, lengthening same by about 31 feet. A platform now in the school may be used in the work. Three D.sks, 8 feet in length, with forms, will be required to be made and fixed to the platform. The Mistress's Desk, with part of the Cupboard, to be removed; both parts of the cupboards will require new sills.—For further particulars apply to the Head Teacher at the School's. Tenders to be sent to the Clerk, T. M. STONESS, 31, Clifftonwood street, Newcastle-on-Tyne, not later than Saturday, the 16th inst.

ABBOTT'S HOSPITAL, GUILDFORD.

SIR,—While pleased to see your illustration of the hospital in High-street, Guildford, published in your Midsummer Double Number, I, as an old scholar of Abbott's School, attached thereto, must take exception to the definite article being prefixed to the title.

Upon this point we were always very particular, lest the credit for the "foundation" due to the famous Guildfordian named Abbott should be attributed to the religious order of old. It should

be simply Abbott's Hospital, as your description explains, not "The Abbott's."

May I further add, the building some years ago underwent a faithful and complete restoration externally, consequent upon the decayed state of the brickwork? Most, if not all, the old chimney stacks were then rebuilt, so that the existing work must not be looked upon as altogether original.—I am, &c., J. WILLIAM STEVENS.

6, Southampton-buildings, W.C., July 7.

CHIPS.

Last week a two-light stained-glass window was placed in the west end of north aisle at Halifax parish-church, as a memorial to officers of the 33rd Regiment killed by a landslip in India. Messrs. Powell Brothers, of Leeds and Whitefriars, London, were the artists.

The Marianne-Norington memorial drinking-fountain on the Hoe, Plymouth, was formally presented to the town on Wednesday week. It is built of Portland stone and red Mall granite, and is surmounted by a figure in the former material of "Rebecca at the Well." Messrs. Hine and Odgers, of Plymouth, were the architects. Messrs. Freeman and Sons, of Penryn, executed the work, the sculptor being Mr. Samuel Trevenen, of Plymouth.

The completion of the new waterworks at Granton, N.B., was celebrated on Saturday by publicly turning on the water in the town. The supply is obtained from springs at Fauran, Alnham, at an elevation of 275 ft. above the square, and discharges 68 gallons of water per minute, equal to 62 gallons per head supplied per day. The contractor was Mr. W. Scott, of Calderhill, Inverness.

A memorial three-light window to the late Mr. J. T. Armitage was unveiled in Almondsbury parish church, near Huddersfield, last week. It is on the south side of nave, and has as subjects, in the centre, Christ, the Light of the World, from Holman Hunt's picture; and in the side-light, the Virgin Mother and the Apostle John. Messrs. Heaton, Butler, and Bayne, of Garrick-street, London, have carried out the work.

At a meeting of the Beverley and Barnston drainage commissioners held on the 30th ult., the plans of Mr. Barry, C.E., for the drainage of the district were, after a long discussion, adopted and ordered to be carried out as speedily as possible. The estimated cost is £25,000.

The tender of Messrs. William Cowlin and Son has been accepted for the erection of the Church of St. Saviour, Woolley Park, Bristol, at £1,839, this sum to include the whole of the work except carving. Mr. J. Bevan, of Nicholas-street, Bristol, is the architect.

The new waterworks for Forfar are in course of completion, and it is expected that the service reservoir at Paggerton will come into use in three months' time, and the principal one—that at Den of Ogil—before Christmas. The chief engineer is Mr. J. Bateman, C.E., of London who paid a visit of inspection to the works last Friday.

The pier at R-dear, in the North R ding, which was cut through by a brig during a storm last October, has just been restored, and was reopened on Saturday. The work of rebuilding the six bays demolished has been carried out under contract by Messrs. Heald and Wrighton, of Stockton-on-Tees.

Mr. Yeo has been appointed surveyor to the Okehampton rural sanitary authority.

Extensive railway improvements have just been commenced at South Stockton by the North Eastern Railway Company, the scheme including the substitution of a new island station for the present inadequate one, the alteration of all level crossings, and the construction of a new railway bridge across the Tees. The contract has been taken by Mr. Walter Scott.

An inquiry was held at Sidmouth on Friday, before Mr. Arnold Taylor, one of the inspectors of the Local Government Board, on an application of the Sidmouth local board for sanction to borrow £1,000 for works of sewerage and street improvement.

The restoration of the parish-church of Rye, Sussex, has been commenced this week.

On Saturday, Captain Hobbard, R.E., on behalf of the Local Government Board, held an inquiry at Oswestry, with regard to proposed loans by the town council of £2,000 for street improvements and £100 for sewerage works. On the same afternoon the members of the town council visited alternative sites at Penegwely for the proposed new reservoir suggested by the water-engineer, Mr. Edward Filmer, C.E., of Leeds.

The guardians of Carlisle union have adopted plans by Messrs. Hetherington and Oliver, of Carlisle, for alterations at Fashill workhouse.

Entercommunication.

QUESTIONS.

[6531].—**Disputed Contract.**—Will Mr. Hugh Melchian, whose lucid replies so frequently assist us, advise me on the following?—A carpenter, having furnished plans and specifications, and become competitor for the contract, another party got the contract at a considerably less sum, and the carpenter got the appointment of clerk of works over the contractor. Now, when the contractor says the works are finished, the clerk of works brings forward a list of charges, some for works omitted to be done, others not done in accordance with the specification—walls lower than shown on the plan, the contractor insisting they are just to the height personally ordered, and that when the scaffolding was up and men going on a few inches (the difference only) either was or very small consequence to him. The most difficult to deal with is a "concrete" floor. In the specification there is no instance on us to how it is to be made. The only mention in the specification that could possibly be applied to it is on the first page of what he calls general conditions in the expression "Cement where used to be of the best quality Portland, made in the proportions of two parts sand to one of cement," and on the second page of general specification, "The floor of same shed to be of concrete at least 2 in. thick." The ground on which his floor is formed is soft and damp. The ground on which the floor was formed to which my specification was applied is hard and firm, somewhat gravelly, yet 9 in. deep of stone, closely packed in two courses by hand, and after this 4 in. deep of broken limestone, tightly rammed to a straight edge. Concrete formed of sifted gravel and sifted sand edge, thoroughly washed in finer sieves in two waters, 3 parts gravel and 1 part sand to 1 part cement, all by measure, mixed freely in a dry state, and tempered on a stage, spread by a wooden float, punning down the composition fully 1 1/2 in. among the stones, and to be 1 in. above the stones. I don't believe, no matter if the composition were unusually strong, it could withstand the "wear and tear" it must endure in a public market-yard in the absence of such a foundation as stated above, to secure drainage and firmness. In this case, if the proportions required by the specification were observed, the cement must have been dead or adulterated before being used, or it must have perished since, as the composition has become quite disintegrated. By the foot it can be easily rubbed into dust—as a floor it is perfectly useless. All the parties concerned have agreed among themselves to leave the entire matter to my award. My own opinion is that it would seem to be unreasonable to hold the contractor responsible in the absence of a proper specification for a properly-made floor, but for the value of the cement and sand expressed in the specification and laid in position—say, 2s. 2d. per yard. But it seems to me a most anomalous action of a clerk of works to have permitted bad materials, wrong proportions, and objectionable workmanship in the works to have accumulated till the job is said to be finished, instead of, as they occurred, to have them remedied, by removing the objectionable materials and work, or if the contractor became refractory, suspend the works till this was done.—J. McD.

[6535].—**Smoky Chimney.**—Can any of your readers kindly suggest a method of preventing smoky chimneys in third-floor offices in the City of London? The water would prefer something cheap, simple, and effective.—DOWNSIDE.

[6536].—**Excavation.**—How is circular excavation, as for wells, measured, and what are the dimensions taken?—X. Y. Z.

[6537].—**Bosses and Dogs.**—What is the meaning of the term "bosses" as used in plumbing? Also, what are the iron dogs of a door?—X. Y. Z.

[6538].—**Measuring Buildings.**—What is the best method of measuring up plans, sections, &c., of old buildings, such as churches? Is it necessary to have board and squares on the spot, or is a book sufficient, into which dimensions are taken to be plotted at home? Any information on the subject, or the name of any book, will oblige.—STUDENT.

[6539].—**Reservoir.**—Short description of the following will oblige. Suitable reservoir (material, size, filter, and pipe connections) for keeping constant supply of water to a country house of, say, twenty inmates, and also to supply stable, &c. There is an unlimited supply of water from a stream, which, however, is very liable to be fouled by clay when in flood. As it is desired to dispense with cisterns in house, what is the best arrangement for not wholly cutting off water when reservoir is being cleaned?—L. L. U.

[6540].—**Local Board Office.**—Could any of your readers inform me of a well-designed local board office, comprising board room, usual offices for tax collector and surveyor, suitable for a population of, say, 5,000? As I have similar offices to design, I should be glad to learn of any well-proportioned building of that class.—BRUNING SURVEYOR.

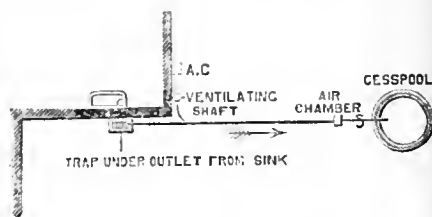
[6541].—**A Difficulty.**—An architect leaves a set of quantities, desiring a tender for the work. The estimate is sent, but before it is settled who is to have the contract, the gentleman calls and asks that the priced bill of quantities be given up. Upon our refusal to do so before our tender is accepted, we never refuse after the contract is settled; he withdraws, places the work elsewhere, and assigns as the sole reason the non-compliance with his request.—SWAN.

[6542].—**Diagrams.**—I have to prepare a number of large diagrams illustrating various features of architectural construction for a course of lectures on that subject. It is necessary that they be prepared in such a way that they may be folded without injury in order that they may be carried from place to place. Will some correspondent be good enough to give me some information as to the material and colours I ought to use? Any hints will be acceptable.—A. J.

[6543].—**Damp Wall.**—I am connected with a Sunday School library, and the wall at the back of the book-case is an external one, which is very damp. I should be very glad if some of your readers would give me their opinions

of the best method of coating the wall, internally only, so as to prevent the damp coming through. If paint, or any glutinous mixture should be recommended, I should be glad to know what ingredients would be required, quantity to use, and probable cost per superficial foot.—LABRARIAN.

[6574].—**Ventilating Drains.**—The by-laws of the municipal sanitary board here, give us the system to be adopted of ventilating drains as sketch, and specify the



cesspool to be also ventilated; whereas our sanitary surveyor requires the air chamber in position dotted and marked A.C. and further states that the cesspool will be sufficiently ventilated without supplying a separate ventilating drain for it. As the surveyor and the by-laws seem to give exactly opposite opinions, I should be glad to know which is right, if either? And, moreover, the by-laws say that the ventilating shaft shall contain a sectional area not less than that of the drain it ventilates; whereas ninety-nine out of a hundred here are from 2 in. to 3 in. diameter to ventilate 6 in. drains; and this with the entire sanction of the surveyor. I should like also to know if a plan is passed and signed by the board, whether the surveyor can compel you to do things at variance to such plans.—COUNTRY SUBSCRIBER.

REPLIES.

[6531].—**Bridlington.**—The following notes may, perhaps, be of some use to "E.C." during his visit to Bridlington and Scarborough:—Flamborough, 4 miles from Bridlington, is, of course, interesting to any one on account of its natural attributes, and the church there is well worthy a visit. It contains a Norman in-chancel arch and an old wood screen (very rich of 15th century work). Burton Agnes, 4 miles from Bridlington. Here there is a good church, and the hall is a fine and rare Elizabethan mansion said to be designed by Inigo Jones. It has a rich entrance gateway of the same date, above the centre arch of which are the Royal arms of James I. Hunmanby Church was the "Matrix Ecclesie" of several others in the neighbourhood. It is old, good, and interesting. There is a quaint oak roof, and in the chancel is a fine marble monument (figure of piety by Fisher) to the Oshaldston family. The hall lodge is a pretty curiosity, having been erected in 1829 to represent a monastic ruin. The stone was obtained from Filey Brigg, and was thoroughly weather beaten by the action of the sea before its removal. There is also a good stone high gate, recently erected to the memory of the late Admiral Milford, R.N. Also Rudstam Church is good, and there is the celebrated stone obelisk in the churchyard. It stands over 25 ft. above the ground (probably as many below), and has been calculated to weigh upwards of 50 tons.—HENRY LAWSON.

[6552].—**Thickness of Piers of Arches.**—It would appear that Gwilt's method for finding the thicknesses of abutments or piers to arches is either not to be trusted or fails to convey the true meaning. Further, that the formula or geometrical method usually given do not agree with each other in their results, thereby leading to an uncertainty in the minds of all who have not a thorough acquaintance with the subject, and I am afraid not one such is to be found. It is necessary in order to understand modern theories on the arch to know integral calculus and higher mathematics. I have consulted the works of several authorities and calculated the required abutment thicknesses for the two examples of arches given by "J. H. M." with the following results. For the semicircular arch of 60 ft. span, supposing the height from ground to springing to be 30 ft.:—According to Gwilt's geometrical method, 7 ft. 6 in.; Tarn's method allowing half as much again for safety according to article in the Building News of Aug. 21, 1874, p. 218, partly geometrical and partly by quadratic equations, 8 ft. 4 in.; formula in Horst's Handboek, 10 ft. 7 in.; and the formula in Molesworth's Handbook, 13 ft. 8 in. For the segmental panted arch, of same span and height of abutments as the former, struck with a radius of 45 ft., the centres being 35 ft. below the springing:—According to Gwilt about 3 ft. 9 in. only; to Tarn's method, 10 ft. 10 in.; to Horst, 8 ft. 4 in.; and to Molesworth, 23 ft. 10 in. The reason why the results according to Molesworth are so much higher I believe that in that case the arch is supposed to be fully loaded with material of a nature homogeneous with that of the arch and abutments, whilst in all the other cases the arch is supposed to be loaded with its own weight only. Gwilt does not consider a loaded arch, Molesworth does not consider one unloaded, but Tarn and Horst provide for all cases; I prefer the latter. The formula in Molesworth is also given by Horst who adds, "this formula gives the thickness of abutment without wind or other forces just sufficient to balance the thrust of the half arch," the other calculated results are for the load only. In the Building News of Sept. 24, 1875, in an article on "The Stability of Arches" it is rightly pointed out "that it is customary to consider the arching as such a mass, besides its own weight, that of the entire superstructure raised over it" and "that this view is an erroneous one," further that a large portion of the superstructure is self-sustaining or is supported as if by a keel. The author is, however, I think, mistaken when he takes as granted, that the weight sustained "on the abutment" must have a resultant at right angles to the skewback. We are also told in the Building News, Dec. 17, 1875, on the authority of Dr. Hermann Schlicher "that the line" (curve of pressure) "may pass outside this middle third" (of the arch ring or face) "and generally so passes without endangering the arch's stability"; further "that an arch

cannot stand unless the line of pressures pass within the arch ring is disproved by experiment." It is thus seen that the present theory of the arch rests on an uncertain basis. I forgot to say when speaking of the two cases given by "J. H. M." that Hurst as well as Gaitt makes the unloaded segmental pointed arch require a smaller abutment than the semi-circular arch; this would in all probability, be found correct, but when fully loaded, the semi-circular arch would require the smaller. In fact a semi-circular arch of large span would not stand by itself, unless loaded on the abutments and extrados to the height between springing and crown; neither do the springings of such an arch carry the superstructure in the manner of an arch, but in the manner of corbelling, and the lowest joints might be laid horizontally, as was always done in the springing of groin ribs and often in the arches of arcades during the 13th century, care being taken to provide again the chipping of the feather-edges of the beds. Many readers would probably be surprised by my saying that a semi-circular arch is simply a segmental arch of smaller span, the total width being reduced by corbelling. The following extracts from Rankine's "Manual of Civil Engineering" will prove useful:—"Each pier of a series of arches ought to have sufficient stability to resist the thrust which acts upon it, when one only of the arches which spring from it is loaded with a travelling load. That thrust may be roughly computed by multiplying the travelling load per lineal foot by the radius of curvature of the intrados at its crown in feet." "Each pier of the arch should always give sufficient space on its top for two arches to spring from." "Either of these rules gives in general a less thickness than those adopted for piers in practice, which range from one-tenth to one-fourth of the span of the arches; the latter thickness and those approaching to it, being suitable for abutment piers. The most common thickness, for ordinary piers, is from one-sixth to one-seventh of the span of arches." "Piers, like abutments, are advantageously lightened, especially when very lofty, as in viaducts, by being built hollow, or by having archways traversing them, with inverted arches at the base." In a previous clause, he says:—"In some of the best examples of bridges, the thickness of the abutments ranges from one-third to one-fifth of the radius of curvature at its crown." M. Villette-Duc says on this subject in his "Dictionary of Architecture":—"To ascertain these actions by calculations would be a work of pure loss, for these calculations would vary in infinitude, on account of the heights or breadths of the openings, of the thickness of the solids, of the quality of the materials, of their resistance, of the heights of the beds, &c. But human sentiment, when hurried, is more subtle than calculation; in the same manner that a machine, however perfect it is, cannot attain the delicacy of the hand, and the surety of an eye glance." He had previously explained that the Early Medieval architects probably endeavoured to ascertain the thrusts of arches by geometrical diagrams, similar to though simpler than that given by Gaitt. Also read BUILDING NEWS, Feb. 4, 1876, p. 115.—HUGH MCLACHLAN.

[6560].—**Bearing Loads.**—For angle and channel iron, the breaking weight in tons per sectional inch has been given in one formula as $W = \frac{19}{1 + \frac{r^2}{900}}$, where $W =$

breaking load, $r =$ length divided by least diameter. The safe load may be taken as one length of this. Hurst's "Architectural Handbook" gives a formula.—G. H. G.

[6562].—**Defective Rain-Water Tank.**—As "User" does not want to dig round tank on the outside, nor to use asphalt, the only sure alternative I can think of is to build another brick tank within the present setting rendering the brickwork in cement. Let the bricks be impermeable, and the Portland cement of good quality.—G. H. H.

[6563].—**Durer's Works.**—On looking over my bound volumes of the BUILDING NEWS for the past ten years, I have found up the following reproductions of engravings or paintings by Albrecht Dürer:—The Virgin and Butterfly, published Jan. 20, 1871; the Apocalypse series, Nov. 7, 1873, and June 30, Aug. 4, Sept. 29, and Dec. 22, 1876. The Nativity, Dec. 24, 1880. Bits from pictures, May 2, 1873. Outlines from paintings, by Dr. Zentli, Aug. 24 and Sept. 22, 1876. Designs for decorations, April 25, 1879. Durer's house at Nuremberg was illustrated in the BUILDING NEWS for Dec. 24, 1875. Accompanying the illustrations on Aug. 24, 1876, is a biographical sketch by Dr. G. G. Zentli, to which I would refer "G. W. T."—EAST ANGLIAN.

CHIPS.

The annual excursion of the Cambrian Archaeological Society will be held at Ludlow and Church Stretton, during the first week in August.

The foundation-stone of a new block of business premises, now in course of erection for Messrs. Rowntree and Sons, at Westborough, Scarborough, was laid on the 7th inst. Mr. Burgess is the architect; Mr. George Scates, the contractor; and Mr. J. Kay, the clerk of works.

A tramway extension from Portsmouth to Cosham was officially inspected by Major-General Hutchinson, on behalf of the Board of Trade last week. The contractor was Mr. J. Sheppard, of London.

A new vicarage is being built in Waterloo-road, Wolverhampton, for Christ Church parish. Mr. S. Pountney Smith, of Shrewsbury, is the architect, and the tender of Mr. Richard Price, of that town, has been accepted for the work.

Mr. Hawkesley, C.E., has proposed a new scheme for the drainage of the Lower Thames Valley upon the instructions of the Main Sewerage board for that district. He proposes to convey the sewage-treatment in any manner directly into the estuary of the Thames near the mouth of the Darent.

PARLIAMENTARY NOTES.

THE METROPOLITAN BRIDGES.—Last Friday a Select Committee of the House of Lords passed the Bill, which has already received the sanction of the House of Commons, authorising the Metropolitan Board of Works to construct new bridges at Battersea and Putney, to widen and rebuild the existing bridge at Deptford Creek, to alter Vauxhall-bridge by converting the three central arches into one, and for relieving the Hammersmith-bridge Company from all obligation or liability as to the repair and lighting of the bridge and its approach roads. The new bridge at Putney will be a granite-faced structure, erected at a total cost of £106,000, upon the site of the aqueduct conveying the pipes of the Chelsea Waterworks across the river, the mains of which company are to be laid in the footways of the new bridge. With respect to the new bridge at Battersea, the Committee have authorised its construction with the curved approach. As now sanctioned by both Houses, the bridge will be an iron structure, erected somewhat to the east of the present bridge, at an estimated cost of £231,000. The width will be increased from 23ft. to 40ft., and the number of spans decreased from 17 to 5, the centre of which will be 173ft. wide. The new bridge will be 6ft. higher than the present one, which will allow 15ft. above Trinity high-water mark.

THE ARTISANS' DWELLINGS ACT.—Last Friday afternoon Sir R. A. Cross, the chairman, and several members of the Select Committee of the House of Commons, appointed to inquire into the working of this Act, paid a visit to East London for the purpose of viewing some of the sites taken for the erection of blocks of buildings under the Act and to inspect some of the houses already finished.

GUILDFORD, KINGSTON, AND LONDON RAILWAY.—A Select Committee of the House of Lords on Tuesday passed that portion of the Guildford, Kingston, and London Railway which it was agreed should be constructed by the South-Western Company, but have refused to sanction the branch line which was to have crossed Great Bookham common to join the South-Western, and London, Brighton, and South Coast Railways at Leatherhead. As the other branches to Little Bookham and Ashstead were abandoned in the House of Commons in favour of this Leatherhead Extension, the Bill, as now passed by the Lords, will only authorise the construction of the main line, without branches from Surbiton to Guildford. The other portion of the line from Surbiton to Fulham, which is to be constructed by an independent company, has passed unopposed.

STATUES, MEMORIALS, &c.

THE LATE LORD LAWRENCE.—Mr. Woolmer's bust of Lord Lawrence in Westminster Abbey was unveiled on Tuesday. The bust stands, on a pedestal representing the Indian lotus-leaf, against the north wall of the abbey on the west of the gate called the Canons' door, and nearly underneath the monument of Sir James Outham. The breast is draped in the robe of the Star of India. Over the heart is worn the star of the order. The face finely expresses the power which Lord Lawrence exercised over those who approached him. The forehead is very high and capacious; the distinctive features of the face are the deep-set eyes protected above by unusually low, straight brows. While the general cast of the face is such as to convey the idea of a commander who would irresistibly enforce his will and compel obedience, the expression of the mouth is singularly sweet and simple. The lines are large and strong, but the finely-pointed lower lip indicates extreme sensitiveness. The sides of the pedestal are decorated with incised and gilded lotus flowers, and in front is the inscription.

STAINED GLASS.

BARNSTABLE.—A large stained-glass window, the work of Mr. W. F. Dixon, London, has just been erected in the parish-church of Barnstable, to the memory of the late Frederick Richard Lee, Royal Academician, who was born at Barnstable, June 10th, 1798. The window was erected by his daughter, Mrs. Colonel Hibbert.

BRISTOL.—During the past month, Messrs. Camm Bros., of Smithwick, have fixed at Christ Church Congregational Church, Sneyd Park, Bristol, a handsome and costly stained-glass window, to the memory of Mrs. Derham, wife of Mr. James Derham, of Sneyd Park. The window is situated at the west end of the church. No fewer than 18 subjects, typical of Old and New Testament history, are treated. The series comprise the Garden of Eden, with Adam naming the animals, indicative of human dominion over creation; the Expulsion from Eden, the Flood, the Offering of Isaac, the trial of Abraham's Faith, Jacob Blessing the Children of Joseph, Moses bringing the Tables of

the Law, Aaron between Living and Dead, with Censer by which he stayed the Plague; the Crowning and Anointing of David, the Translation of Elijah, the Adoration of the Magi, the Flight into Egypt, our Lord with the Doctors in the Temple, our Lord Blessing Little Children, the Sermon on the Mount, the Raising of Lazarus, the Crowning of our Lord with Thorns. In the tracery of the windows are representations of the Two Covenants, Aaron with the altar of sacrifice and incense, David with crook, crown and sceptre, Jeremiah weeping over the Ruins of Jerusalem, St. John with his emblems, St. Peter with a key, fish-boat, net and inverted cross, St. James, with an appropriate passage from his Epistle, "Behold, we count them happy who endure." At the apex on one side is Moses, as representative of the Old Dispensation, and St. Paul as chief of the New Dispensation, and in the central piece of the tracery is a representation of our Lord in Majesty, surrounded by cherubim and seraphim. At the base of the window is an inscription.

WATER SUPPLY AND SANITARY MATTERS.

LINCOLN.—The main sewerage of this city having now been completed, from the plans of Mr. Mansergh, the town council discussed on Wednesday week the mode in which the house connections should be made, and who should bear the cost—the ratepayers at large or the individual owners whose property was connected. Objection was raised to the proposal by the sewerage committee to require Stanford's patent joints for the connections, which it was said would cost 1s. 10d. per yard, whereas cemented joints, which had stood well in this city during twenty years past, and were also used in London, only cost 10d. a yard. On the other hand, it was said that cemented joints would not be safe in wet soil, and that the builders of Lincoln would, as a rule, support the use of Stanford's joint. In the end, all propositions made on the subject under discussion were withdrawn, and the sewerage committee were granted full discretion and power to act. The matter has evoked a warm controversy in the city newspapers, and Friday's *Lincolnshire Chronicle* quotes at great length from the report of Mr. S. S. Hellyer's fourth lecture on Plumbing published in the BUILDING NEWS, in condemnation of the Mansergh's trap, and the report of lecture is referred to by several of the correspondents.

LIVERPOOL.—The Earl of Powis yesterday laid the foundation-stone of an immense embankment across a Welsh valley, which will form a new lake capable of holding nearly 2,000,000 gallons of water. It is intended to give a supply of water to Liverpool (by pipes extending a distance of sixty-seven miles over and through mountains and valleys) of 52,000,000 gallons a day. The river Vyrnwy is the chief upper tributary of the Severn, and the waters of this stream, together with those of two affluents, the Marchmont and the Afon Cowng, will be impounded at Llanwddyn, by a dam or embankment of masonry, built across the valley, which will be 140ft. high and 1,255ft. long. The embankment arresting the water of the three streams will form a lake five miles in length, with an area of 1,115 acres. This water will be conveyed to Liverpool for the use of the inhabitants there, a distance of nearly 70 miles, in a triple set of pipes, each of a diameter of four or five feet. Three tunnels have to be got through—the Kirnant tunnel, about 2½ miles in length, and the Morda and the Oswestry tunnel, each under a mile in length. Oswestry and other towns on the route will take water from these pipes. The waters of the district are remarkably pure, and the drainage area from which they are collected is 22,000 acres in extent. The works are expected to occupy eight or ten years in their completion.

The annual meeting of the Sanitary Institute of Great Britain was held yesterday (Thursday) afternoon at the Royal Institution, Albemarle-street, S.W., under the presidency of Earl Fortescue. An address was delivered by the Chairman of Council, Professor F. S. B. F. de Chaumont, F.R.S., on "Modern Sanitary Science," and the medals and certificates awarded at the Sanitary Appliances Exhibition at Exeter last year were presented. In the evening the anniversary dinner was to be held at the St. James's Hall Restaurant, under the presidency of Prof. de Chaumont.

The President of the Local Government Board has visited her Majesty's ships, *Atlas* and *Endymion*, now moored off Greenwich, which are about to be used by the Metropolitan Asylums Board as hospitals for small-pox and other infectious diseases. They have been converted to their new use from the plaques of Messrs. A. and C. Harston, architects, and give accommodation for 200 acute cases, or 600 convalescents.

Our Office Table.

The preservation of gas service-pipes was the subject of a good deal of discussion at a late meeting of the Associated Gas Engineers of New England. Special stress was laid upon the destructive influences of the salt in the soil of seaboard places, and the secretary said that at Charlestown the wrought-iron pipes were sometimes found to be so corroded that a touch would crumble them; but so long as they remain undisturbed in the ground they continue to hold gas. The same state of things was reported from other seaboard places, and it was also stated that gravelly soil and land filled with ashes were almost equally as bad. Indeed, one official stated that the pipes in his city were so badly acted upon in the gravelly soil that the loosening of the ground about them by the watermen, and even the shovelling of earth upon them, would make five out of six leak badly. Galvanised iron pipes are being put in in many places, and are much more durable; but they cost 50 per cent. more than common pipes, a weighty objection, which applies as well to lead pipes. Cast-iron pipes are not in favour among American gas-men, and the only practicable thing seems to be to find some process to make the wrought-iron pipes more durable, and at no great expense, or to use some other material than iron. Favourable results have been obtained by dipping the pipes in tar or asphalt, and by lining them with cement; but this latter method materially diminishes the capacity of the pipe.

The French difficulties in Tunis have brought the following little game to light, which has, it is said, been carried on for a long time at Carthage. Four or five cicrones who lounge about the place lead the visitor from one place of interest to another—from the pretended palace of Neptune, a heap of rubbish, to the pretended Senate House. At a proper moment the guide pokes his cane into a hole, and startles everyone by the discovery of a rich old mosaic, which he hastens to sell to the visitor. The mosaic is made in Marseilles, and the investment-yields a percentage unheard of even in Capel-court.

Ten years ago, the roofing-slate industry in the United States was not considered of sufficient importance to receive even a bare mention among the "special industries" of the census reports. Last year the capital invested in the manufacture of roofing slates amounted to more than \$8,000,000. Over 3,000 men were directly employed producing 600,000 "squares," or sufficient to cover 60,000,000 square feet. The quantity produced in the several States having slate quarries was:—Maine, 60,000 squares; Vermont, 130,000 squares; Pennsylvania, 320,000 squares; New York, 10,000 squares; Virginia and Maryland, 20,000 squares; other localities, 60,000 squares. The Pennsylvania quarries, which produced more than half the slate turned out during the year, have been worked about 15 years. The largest quarry was opened in 1865. It contains 60 acres, gives employment to 200 men, and produces 40,000 squares a year. The most durable slates are those from Southern Pennsylvania (Peach Bottom) and the Maine slates. The latter rival the best slates of Wales. The dark blue or blue-black slates are most durable. The fancy coloured slates—green, purple, red, variegated, &c.—do not hold their colour. Red slate is most expensive—during the past season from 7dols. to 9dols. per square. The Peach Bottom slates have ranged from 5.50 dols. to 6.50 dols.; Maine slate, 5.50 dols. to 7.75 dols.; common Pennsylvania, 1.50 dols. to 3.25 dols.; Vermont purple, 5 dols. to 5.50 dols.; green and variegated, 3.50 dols. to 4.50 dols.

The Sir Gilbert Scott Memorial Brass in Westminster Abbey was unveiled on Wednesday last by Archbishop Jennings, in the absence of the Dean of Westminster through illness. A large number of architects and personal friends of Sir Gilbert Scott were present. The archdeacon made a short and suitable speech, mentioning a few interesting facts in connection with his personal relationships with Sir Gilbert Scott. The brass is a very handsome monument, beautifully executed, and it is situated near the pulpit in the nave, immediately adjoining the grave of Sir Chas. Barry, R.A. A drawing was given in our pages on Sept. 12, 1879.

ARRANGEMENTS for the forthcoming industrial exhibition at the Hotwells, Bristol, are progressing rapidly. Messrs. Ford and Co. are proceeding with the building which is being erected under the superintendence of the architect, Mr. H. E. Edwards, and is now in a comparatively forward state; 613 persons have sent in their names as exhibitors. The committee have attracted exhibitors not only on a large scale in Bristol but from all parts, including Cheltenham, Worcester, and Swindon. The exhibition will be formally opened on Monday, the 25th inst., by the Mayor. The departments will be all well filled, and include models, working models, specimens of home handiwork in connection with all manufacturing trades and businesses, needlework and cookery, plants, flowers, fruits, and vegetables, fossils and natural history objects, &c. The industrial and art sections will receive additions until the 16th inst.

At the Industrial and Fine Art Exhibition recently held at Plymouth, the Gold Medal was awarded to Messrs. Goad and Co., marble merchants, who were also the recipients of the Silver Medal for workmanship. Their exhibit consisted principally of immense marble blocks, weighing several tons each, and forming part of the dome piers intended for the new church of the Oratory, South Kensington, of which Mr. Herbert A. K. Gribble is the architect.

SPEAKING about the Walker Art Gallery at the last Liverpool Council meeting, Mr. Rathbone asserted that, when any artistic brickwork had to be done in Liverpool, London bricklayers had to be procured to do it, and he deplored this as a sad state of things. Mr. J. C. Edwards, of Rumbon, writes to a Liverpool contemporary that there are but three instances in which London brickwork has been introduced into Liverpool for its artistic value. The principal one is probably that built for Messrs. Agnew, at the corner of Castle-street. Here it acquired the term "sensation" brickwork; for what reason Mr. Edwards says he cannot say, unless it is that "sensations" usually last but a few days, and that was the case with some of this brickwork. Passers by may remember that the building had been erected but a few months before the proprietors discovered that their ground-floor exterior was gradually passing away, and found it necessary to replace it with work of a more substantial and less "sensational" nature. Having been connected with brick and terra-cotta work, both in London and Liverpool, Mr. Edwards unhesitatingly asserts that Liverpool bricklayers are as capable of doing good artistic brickwork as any body of men in the country. It would be difficult to instance better workmanship than is exhibited at St. Francis Xavier's College, or at the Eye and Ear Hospital in Myrtle-street; and as a specimen of individual skill, the terra-cotta pulpit now at Messrs. Norbury's Art Rooms could not be surpassed. And these were constructed entirely by Liverpool journeymen.

We are asked to say that plumbers' exhibits for the International Medical and Sanitary Exhibition must be sent, addressed to "Mr. Mark H. Judge, Exhibition-road, South Kensington, S.W.," on or before Tuesday next. Invitation cards for the opening ceremony will be sent to all plumbers intending to exhibit if their names and addresses are received by Friday. Season tickets will be given to them as soon as their exhibits are sent in.

CHIPS.

On Saturday the new Mynydd-Mawr Railway, near Llanelly, was formally inspected on completion by the directors and shareholders, accompanied by the engineers, Messrs. Kinnipie and W. Rosser.

An inquiry was held at the town hall, Herne Bay, on Saturday, by Mr. Arnold Taylor, C.E., an inspector of the Local Government Board, with reference to an application from the urban authority for leave to borrow £1,000 for a breastwork and general improvements.

George Pilshan, foreman to Mr. S. Quelch, builder, of Egham, was committed for trial on Monday on a charge of having fired at and wounded with a revolver a fellow-workman named William Hazell, when at work at Salt Hill, Slough.

A new organ was opened at Kirk Arbury parish-church, near Castletown, Isle of Man, on Sunday week. It has been built by Mr. Hewett, of Leicester.

The foundation-stone of a new Wesleyan chapel was laid in Canterbury-road, New Brompton, next Chatham, on Friday. Messrs. Naylor and Son, of Rochester, are the contractors, and the cost of erection will be £1,800.

On Tuesday afternoon Mr. C. R. Jackson, chairman of the Building Committee, laid the foundation-stone of a new wing to the present hospital at Fulwood Workhouse, near Preston. The building will comprise an additional hospital ward and a ward for infectious cases, and is to be called the "Jackson wing." It will accommodate about 124 patients. The contract is let to Mr. R. Saal, builder, of Preston, for £10,323, and the work is to be completed in twelve months.

At a general assembly held at the Royal Academy on Wednesday evening, Mr. Edwin Long was elected a Royal Academician.

The death is announced of Mr. George Zobel, the mezzo-tint engraver, at the age of 70 years. Mr. Zobel, who had long resided at Brixton, frequently executed works for the Queen, the Prince of Wales, and other members of the Royal family, and was a regular exhibitor at the Royal Academy.

At the Lancashire quarter sessions held last week, plans for the erection of a magistrate's court-house at West Derby, at an estimated cost of £36,000, were approved.

At a meeting held at Chelmsford on Tuesday, plans by Mr. F. Chancellor, of London and Chelmsford, were approved for a cemetery lodge to be built in Rectory-lane, at a cost of £100, and he was also appointed architect for a proposed mission chapel at Rainsford-end. A meeting was held at Moulsham, a suburb of Chelmsford, on Thursday, when Mr. Chancellor's plans for the enlargement and improvement of St. John's Church were adopted; the scheme includes the provision of a tower and additional accommodation for 120 persons, and the estimated cost is £1,600.

A brass lectern has just been placed in Holy Trinity Church, Newington, S.E., in memory of the late Mrs. Armstrong. It was supplied by Messrs. Jones and Willis, of Birmingham and London.

The Cotswold Archaeological Society visited the Forest of Dean on Friday last.

A new engine and centrifugal pump erected at Tattershall for the drainage of the Timberland and Tilney Thorpe Fens were formally started last week. The engine is capable of working up to 150 horse-power, and the centrifugal pump lifted at the trial 120 tons of water per minute to a height of 11ft., discharging it from the fen drain into the river Witham. The work has been executed for the Timberland drainage trustees, by Messrs. Tuxford and Sons, of the Boston and Skebeck ironworks, under the supervision of their engineer, Mr. J. E. Williams, of Boston.

The Bromsgrove local board decided last week to call in Mr. Purchas, C.E., of Worcester, to report as to the best means of draining the extension area of their district.

Mr. S. H. Ferry, C.E., Local Government Board inspector, held an inquiry on Tuesday week at St. George's, Gloucestershire, into an application from the local board of St. George's for sanction to borrow £5,000 for providing a cemetery for the parish. The plans had been prepared, and were shown by Mr. W. Dawson, the surveyor to the local board.

Extensive additions are about to be made to the Bolton bank premises at Atherton, from the plans of Mr. George Woodhouse, architect, of Bolton.

A new Roman Catholic Church of St. John Curtius and St. Nicholas, at Broxburn, near Linlithgow, N.B., was consecrated on the 7th inst. It is Gothic in style, seats 600 persons, and was built at the cost of the Countess of Buchan.

A two-ton bell for Eddystone new lighthouse was cast at Messrs. Gillett and Bland's foundry, Croydon, on Tuesday afternoon.

Holloway's Pills—the sheet anchor of the confirmed dyspeptic. A few trials will prove their potency in removing indigestion, biliousness, nervousness, loss of appetite, want of sleep, and that utter weakness which waits on a cold and disordered stomach. They act as a laxative, sedative, and gentle purgative.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (TO-MORROW).—St. Paul's Ecclesiastical Society. Day visit to Rochester. Train from Victoria 10.10 a.m.
Opening of Sanitary and Medical Exhibition, South Kensington.

Doultling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to

CHARLES TRASK,
Norton-sub-Hamdon, Ilminster, Somerset.
—[Advrt.]

THE BUILDING NEWS.

LONDON, FRIDAY, JULY 22, 1881.

DOMESTIC BRICK ARCHITECTURE.

IT would be thought a downright piece of mannerism now, to plan a building upon the formula laid down by the followers of Vitruvian or Palladian precepts, the adoption of which would throw the principal apartments into symmetrical groups, with a prostyle hall in the centre, the whole design being arranged in reference to an axis and one of the Five Orders. Such a method of procedure would, at least, involve some trouble, measurement, and adjustment of parts. It would require the principal apartments to be arranged as wings, and the windows would have to be set out with reference to an order of columns, the proportions of which would control the heights of the whole composition. The plan at every step would be governed by the elevation, the demands of which are imperative. Comparing this mode with our modern haphazard system of arrangement and composition, nothing can be imagined more opposite. It was the outcome of pedantry, it is true; but it necessitated careful adjustment of parts. Those of the "Queen Anneists" who have been furnishing up their scraps of Classical detail, often lose sight of the consistency and proportion which were the ruling principles with the architects of antiquity and the Renaissance. But then we shall be told this incontinuity and disproportion is of the very essence of the style, without which it loses its charm and association. It is useless for the Classicist or purist to talk of modules or "minutes," entasis, or intercolumniation, the gradation and projection of orders—such learning is deemed only pedantic, perfectly soulless, and to be only of use to instruct people how not to become artistic. According to modern canons and taste, the very essence and feeling of art is expressed in the dictum that to become artists we must unlearn all rules, and affect an abhorrence for all methods. It is true enough that the real artist ought never to show his art, or parade it, and this truth has found expression in the aphorism—"True art is to conceal art." At least it is the delight of the artist in this last phase of architectural taste to depart as much as he can from those generally-received proportions which have usually guided the architect in both Classic and Gothic. As regards such fundamental things as the proportion of openings, doors, and windows, it is nothing unusual now to see doorways of extremely wide proportion, often quite square, and seldom higher than one and a half times the width. The panels of doors are made to increase this apparent width by being often in one without the usual vertical middle muntin. The question is, is there any gain by adopting such proportions, and if not why are they used? We certainly do not mean to assert that the modern joiner's idea of proportioning a door is perfect, such for instance, as the rule of thumb of 6ft. 8in. by 2ft. 8in. Modern house-doors of an ordinary kind are ridiculously narrow, and give an air of insignificance to a house; but we think there is no good reason for returning to a proportion which defies every principle. The ordinary canon for the human figure may reasonably be added as giving, with a fair margin, something like an approximate width of openings, and this rule agrees fairly well with the dimensions usually considered to be agreeable. The excesses of dress,

such as the farthingale, the pantaloons, and other extravagancies of the reigns of Elizabeth and Charles II., may probably have influenced architects in the proportions of doorways and staircases; but modern taste in this particular has undergone a great revolution, and the fashionable architect might be asked to give a reason for so glaringly violating one's sense of fitness. Windows are made all sizes, and the extremely narrow opening has become a favourite with artists of this school. But rule here also is set aside, for we see very wide openings as well as very narrow ones, and all of various heights and levels of sill line. Large mullioned arrangements on the first floor over very small casements in the ground-story are exceedingly common, in spite of their evident incongruity in houses of only two stories. We should have nothing to complain of if these openings were regulated by the requirements of the interior; but their authors do not even pretend they are, much less that they should appear proportioned with any regard for architectural propriety. The ingenious theories of Lebrun and others would be ridiculed, probably, even if they had ever been known by some of the school, and it would be worse than useless to tell these contemners of method that the most beautiful forms and proportions they sometimes copy with delight have been found to correspond with an obvious principle based on reason, that the load should not be apparently much greater or less than the support; in other words, that the voids and solids should be about equal. To take the best examples of the Orders, or the highly-pleasing arcades given by Palladio, Vignola, and other masters of the Italian, it has been found that there is an equality between the superficial area of the solid parts of the load and supports which may be easily tested by a geometrical method, and that, if we regard the solids and voids, the areas of each are in the more monumental examples found to be equal. It would be absurd to drive Lebrun's or any other theory so far as to say all openings and supports should be proportioned upon this system, yet the simple knowledge of a good ratio, say that which makes the solid part of an arcade about two-thirds of the void, or dictates the double square used by Vignola and other masters for the doorway or window-openings, might lead to an avoidance of what is positively ugly or painful to our sense of good proportion.

The employment of columnar orders is sometimes attempted. The very spirit of the style forbids the use of columns and ordinances according to rule, and the best specimens of "Queen Anne" or "Free Classic" are those buildings in which they have been very sparingly introduced. A very common decoration is the brick pilaster reduced to either a mere strip of vertical projection of about 15 diameters in height, or a squat-looking shaped form with dropsical entasis half the height usually seen. As merely brick relief we are not justified in charging these decorations with being violations, though they sometimes appear in positions which demand more regard to orthodox proportions, and there is certainly no excuse for making them so grotesque as to become ridiculous parodies. Such things as a squat-brick pilaster carrying a broken frieze of its own height and a bare member or cornice, and near it, another loaded with a projecting pediment of crushing size and weight or with immense carved trusses of considerable projection over a doorway, are too Hudibrastic for everyday art. They may provoke a smile; but what shall be said for such inanities as a little pediment, full-membered, with cornice a few inches long, stuck over the centre of a wide window having no apparent support except the glass! There is

a wide field for sensible brick architecture borrowing from 16th, 17th, and 18th-century models, and for everyday domestic life the style of either of these periods has something more real and honest than either Italian or Gothic of the Epochal types; yet if it is to take any permanent place in art it must cease to become the vehicle of the mere comical and buffoonish.

It is thought by many artists that even these qualities redeem a work from a dull and spiritless stereotypism. Rather than be mediocre let us be capricious, they argue; and as sensation is the order of the day, they make some little stir by their extravagances. Time works rapid change. Wonder at the audacity of the performance very soon ceases, and any admiration the work once extorted, on account of the daring and *verve* exhibited by its author, soon dies away before that stern and relentless arbiter—common-sense.

THE INTERNATIONAL MEDICAL AND SANITARY EXHIBITION.

THE Medical and Sanitary Exhibition, formally opened last Saturday by the Right Hon. Earl Spencer, occupies the greater portion of the annexes of the Royal Albert Hall at South Kensington. The Horticultural Society's gardens, with their wealth of foliage and flowers, add to the attractions of an exhibition, in itself rather dry and uninviting in its details, and the long arcades and quadrants skirting the gardens seem admirably adapted for exhibition purposes, in spite of some drawbacks of a practical character. The exhibition has been divided into no fewer than 17 sections. Sections I. to VI. are chiefly devoted to the exhibition of surgical instruments and appliances for hospital purposes; another section is given to drugs, dietetic articles, and mineral waters; electrical apparatus, optical, medical, physiological, and other appliances form four other of the sections; section XIII. represents hospital architecture and construction; section XIV. is given up to ventilating, lighting, and warming; section XVI. illustrates water supply and filtration, and the last section is devoted to a miscellaneous collection of objects, school-furniture, clothing, and books. Each of these sections is presided over by competent judges and specialists, who are now preparing their awards, and the list includes a few of our foremost authorities in medical and sanitary science. In the section (XIII.) devoted to domestic and hospital architecture, planning, and construction, which we notice on another page, we find the judges' names include Sir Joseph Fayrer, K.C.S.I., M.D., G. Aitchison, A.R.A., F. Mouat, M.D., Edward C. Robins, F.S.A., P. Gordon Smith, Professor T. Roger Smith, Henry Saxon Snell, and Alfred Waterhouse, A.R.A.

This and the following sections comprise nearly every department of sanitary science, and it is to these we shall chiefly devote our attention. The sanitary sections occupy the largest area. Entering the eastern arcade from the main entrance in the Exhibition-road, we find the space has been allotted chiefly to exhibitors of sanitary goods under sections XIII., XIV., XV., and XVI. Sanitary apparatus, ventilating and warming appliances, drain-pipes, traps, innocuous oil-paints, improvements in heating stoves, and appliances for opening pivot and other sashes, are largely shown. These several articles have not, unfortunately, been placed in any order; our notes, on this account, will necessarily appear rather unmethodical. A large full-size model of a window, with sashes, near the entrance end, exhibited by John Bryden and Sons, shows a clever contrivance for opening and closing, by means of cords and pulleys, also a

pivot-sash for hospitals, intended to be under control of attendant only. An arrangement of levers at the side of the sash-frame is the principle adopted. We also notice a variety of bell-hanging appliances, electric, pneumatic, and mechanical, of excellent make. Sanitary paints are numerous, and shown by several firms. Decoration is not largely represented in the exhibition, but for walls, Fredk. Walton and Co.'s specimens of dados and wall-surfaces leave little to be desired, either on account of their artistic or sanitary advantages. The material is that known as the "Lincrusta-Walton." The specimen with the fillings and dados of a bronze-colour, richly embossed, and another shown in the Adams style are admirable examples of effective and cheap decoration. These are made of oxidised linseed-oil and wood fibre, and the relief is as sharp and clear as wood-carving.

Passing the Shone Drainage Co.'s exhibits, with models of the automatic sewage-ejector and flushing apparatus; we meet with a simple self-acting flush-tank in operation, made by Maguire and Son, Dublin. The firm also exhibits a plan of house-drainage and ventilation, in which the drains are laid upon an improved plan in connection with an air-shaft and inlet. The "patent safety joint-drain" is a great advance on the ordinary drain-pipe with its irregularity and imperfect jointing. In this plan, each joint is laid in a sort of cradle filled up with cement, and every other pipe has an opening for inspection. The line of pipe is kept in a true concentric position; every joint rests on a solid bearing, and is not dependent on loose ground, or the cement being run in on the lower half of socket, a solid water-tight joint is made in a part where pipes are apt to leak. The Thames Bank Iron Company exhibit a variety of warming and other apparatus. Our attention was particularly called to an improved gill stove, the peculiar feature of which is that it is formed of segments, fitting together without bolts and free to expand. The heating-surface is considerable, and the gills break with each other instead of being in a line. The stove can be set in brickwork, having cold air and warm air ducts. A large, full-size model of an apparatus for opening conservatory or laundry windows is shown. The lights comprise a top light and a side light, and both can be easily opened by rods acting on levers and arms. It can be fitted up at about 4s. a window. A cast-iron skirting, with 2in. water-pipes, and some coil columns and cases, are exhibited. The india-rubber ring for hot-water pipes is a useful means of preventing the effects of expansion and contraction.

Messrs. Wilcock and Co., Burmantofts, Leeds, have a large and very noticeable stall in the arcade. The specimens of this firm's very beautiful faience, in a variety of decorative forms, cannot fail to be appreciated for their artistic designs and pleasing shades of green and brown. The panels, friezes, string-courses, and moulded work are of very excellent manufacture; and one of the principal exhibits is a Moresque arch composed of voussoirs, arranged in a star-like shape, and relieved with a rich arabesque on the surface. These are all hand-moulded. The designs shown give a good idea of the capabilities of the material for architectural purposes. We now draw the visitor's attention to a few sanitary articles made by this firm, which show how stoneware may be applied to such things as troughs for closets, mangers, sewers, siphon-traps. Wilcock's trough closets (Holroyd's patent), possess the qualities of durability, non-absorbency, and cleanliness. They are salt-glazed, and are admirably suited for large establishments, schools, and workshops. The troughs can be made in one by socketed joints if several closets are re-

quired, the division-walls being of common or glazed bricks. A perforated flushing-pipe flushes the whole length of trough, and is placed under the rim of trough, and a valve-chest is provided for every six or twelve seats at the end of the row. The seats are of pitch-pine. The sanitary manger and cattle-trough are two valuable manufactures, and the specimen tube of 2ft. diameter, the patent gullies, and the large double siphon intercepting arrangement seen among the sanitary exhibits of the firm show the capabilities of the clay for purposes of sewerage and drainage. The next exhibitor is Mr. J. E. Ellison, of Leeds, who not only has an interesting display of ventilating arrangements on the conical-aperture principle, both for the exterior and interior of buildings, in the shape of perforated bricks, ventilating skirtings, &c., but also exhibits several forms of his air-diffuser for the admission of air to rooms. One of these is a square disc of polished wood, with the apertures formed by diagonal pieces in the form of a cross. This very simple contrivance, which any carpenter can make, is made to slide within a case or frame let into the wall in communication with the air inlet. The triangular openings formed between the case and the cross pieces become dispersers of the air. In another branch of sanitary work the Antiseptic Apparatus Co. shows a closet supplied with their patent apparatus for neutralising and destroying unpleasant gases, the principle of which we lately described in these pages. Nothing can be simpler in action, and the apparatus can be easily fitted to any closet at a trifling cost.

Messrs. Banner Bros., in addition to their well-known system, have several new inventions to record. We may draw particular attention to a system of ventilating apartments by clockwork, in which the motive-power is a small fan, which works in a case connected with the outlet, thus producing suction and expelling the vitiated air. Banner's railway-carriage ventilator is certainly a very ingenious application of the principle of the induced air-current ventilator, and its merit is that it can be applied to old carriages at a small cost, while it is extremely simple and sure in action. Mr. Banner introduces S-shaped openings over the carriage-doors, the sides of which apertures are made to project and form an oblique surface, so that, when the train is running, the inclined sides create a suctional effect at the opening by the air which strikes against them. Round the inside of carriage are rectangular tubes, with slits, for the passage of the vitiated air, and this tube, being connected with the opening already mentioned, becomes the means of drawing off the hot or respired air from the ceiling of carriage. The plan has the merit of efficiency and economy. Another invention, shown by a small model, represents a means for purifying the atmosphere of our underground tunnels. A vacuum is created by a travelling disc, by which fresh air is introduced, and the foul driven out.

Mr. W. P. Buchan, of Glasgow, has a stall in which several important modifications in drainage and ventilation are illustrated. Those who wish to become personally acquainted with the plans advocated by Mr. Buchan in the BUILDING NEWS will find an inspection of this stall an aid. The "Carmichael Wash-down Accessible Closet" is in one piece of earthenware, is an excellent and cleanly substitute for the ordinary closet apparatus, and the metal jet fan is very effective. The siphon form is extremely simple and effective; the basin outlet forms the trap, and is inserted into the lead soil-pipe. We notice also a few specimens of Mr. Buchan's "induced current ventilators," which are made of several sizes, from 6in. to 60in. diameter in the body, and of external forms to suit

soil-pipes or roofs. The systems of house-drainage and ventilation are illustrated by large diagrams, in connection with which we may notice the improved form of drain-trap, in which the water falls into the trap suddenly over a sharp angular edge, instead of a rounded edge, the effect of which is to remove all matter from the trap. The lid for cleansing or jointing, and the ventilation insured, make it one of the best in the market for simplicity and cleanliness of action. The anti-bell trap is a decided improvement on the old iron bell trap, which is constantly accumulating filth.

Messrs. Robt. Boyle and Son have a large and conspicuous stall on which are displayed a variety of forms of their well-known "air-pump ventilators." It is needless to say that Messrs. Boyle have made it their business to study every purpose for which a ventilator can be fitted. We notice several large handsomely-cased ventilators suitable for the roofs of public halls or churches, and in the leading styles of architectural design, though for ourselves we prefer the plainer and more honest forms in which the plates can be arranged, and several of these are exhibited. We notice a capital form of ventilator suitable for buildings where a down-draught is experienced; the plates are placed horizontally, and the outer casing is bevelled both top and bottom, so that a current of air impinging vertically or at an inclined angle at the top produces the desired vacuum. One model shows a case in the form of a small octagonal temple with columns and cupola, the plates being introduced in the arches of the octagon. The decoration in marbles and gold is very showy.

We must call attention to an improved form of socketed-pipe (Brookes' patent), shown by Edward Brookes and Sons, the sides having ribs cast upon them to give increased strength and better bearing; the same firm's large stoneware invert, the excellent fittings displayed by Haywood, Tyler and Co., and the tip-up lavatories and patent shower and spray shampooing apparatus, with combined hot and cold supply valves, exhibited by G. Jennings. The latter are manufactured with every requisite in a highly finished manner. A concealed urinal and a combined urinal and lavatory, and the automatic intermittent flushing apparatus and Dubois' ball-traps are all worthy of the inspection of architects and others who are looking out for improvements, elegance, and economy. J. Warner and Sons show a portable w.c. fitted with a pail below the seat which can be removed by hand, and having a tank with handle for flushing, and a self-acting valve-pan to the basin. Owen's patent trapped urinal combines lavatory, basin, and slop sink. It is siphon-trapped and ventilated. Messrs. James Stiff and Sons, Lambeth, are large exhibitors of sanitary stoneware, salt-glazed ornamental stoneware, and terra-cotta. Referring now more particularly to the sanitary exhibits, we saw a new portable drain disinfectant to be used for disinfecting drains, and another for hospital use. These are made in two different shapes of stoneware, cylindrical and conical, and chlorine-gas is generated inside and escapes by a tube from the upper end to the lower, thence discharging into the current of the drain. The disinfectant can be placed in any manhole or shaft. The end coming into contact with the sewage matter in the drain, the latter is disinfected. The firm also shows Weatherley's disconnector waste-trap, Weaver's sewer-air trap, and several good types of intercepting arrangements, yard gullies, &c. Weatherley's disconnecting and ventilating trap is a double siphon, and appears to combine the advantages claimed by several others. The terra-cotta Grecian doorhead and some architectural majolica claim the attention of architects. Messrs. Doulton and

Co., Lambeth, are well represented by a large stall crowded with Lambeth faience, the merits of which require no reiteration on our part. The sanitary exhibits are numerous, and many of them are well-known to our readers. Lavatories made in earthenware, Doulton ware, and wood, are handsome pieces of sanitary furniture. We note also a few capital slop-sinks, urinals of earthenware, closets, flush-out and trapless, valve-closets of superior make, stoneware drain-pipes, and Doulton's patent joint for pipes, the peculiarity of which is that the ends of the pipes are accurately ground at the junction, instead of having the usual socket. A circular fillet is cast on each pipe near the end, which allows of a cement joint of 3in. wide all round, the lower half of joint resting on saddle-pieces, so that settlement and breakage are avoided. The Stanford joint made by this firm, and Kenin's air-chamber floor and trap for intercepting sewer-gas and other specialties are exhibited. Sanitary forms of ironwork have received ample attention from the well-known Glasgow firm, Walter Macfarlane & Co. The exhibits occupy one of the largest allotments of room in the arcade, and the objects are sufficiently striking from their size to enlist attention. They come within five sections. We notice two or three urinals on the square and circular plans, remarkable alike for their clean sharp casting, and the attempt to make these unsightly excrescences ornamental.

Messrs. Steven Bros. and Co., of Upper Thames-street, are large exhibitors of high-class ironmongery, baths, heating apparatus, ranges, stoves, &c. We observe the patent bath and fittings exhibit practical and sensible provision for the convenience of those who use them. The hot, cold, and waste are in a small compass and do not project unnecessarily, they are easily turned by the user without getting out of the bath. The bath is made of cast-iron. We notice also an earth-closet (Moser's), a handsome electro-plated kitchener, with tiled back and sides, fitted with cone ventilators at top, to carry off the fumes from cooking, and dampers drawing from the front. The combined open and close fire and the convertible register-stove are both clever modifications. A novel kind of heating and ventilating apparatus is shown by Mr. G. E. Pritchett, F.S.A. It is one bay of a hospital ward, lined with Ree's metal tiles, and fitted with corrugated double plates, between which the hot water circulates. The heated plates are made to form a kind of dado. Fresh air is supplied at the base and is admitted warm at the required height through adjusting louvres. Heated plates along the cornice cause the ventilated air to ascend, and is carried away at the roof-level. The plates have a larger heating-surface than pipes, and occupy hardly any space, and being smooth do not harbour dust, so that the system is well adapted for fever-wards.

Messrs. J. Tylor and Sons have an assortment of valves and traps for water supply, and their patent ground-joints, doing without solder, are capable of standing high pressures. We notice also some water-meters, an automatic arrangement for registering, pumps of improved manufacture, and various other hydraulic apparatus. Architects will find the stall of Messrs. William Tonks and Sons, of Birmingham, well repay a visit. The architrave ventilators with Currall's patent, adapted by Mr. Mark H. Judge, are inexpensive means for promoting a circulation of air above doors. Other patent ventilators for fixing in chimneys, and on doors and windows, may be seen. We notice also some excellent window-fasteners, Hopkinson's door-chains and bolts for allowing doors to be partially open—worth the attention of the profession; steel sash-lines of ribbon shape (Hookham's); case-

ment stays, keyed door-furniture, &c., showing many important improvements.

In the eastern quadrant the exhibits are even more numerous than elsewhere. Messrs. W. Woollams and Co. show an assortment of wall-papers of an innocuous kind, in bright and neutral colours. They are manufactured free from arsenical pigments, and at very moderate prices. Messrs. Rosser and Russell compete well with other exhibitors in their reversible grate for smoke-consumption. It has a revolving fire-basket, so that the fire can be lighted and reversed, and the products of combustion are thus consumed. The grate has a neat and artistic appearance, and its construction commends it to the consumer. The range and boiler safeguard, and the warming and ventilating apparatus, are useful and efficient articles, and their model of glazing-bars for green-houses, &c., is certainly simple and watertight. We recently described the bars in detail. Messrs. Smith and Stevens are exhibitors of Russell's "Binate door furniture," which is made in one solid piece of wood. They also show a variety of fittings, and furniture, hot-water apparatus, coil-cases, baths, and fittings, and architects will find little in the furniture of houses, churches, or schools unrepresented. Their weathertight sill-bars and casement fastenings are specialties which call for attention. The "hook-bar" is a simple and effectual check for casements.

Passing a large display of art metal-work, we may notice Messrs. Fredk. Edwards and Sons' specimens of the new smoke-consuming slow-combustion grate, the advantages of which we recently enumerated. This grate, with its blind fitted so as to move downwards in front of the burning fuel, is a modification of Dr. Arnott's, but without the sunken ashpit. It has a neat and artistic appearance. The blind is well-managed by counterbalanced weights, which are concealed by projecting cases on each side. These are made ornamental. Sufficient coal is put on the grate to last for a day, the fire is made at the top, and the coal burns downwards. The warm air-chamber is supplied by an inlet, and before the fire is a neat fender guard, and a cinder basket and dust-trough are fitted below the grate. Economy is secured by a valve, actuated by a chain at the top of grate. Another form of grate is well adapted for infirmaries and railway-stations, and the invention is a decided step towards the abolition of smoke. Messrs. Verity Brothers' large and handsomely fitted up stall cannot fail to attract the visitor. The rapidly revolving fan or air propeller, acted on by a small jet of water, and the vertical tubes of various sizes and descriptions, which discharge the air into the room on this plan of ventilation, may be inspected in actual operation. The opening at the top of discharge outlet can be regulated at pleasure, by which the in-current can be diverted. The tubes are made also to open, to admit of a moistened sponge to cleanse the air, or of ice in hot weather to cool the air, or a box of disinfectants may be introduced. Messrs. J. Weeks and Co.'s hydro-caloric coil, lately described by us, and various other appliances for warming and ventilation, will enlist the attention of all those who are endeavouring to economise and simplify existing systems. Square and circular coils are to be seen, and we may especially draw attention to a vitiated-air extractor, in which a coil is placed below the cornice, thereby creating an up-current for the extraction of foul air. The inventors show the application of their coil to horticultural buildings. Messrs. Musgrave and Co. are the exhibitors of several slow-combustion stoves of superior manufacture, made of iron with firebrick linings. A number of handsomely-enamelled tile stoves on the same principle are shown, a hot-air

stove for placing in a brick chamber, and other exhibits, including stable-fittings.

Messrs. Benham and Sons are another large firm of exhibitors. Among other exhibitors of articles we must describe more in detail next week we may name the "Eureka" Concrete Co.'s stall, showing a large model of a stable, indicating method of laying a "Eureka" concrete sewer and invert concrete pipes, well worthy of the attention of all engineers, architects, and sanitary bodies. For paving fireproof floors, railway platforms, as well as for all architectural purposes for which stove or brick are now used, the Eureka concrete is admirably adapted. The specimens of concrete by Charles Drake and Co. show how ornamental a material concrete can be made by the admixture of marble fragments. The exhibits comprise a marble concrete bath, cast in one piece, polished; a Drake's mosaic marble jointless concrete pavement, 8ft. by 6ft., with Grecian scroll and border-lines in red, black, and white marble concrete; a specimen slab of fireproof concrete floor, with structural ironwork encased in fireproof concrete, illustrative of Drake's specialty in monolithic fireproof staircases, upper floors, and roofs; mosaic marble concrete hearth, cast in one piece to fit fireplace and fender, in various coloured marbles; mosaic marble curb fender of white marble, highly polished, and stated to cost much less than solid marble; specimen pieces of monolithic concrete walls, built with Drake's patent dovetailed self-fixing concrete building slabs; samples of floor and wall tiles and slabs in mosaic marble and granite concrete; and photographs of important buildings erected in concrete by Messrs. C. Drake and Co. The marble tiles, floor, and polished walls are worth attention. Mr. Joseph Constantine exhibits in the quadrant also his patent convoluted stove to which we lately referred at some length. Messrs. Gillow and Co. have a few admirable lavatories designed for limited space, fitted up in walnut with earthenware basins; Messrs. Potter and Sons a revolving firegrate, invented by Mr. H. Saxon Snell, the object of which is to cause a more perfect combustion of the fuel by turning the lighted part of fuel below, also the better known "Thermhydryc" ventilating, hot water, open firegrate used in many infirmaries by the same inventor; Mr. Alfred Walker shows some capital specimens of his granite and iron slag concrete for paving purposes, railway platforms, &c.; Bellman and Ivey several beautiful specimens of their scagliola for columns and architectural decoration; Crossley Brothers the "Otto" silent gas-engine, and many other exhibitors are represented whom space prevents us even from mentioning this week.

HOSPITAL AND SANITARY CONSTRUCTION AT THE SANITARY EXHIBITION.

TO the architect and sanitary engineer the western gallery at the Medical and Sanitary Exhibition presents much that is instructive and interesting. There is a collection of several valuable drawings by leading architects, illustrating the planning and construction of recent hospitals. Among those who contribute to this section we may mention the names of T. Worthington, F.R.I.B.A., Professor Roger Smith, H. Saxon Snell, F.R.I.B.A., Mark H. Judge, E. C. Robins, F.S.A., Yeoville Thomason, F.R.I.B.A., Ernest Turner, F.R.I.B.A., H. G. Brace, A.R.I.B.A., Coe and Robinson, W. Chisholm, H. H. Bridgman, A.R.I.B.A., W. Eassie, C.E., C. O. Ellison, Captain Douglas Galton, C.B. A large area of the wall of this gallery is devoted to a series of plans, drawings, and photographs, illustrating Mr. H. Saxon

Snell's designs, published in his "Charitable and Parochial Establishments," recently noticed by us. Plans of St. George's Union Infirmary, St. Marylebone Infirmary, dispensary, relief station, and casual wards, the Holborn Union Infirmary, and various other institutions of the same kind are here displayed, and may give the architect and general visitor practical information of the most recent and approved buildings of this class. A set of drawings, illustrating the plans of the Freehold Cottage Dwellings Co., designed by T. Marcus Haughton, architect, may be noticed, not for any artistic merit, but as showing the arrangement of cottages for workmen, having six or seven rooms. Several classes are shown, costing in brick from £150 to £285. In the architect's concrete the cost is put down at from £135 to £255. Details of the drainage and ventilation are shown. Those interested in the planning of town hospital wards will regard with satisfaction the plans exhibited showing the reconstruction of the University College Hospital, as designed by Dr. G. V. Poore and Mr. A. Waterhouse, A.R.A. The general plan we may describe as partaking in shape of the letter **m**, the long connecting building to the three cross-blocks forming private wards as well as a corridor. The cross-blocks contain the wards, and are on the pavilion plan. Each pavilion is complete in itself, and contains three wards. One ward, 84ft. by 25ft., provides for seventeen patients, allowing 124ft. super. to each. The beds are placed opposite, along the side-walls, with windows between, and a scullery, bath-room, and w.c. are placed at the outer end, so arranged as to get a small balcony between the projection of the closets. The middle pavilion is of like length, provides for sixteen beds, and gives 117ft. super. to each. The arrangement in other respects is the same. It is placed 76ft. from the other blocks. The right-hand pavilion is longer, and projects beyond the corridor: it provides for twenty-five patients, and gives 123ft. superficial of floor to each. The heating is by stoves and open grates in the centre of wards. Equally distant from the wards are arranged staircases projecting from corridor into the areas, and these have lifts in the well-holes. The servants' bedrooms, kitchen, operating-theatre, clinical-theatre, &c., are on the fourth floor.

The Artisans', Labourers', and General Dwellings Co. are represented by several drawings, showing houses of the first, second, third, and fourth classes, from designs by Mr. Rowland Plumbe, F.R.I.B.A., the general plans of which are pretty well known to our readers. Mr. Mark H. Judge exhibits plans also of three-roomed dwellings for artisans, the area occupied by each being the same as that of an ordinary house. The plans show two dwellings in each, with separate entrances, yard, and offices. The elevation, relieved with red brick string-courses and arches, present neat exteriors, in which economy has been studied. A detail of the fireplace trimmer-arch shows that construction has been cared for. Mr. E. C. Robins, F.S.A., contributes several plans and views of infirmaries and hospital buildings. The premiated design for Hampstead Infirmary shows the pavilion arrangement of wards. The second prize design for the London Orphan Asylum, by the same architect, adopts a plan in which the blocks are all separated on the pavilion system, and are arranged round three sides of a quadrangle or rather octagon. The boys are placed on one side, and the girls on the other. Each block contains a kitchen, day-room, lavatory, &c., on the ground-floor, above which is the dormitory, with three rows of beds. About 50 beds are provided in each, and the size is 65ft. by 31ft. In the quadrangle oppo-

site the blocks are arranged the schools, and in the centre are buildings for the swimming-baths, playgrounds, and other purposes. The design is of rather too florid a Gothic type to please us. The plan for the North Staffordshire Infirmary is a plain but effective arrangement: the wards form pavilions, and have V-shaped bay windows, enabling patients in bed to look out. We notice, also, a five-pavilion arrangement for St. Pancras Infirmary, and the author's design for the City of London schools. Messrs. Coe and Robinson show their plans for the West Herts Infirmary, also the South Devon and East Cornwall Hospital, the arrangement being on the pavilion system.

One remarkable plan and design of a hospital adapted to the site of University College Hospital, on the circular-ward system of Professor Marshall, is exhibited by Francis E. Jones, architect, of Cockspur-street, which forms one of our illustrations to-day. The wards are in four circular blocks, arranged symmetrically in connection with the central administrative block, as shown by the plans we reproduce. The system of Professor Marshall is generally known, and as the author points out, the advantage of the plan is its suitability for a confined site, such as that of the University College Hospital. Another important point claimed in its favour is that only one point in the circumference of a circular ward is as near the houses on the opposite side of the street, as the whole long side of ward on the oblong plan. The wards are also practically unobstructed as regards light and air, by the administrative building. To reduce cost in building, which "circular work" would entail, the author makes the walls hollow, the external portion being made polygonal, and the inner half-brick ring circular, which latter would be plastered. The form being circular, the wards contain more superficial feet of floor-space for a given length of wall, and consequently the cubic air-space is greater also. Mr. H. H. Bridgman, A.R.I.B.A., sends a plan section and a perspective view of the proposed hydropathic establishment at Bournemouth. The design is in a florid Elizabethan style of red brick, and shows a large square central hall with the baths on both sides, and with the principal apartments on the main fronts. The same author exhibits his design for the Camden Turkish baths.

The plans of the new Lying-in Hospital, Madras, by Mr. W. Chisholm, are interesting, as showing arrangements in tropical countries. The wards are on the pavilion system, the labour-wards are in the centre block, and covered corridors connect it with the other pavilions. Each floor is a complete unit. Contagious diseases are provided for in distinct cottages in the rear. Mr. Lawrence Booth, F.R.I.B.A., shows the plan and elevation of hospital being erected for the sick and infirm of the Salford Union at Hope, near Eccles. The design is Elizabethan in style, with a touch of Queen Anne, and the plan shows a number of pavilions, single and double, connected by a long corridor, 850ft. long, with the administration-block in the centre. The wards are for 32 beds each, and each has a day-room at the corridor end, with nurses' room and scullery. The cost is estimated at £63 per bed for 880 beds—a moderate price compared with some buildings. A superficial area of 80ft. is given to each patient, or 1,000 cubic feet of air. We also notice plans of dwellings for workmen at Salford, by the same architect. Mr. E. O. Ellison's plans of hospital for eye-diseases at Shrewsbury, designed on economical principles, and for a separation of out- and in-patients, have good points; the ink perspectives, in a Gothicised style, show a pleasing breaking-up of parts for buildings of this character. We may also

note in passing the colossal plans for the Herbert Hospital, Woolwich, designed by Capt. Douglas Galton, C.B., one of the first important buildings on the pavilion system in England; the North London Convalescent Hospital, by Professor Roger Smith; three portfolios of drawings illustrating Prestwich Union, near Manchester; the Albert Edward Infirmary, Wigan; the Liverpool Convalescent Institution; and the Chorlton Union, near Manchester, from designs by Mr. T. Worthington, F.R.I.B.A.

Details of sanitary house-construction are to be seen in several drawings. We particularly refer to Mr. Henry G. Brace's sections and details of a proposed house at Addlestone, Surrey, showing details of ventilation. In this arrangement the hall is supplied by fresh air through glazed pipes; the air admitted is heated by a coil in the hall, and then enters over the doorheads of the rooms. The vitiated air is extracted through Dr. Ball's or Boyle's ventilators into smoke-flues. Mr. Ernest Turner, F.R.I.B.A., also shows plans for house-drainage. We notice the plan of drains at the Home Hospital, Fitzroy-square, and the plan adopted at some houses at Kensington. In all these cases the author has provided open-trapped gullies at the feet of all pipes and disconnecting chambers at the junctions in the areas. Through the latter the drains are made open channels. The same architect's steam-laundry, Battersea-park, is interesting. Messrs. R. B. Grantham's and Bailey Denton's design for abattoirs exhibits an improved plan of constructing these buildings, in which iron is largely employed in the roofing. The waterproof facing bricks by Mr. Lanchester, intended to be used to face walls of porous quality; the diagrams illustrating the ventilation of theatres and hospitals, by Dr. A. Tripiet; Mr. Yeoville Thomason's plans of sanitary arrangements; F. Siemens' model of crematory apparatus; Dr. Fred. J. Monat's elaborate plans of hospital at Montpellier, now erecting for 600 beds, besides other diagrams, will be examined with the attention they deserve. Sanitary construction and hospital architecture are here brought together in a more complete manner than we have hitherto seen, and we trust the present exhibition will be the forerunner of others of a more comprehensive kind.

THE GLASGOW MUNICIPAL BUILDINGS.

AFTER much disappointment, delay, and lengthened discussion, the Lord Provost, Magistrates, and Council of Glasgow have issued the conditions for a new competition, the text of which will be found in our advertisement pages. Most of our readers know the barren result of the first competition last year, the very limited margin of expenditure which fettered the selection of Mr. Charles Barry, the referee; and the general disappointment felt when it became known that some of the ablest designs were left out in the cold, not from any defect or demerit in their plans, but because they exceeded the cost imposed of £150,000. This misadventure was chiefly owing to the requirements of the Council exceeding the sum they intended to spend, and the framers of the new competition have wisely increased the limit of cost to the sum of £250,000. It would be of little use now to discuss the various suggestions which have been made by competitors with regard to a new competition, or to express the disappointment felt by many engaged in the last contest who achieved a high place, and who not unnaturally have asked that their labours and claims should have been acknowledged in a new trial of strength. It certainly appears a hardship that the best of the designs have gone unrewarded, and

that their authors have, if they enter the field again, to begin *de novo*, though on the whole the authorities have done wisely, we think, in deciding upon an open competition.

The proposed division into two competitions—one of sketch designs open to all, and another a final one, limited to the authors whose sketches shall have been selected by the assessors, will, we believe, meet with approval from all architects. It has been determined by the Council to appoint the assessors at once, and, we understand, Mr. Charles Barry and Mr. Carrick have been appointed to advise. We think a third assessor would be a source of strength. The functions of the assessors will be to select from the preliminary designs those authors who shall be invited to compete in the final competition, and to advise the authorities in the final selection of the four best designs, having regard to the cost and the estimates submitted. It is said that separate conditions will be issued for the final competition, though they will be in strict accordance with the above, but with additions suggested by the results of the first. We hope the second conditions will not needlessly alter or add, or the effect will be that the excluded competitors will have a fair right to complain of what they may justly call a new competition of a very limited number. It is to be hoped the Town Council will be guided by the assessors completely in this respect, and make up their minds to adhere closely to the conditions they have laid down. We may just glance at a few of the principal of the requirements, and, at the outset, we may congratulate the Council on clauses 11 and 12 of the new conditions. The diagram plans prepared by the city architect, to be supplied to each competitor, are not intended to control the designs in any way. They may be altered, as to internal arrangements and accesses, as each competitor thinks fit, and are to be considered merely as indicating the general departments. In the preliminary sketch-plans these departments are to be distinguished by colours similar to those used in the diagram-plans, and this requirement will aid much the assessors and those who may have to compare or criticise. We take exception to clause 7, which says:—"In order to obviate the possibility of the sketch-designs lodged in the preliminary competition being made use of by competitors who may be invited to enter into the final competition, such sketch-designs will not be allowed to be seen by anyone except the assessors to be appointed by the magistrates and council, by whom they will be returned direct to their respective authors." We scarcely see the advantages to be gained by excluding public and professional criticism, especially with regard to the first competition, which this clause is intended to do. Of what use can those who enter into the final competition make of sketch-designs which have been excluded for some inherent defect or shortcoming known to the assessors? If the clause means that a final competitor might unfairly avail himself of any arrangement of merit he has seen by a preliminary competitor, all we need observe is that that preliminary competitor ought to be found in the final selection of authors, and not be excluded, and the clause 25 becomes superfluous. The conditions would have been stronger and better without this clause. As to scale, the adoption of 20ft. to the inch for the general sketch-plans, elevations, and sections is sufficient probably; but why have these drawn to 20ft. to the inch, and the final drawings to a scale of 8ft. to the inch? Why adopt a decimal division in one case and not in the second? If 10ft. to the inch had been named as the scale for the final drawings, we could have understood the preliminary scale, and the first sketch-designs would have then been

just half the scale of the others. Again, if 8ft. to the inch is to be the scale in the second competition, why not make the preliminary scale just half that, or 16ft. to the inch? A 20ft. to the inch scale is certainly small. We are glad to find that a perspective view, taken on a picture line determined on the block plan, is included in the sketches, and that the size of the perspective has been limited, so that the building itself shall not occupy a greater width than 10in. We are also glad that pen-and-ink sketches, without colour, have been decided on, and that the question which gave rise to a controversy in the BUILDING NEWS respecting the admissibility of flat washes or line shading to the window-openings in the last competition, has been set at rest by allowing competitors to use a flat wash of India ink in the door and window openings, and in the roofs. Only outline elevations with such washes will be admitted. It is a pity the conditions have not made it necessary for competitors to show any details. A detail of any part of a building is a better test of competency than an elevation drawn to small scale.

The other technical requirements are generally clear: the ground-floor level is to be about 2ft. above the ground at the centre of the George-square façade, and about 1ft. above the street-level at the centre of the John-street façade. The site, as our readers know, is on the east side of George-square. Stress is laid on proper provisions for warming and ventilating the building, and details of all sanitary requirements are to be supplied by the competitors in the final test. With reference to the question of style, no restrictions are imposed; but preference will be given to Classic, which it is suggested should be treated in a broad and dignified rather than in a florid manner. This statement is, at least, satisfying, as it allays any doubt as to the intentions or proclivities of the assessors on this point, though the gentlemen selected to fill the onerous post are not likely to influence strongly nor prejudicially the tastes of competitors, as would have been the case if other eminent architects had been chosen whose sympathies are more pronounced.

The external fronts are to be of stone, and the freestone quarries of Dunmore, near Stirling, have been suggested as affording a hard and compact freestone somewhat harder than good Portland stone. An approximate estimate is to be sent in with each design, to which adherence will be required. Not fewer than six, or more than ten, of the preliminary designs will be selected, the authors of which will be invited to enter into the final competition. Each of these will be paid the sum of £150 towards his expenses, providing he comply with the final conditions prescribed. This is a small and inadequate payment for even a sketch-plan, and might have been increased to £200. Condition 27 is questionable. It makes it imperative that, until after the final award has been made and officially published, no drawings or descriptions of any of the designs are to be sent to any member of the council or to the public, nor is any exhibition of the designs to take place. Why this strict exclusion of the public or the press is to be enforced is not very evident, nor do we think the prohibition of private canvassing will effectually debar those who resort to such dishonest means of obtaining notice; and to enjoin that no canvass of magistrates or assessors is to be made seems almost unnecessary. We merely add that the preliminary designs are to be sent in on the 30th day of November next. We hope for a better result for all concerned than last year; but, as may be gathered from our preceding remarks, we cannot remain blind to certain defects in the new conditions, which may produce undesirable consequences.

THE ST. PAUL'S ECCLESIOLOGICAL SOCIETY AT ROCHESTER.

THE second session of St. Paul's Ecclesiological Society was closed on Saturday by an all-day visit to Rochester. Between forty and fifty members took part in the excursion, which proved a very interesting and pleasant conclusion to the year's meetings. On leaving Rochester-bridge Station, the *Guildhall* was the first place visited. It is a red-brick and tiled building, erected in 1687, and containing in the principal apartment (the magistrates' room) some panelling, a good coved and plastered ceiling, and a series of eleven full-length portraits of local celebrities, from Sir Stafford Fairbairn, William III., and Queen Anne to the late Sir F. Wykeham Martin, M.P. The *Corn-hall*, a little further up the High-street, has a clock, the gift, as an inscription sets forth, of Sir Cloudesley Shovel, 1706; the present exchange was built from the designs of Messrs. Flockton and Abbott, of Sheffield, in 1871, and is lofty, well lighted, and of pleasing proportions. The *House of the Six Poor Travellers*, immortalised by Dickens, awakened much interest. It is a charity founded by will by Richard Watts, 1579, by which six poor travellers, not being rogues or proctors, receive gratis for one night lodging, entertainment, consisting of $\frac{1}{2}$ lb. meat, 1 lb. bread, and $\frac{1}{2}$ pint of beer, and in the morning 4d. each. The building is solidly constructed, of stone, in two stories; the front-rooms are the curator's apartments, and behind these are, on each floor, three cubicles, white-washed and well scrubbed, and provided with a bed; the upper tier is reached by a narrow gallery. The building was modernised by the substitution of plate-glass for lattice windows, and otherwise restored, about four years since, and the books showed that the charity is constantly made use of. On the High-street several picturesque half-timbered houses were seen, the finest example being a group on the north side, illustrated by a sketch from Mr. Owen W. Davis's pencil in the BUILDING NEWS for Aug. 18, 1871. *St. Bartholomew's Chapel*, on the boundary line between the High-streets of Rochester and Chatham, was seen under the guidance of the Rev. John Bailey, the hospital chaplain. The building consists of small nave with north aisle, north transept, chancel, and apse, and from the exterior gives no promise of archaeological interest, as the west front, and bell-turret, the south wall, and the tiled roofs are all painfully modern and fresh-looking. The Rev. J. Bailey explained that the chapel was founded as an adjunct to lepers' hospital by Bishop Gundulph, but was built by his successor, Bishop Ernulf, both of whom were greatly concerned in the building of the cathedral, the actual work being carried out by a monk, Hugh de Cliffe. When leprosy ceased to exist, the hospital which adjoined on the north was pulled down, and from about the time of Elizabeth the chapel was sub-divided into lodging-houses, and there was every prospect of its destruction. About 120 years ago it was restored to its old uses, and a few years since the late Sir Gilbert Scott, R.A., prepared a report on the building, in which he stated reasons for believing that the flat wooden lintels to the deeply-played windows on south side were the original ones of the 11th century, and were devised in order to leave space for the lean-to building, of which there were clear traces on this side, and in which it was probable the lepers gathered to hear the service. The chapel was partially restored under Sir Gilbert's care, the old carved chalk-stones found in the windows, &c., being replaced and used as guides for the new stonework. The semicircular recess at eastern end was found to be a true apse, domed in concrete, and formerly had a stone bench round it as in basilicas; this apse had since been decorated in colour by a member of the congregation. The old cottages by which the chapel was built round were removed, when it was seen that the window-recesses had been used as cupboards, bearded upon the interior of the chapel, and that a stove projected into it. The sedilia, having Purbeck shafts, had been opened out, and an organ, rather too large for the building, was put into the north transept; the north aisle was entirely modern. Further restoration was contemplated, including erection of permanent vestry, and also the laying out of the grounds. The funds having increased, a new and large hospital of St. Bartholomew was built in 1862,

on the adjoining hill-side. The whole of the afternoon was spent in

THE CATHEDRAL.*

The party were received under the central tower by the Dean, who welcomed them to the place, remarking that though Rochester was neither one of the largest nor most beautiful of our cathedrals, it would be found to contain a great deal of Late Norman and Early English work; but, curiously enough, very little of the intervening work from the 13th to the present century.

The Rev. Canon Scott Robertson, of Canterbury, said the Saxon history of Rochester, from its foundation and onwards, was better known than that of any other see, but no pre-Norman remains were known to exist, unless the theory of Mr. J. H. Parker, C.B., was admitted, that the massive pillars with unchanfered caps at the west end of the crypt dated from before the Conquest. Personally, he believed they must begin with the work of Bishop Gundulph, who held the see from 1077 to 1108, and who also built the White Tower of London, and Malling Tower, near Maidstone. Here, at Rochester, he built a complete church, of which the outer shell of nave had been shown by Mr. Irving, the clerk of works under Sir Gilbert Scott, to remain, in great part, as high as the triforium level. Gundulph was succeeded by Ernulf, who had been Prior of Christ Church, Canterbury, and then of Peterborough, in both of which places he carried out great works; here he carried forward the nave, built the former chapter-house, and from architectural evidence we believed that he built the present rich west front during his occupancy of the see, 1115-20. In 1137-8, the church and monastery adjoining were so burnt that the monks were dispersed, being without shelter, but they returned ten years later, and the Bishop Walter, of that time, greatly pushed forward the work of repairs. The chronicles again contained a most puzzling statement, for, in 1177, we were informed, a second fire reduced the church "to a cinder." The statements appeared to show that the place was utterly consumed; but the members had only to look around them on the rich Transitional Norman work of the nave to see that this must be accepted with a certain amount of reserve. There was, at all events, an extensive restoration necessary, of which Mr. Irving found numerous traces in the south transept, but which he was unfortunately obliged to sweep away. In the nave down which they were looking many peculiarities were noticeable; for instance, upon each pier there was a vaulting shaft carried to level of the triforium floor, but although there were traces of the upper portion of these shafts having been removed, the intention of vaulting the nave with stone was never carried out. The triforium gallery, once very perfect, had been blocked up by Sir Gilbert Scott, who considered this action necessary to insure the stability of the fabric. The tympana of the triforium openings were filled in with varied and exceedingly rich diapering and shields, &c., to which there was no parallel, except some carving at Canterbury, known to have been done about 1236, and this convinced the speaker that the ornamentation was of a much more recent period than Ernulf's constructional work. The clerestory above the very appropriate open-timbered roof, and the great eight-light western window, were additions of the fifteenth century to the nave. Not only was this roof once richly coloured, but the whole of the triforium surface was formerly picked out in green, red, and yellow. If they examined the aisles, they would there find that on the north much more elaborate than that on south side, and the eastern bay to north was blocked up by a huge mass of masonry. The reason for this was that the north aisle was reserved for the use of a parochial congregation from the time of Gundulph till 1121, when a church was built parallel to, and a little north of, the cathedral, a church which was rebuilt as we now saw it in 1521. The blocking up of the eastern bay of nave was in order to shut the parochial service off from that of the cathedral, and also to furnish space for the sedilia, &c. Even after the new church was built the parochial clergy had the privilege of bringing their weekly procession

of the Host through the south-east door of their church, across the cemetery-ground, and entering the cathedral by a door in the north transept, proceeded down the north aisle to a doorway now blocked up near the north-west angle. In 1201 a pious Scotch baker named William was murdered by his servants while travelling at Chatham; the monks of Rochester gave the body burial, and found it a very profitable undertaking, as immediately afterwards miracles began to be performed at the tomb, and streams of wealthy pilgrims were drawn through the city. A shrine to St. William was erected in the south-east transept, and with the pilgrim's offerings the two eastern bays of nave, the great transepts, and the choir were rebuilt. The new work was of a beautiful type of Early English, in which Purbeck marble shafts were freely used. The new work apparently began, according to the chronicles, with the great north transept; the new choir was opened, they knew, in 1227, but was not completed till twenty years later. He ought to have mentioned that Gundulph had built a tower on the north side to east of transept, of which ruins still stood; while, on the south side, beneath the floor, Mr. Irving found foundations of a sunken tower. These Mr. Irving thought to have been towers of defence in connection with the city wall, which he believed crossed the cathedral site, just to east of central tower arch; but the speaker did not concur in this theory. The records stated also that in 1343 Hamo, of Hythe, caused the campanile to be raised with stone, timber, and lead, and put four bells in it, and this upper part of tower, and the wooden spire which formerly surmounted it, was, they knew, removed by Mr. Cottingham for the present not altogether satisfactory tower rather more than half a century since. Three eastern bays of south aisle to nave, they would see, had been greatly extended, so as to form a chapel of St. Mary. This adjunct, which was first mentioned in 1399, formerly had a stone bench running completely round it, so that the only entrance was at the east end. He ought also to mention that they would find in the choir-stalls some of the earliest woodwork known to exist; it was of plaie, but good, Early English character, and dated from about 1227.

Mr. J. T. Micklethwaite, F.S.A., of Westminster, referred to the work of restoration and exploration so long carried on by Mr. Irving, and more recently by Mr. St. John Hope. The division of the Saxon and Norman church into a monastic and secular portion, as at Rochester, was a very usual arrangement, but one which almost invariably led to clashings of processions and strife, and frequently resulted, as here, and at Winchester, Westminster, &c., in the erection of a small church, close to the minster. This parochial adjunct, and the great cemetery, were nearly always to north of the minster, the reason being that the monastic buildings being on the sunny side, the chief approach for lay persons was on the opposite side of minster, and in order that these people might offer prayers for the dead the burials were made on that side. Since the monks, as part of their duty, said prayers for deceased brethren, this publicity was unnecessary in the case of their graves, and they were accordingly buried at the east end of the minster. The prevalent notion that the monks used the cloister garth for burials was erroneous. They often buried close to the chapter-house entrance, and so the east and south walks of cloisters contained the earliest graves known to exist, but the western and northern walks were not so used till much later times. In the 13th century the practice of burial in the church itself commenced. He believed the parochial altar, in the north aisle, before St. Nicholas' Church was built, was on west side of the two Early English bays now forming the eastern part of the cathedral nave, and a choir screen, like that still to be seen in St. Alban's nave, crossed the nave at this point. Upon this screen it was usual to place, not a rood or cross, but the small organs then in use, so that the custom of setting up an organ at the tower crossing had Medieval precedent. The detailed history of this building was exceedingly complicated, not only on account of the great fire said to have destroyed the fabric, but from which a great deal of earlier work appeared to be still preserved to us; but because of the many attempts at ornamentation or enlargement begun in many parts by successive designers, and presently allowed to drop, apparently be-

cause funds failed. When sufficient money came in, the fashion had changed, and a new scheme was in turn commenced and abandoned.

Mr. Micklethwaite then conducted the visitors throughout and round the cathedral, offering explanations at the leading points. Beginning with the crypt, which extends under most of the choir, he showed the earliest work now left in the western portion. The eastern part of crypt consists of six alleys of comparatively slender columns, with Early English bell mouldings to caps. On the north side are a great number of fragments of carving found during the progress of restoration of the cathedral above, and including some censuring angels, and the Virgin Mary being crowned by her Son—work of about 1310—large portions of an Elizabethan tomb, some Late tabernacle woodwork, &c. The carved stones are arranged on boards, quite unprotected from the depredations of unscrupulous visitors, and Mr. Micklethwaite, in commenting on this seeming want of care, mentioned that a lady who recently visited the cathedral, wishing for a relic, carried off the head of a figure from this crypt museum in her mouth. Returning into the cathedral, attention was drawn to the Early English architecture of the great transepts, and the party passed into the choir, where the remains of the 13th-century woodwork were closely examined. The old desks are marked by trefoiled openings carried by very low shafts, not more than 18 in. high, including heads and octagonal bases; greater height was then unnecessary, as they were not used for books. We owed the preservation of these unique examples to the fact that they were encased by the 15th-century builders and used as a ledge; during the last ten years they had been opened out, but he regretted that in so doing they were removed from their original positions. On the previous day he found in a coalcellar in one of the neighbouring houses a piece of wood, which although rotten, could be preserved and replaced as one of the elbows. The singular diapered pattern on the walls was in glaring colours and not very harmonious to our eyes, but was a portion of the original decoration. To the east and north of the presbytery was seen a 14th-century bishop's monument, in alabaster, richly gilt, much after the fashion of the De Valance tombs at Westminster Abbey, although not in Limoges enamel; the deceased is represented on the effigy as clad in the chasuble, without aumbray, but with rich dalmatic, amiss, and maniple, and having a pastoral staff with napkin attached. At the east end, Sir Gilbert Scott's restoration was freely criticised by members, especially the lowering of floor, which was stated, however, now to correspond with the old tile matrices; the want of breadth in the new reredos and high altar, which Mr. Micklethwaite said, seemed to be set too far eastward, judging from the position of the sedilia. On the north wall, close to the east end, remains a very perfect stone lavatory. On the high altar were seen a pair of candlesticks of the time of Charles II.

The members then went up into the tower, where in a treasury they were shown numerous silver-gilt articles of plate, &c. The principal patera of silver-gilt was pronounced by Mr. Micklethwaite to be a domestic fruit-dish of the 16th century, and the chalice to be not later than 1530, the hexagonal stem and base indicating a survival of a pre-Reformation form. It was stated that the existence of this old plate was not generally known, and that it was never used. Returning to the great south transept Mr. Micklethwaite said that the beautiful doorway on the east side was not originally the chapter-house entrance although now known by that name, and leading to the chapter-house; but it was the monks' principal approach from the cloisters. The elaborate carvings on the sides had been rendered unmeaning by some restorer; originally, they showed female figures, one representing the Synagogue with the Law slipping from her hands, the other, the Church holding a model church and a cross, but the latter statuette had been recarved with beard and mitre, and now did duty as a bishop. Passing through this doorway, the present chapter-house, an oblong chamber of no great interest, was seen; and the visitors descended a flight of steps into a garden, made over the western portion of the original chapter-house. It communicates with the cloisters by three richly-treated Transitional arches now blocked up; and upon the walls are remains of intersecting arcading. Returning westwards, the

* The west portal of Rochester Cathedral was illustrated in the Building News for June 24, 1870. Sketchbook Series No. 33), and the new stalls in nave, executed from Mr. J. P. Seldon's design, on Oct. 21, 1852.

remains of the east walk of cloisters, a series of arcades of elaborate 12th century character, were examined. A walk round the cathedral and a somewhat cursory examination of the Prior's and College-yard gateways to north and south of the Close, completed the inspection, which had been of an exhaustive character. *St. Margaret's Church*, next seen, under the leadership of Mr. Ford, has been rebuilt, with the exception of the 14th-century west tower, in a pseudo-Italian style, and was restored about forty years ago by Mr. Hussey, and more recently by Mr. Gordon Hill. The most interesting feature is a so-called palimpsest brass, engraved on both sides with a portrait of one Thomas Codd, vicar of the parish, who died in 1440; it is inclosed in a modern oak frame, locked up, and is placed on the east wall of nave. A short visit to the *Castle** concluded the day's proceedings.

PRACTICAL NOTES ON PLUMBING.—VI.†

By P. J. DAVIES, H.M.A.S.P., &c.

SOLDERING BRANCH JOINTS.

IF you require to solder small branch joints without irons, fix them as at Fig. 22, Chap. V., in which you will see a block, B, placed under the joint (which must not be too high), the object being to block up the joint so that you can wipe clean round the bottom of the same. Neither must it be too low, but just sufficient to keep up the heat. A good height for $\frac{1}{2}$ in., $\frac{3}{4}$ in., and 1 in. joints is a piece of wood $\frac{1}{2}$ in. by $\frac{1}{2}$ in., and from 4 in. to 6 in. long, or, in other words, the bottom of the solder-line E (Fig. 22) should be kept up from the floor, &c., $\frac{1}{2}$ in. of an inch (see end view of Figs. 29 and 30), one a soil-pipe, the other a lin. pipe; this will answer for almost any joint. After this, proceed thus: Take the solder (two of lead and one of tin), and with your splash-stick splash all round the top part of your joint (Fig. 22) at A P, also round F D; keep at this as fast as it will hang together until you have shaped the joint, or as well as you can with the splash-stick; the heat may be kept up by splashing an inch or more beyond the soiling. Now, when you can feel the lot to be in a semi-fluid state, take the cloth (which your mate has made hot over the solder) in your left hand and wipe all round the top part and left-hand side of the joint from P to K, then round the bottom and centre part as at G; bring this round to the line F K; next take the cloth in your right hand, and as "quick as thought" wipe the top part of the right-hand side, or round P C K; then J G L, also the bottom, and then as a finish wipe down from K L, and off at F. If you work quickly, you may do it without showing the marks of your cloth when coming off.

Should your solder be rather coarse, it would be best to use yourself to first wipe clean round the top part of your joint from P C K to J G L, and finish as you go down the joint. By the bye, you may notice one very peculiar phenomenon in joint-wiping, viz., that the solder sets first round the top part of branch joints, which at first sight appears strange, and you will probably think that because the heat ascends that the top solder is the hottest part, but this is not the case; the truth is, the lead has taken up the heat, and the body of the heat is in the centre of the joint. For this reason always wipe the outer edge first, *unless you can do all at once*.

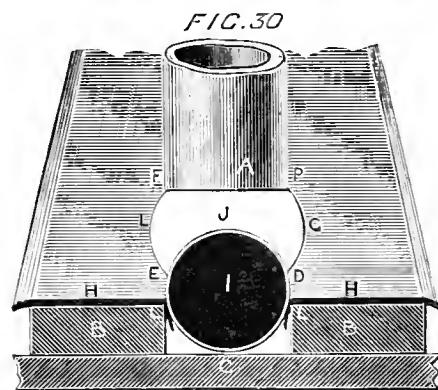
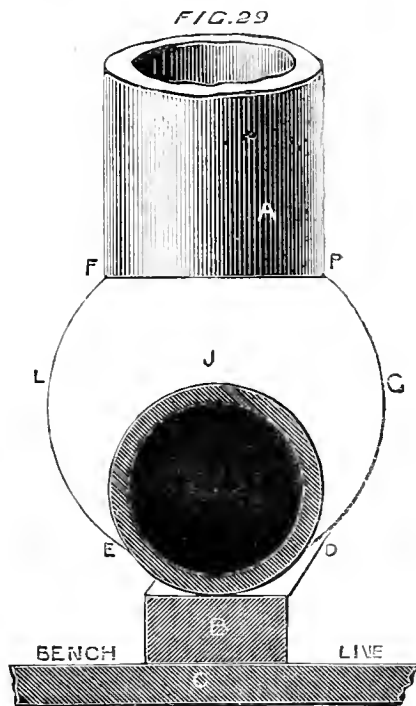
Fig. 27. This diagram shows the joint finished, but cut in half at the solder B G, as also the bottom part of the pipe. This is as the solder should be when finished, i.e., even in thickness, and strongest across the joint at B.

Fig. 29 shows the end view elevation of the joint and the solder on the sides; that is, true and round where the strength is required. It also shows the blocking up of same ready for wiping.

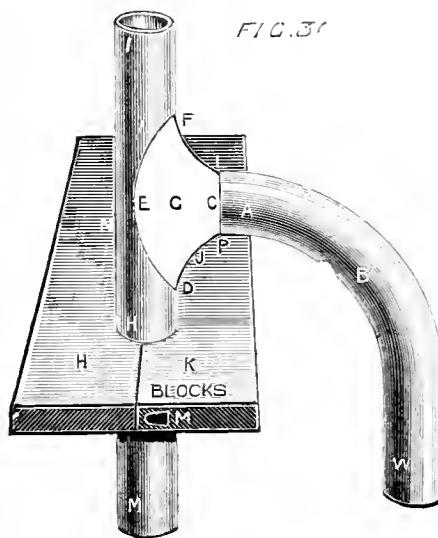
Fig. 30 shows that instead of a block being put under the bottom of the pipe, two bricks or other packing (a few pieces of sound boarding here are handy) are required on the top of these. Place two or three thicknesses of newspaper as shown at H H, tuck it between the side of the pipe

and packing as at L L, in this diagram, to prevent the solder from running through.

Let us again examine Fig. 27. This is a joint made on the slope. When wiping it splash on the solder as you did Fig. 22, but when



wiping, first shape the back part from P to D. When the pipes lie at such an angle that you



cannot get the fingers and cloth between them, wrap a piece of fustian or old cloth round a

small stick, a suitable size for going between the pipes and wiping this part; then finish the two sides and come off from F to B, keeping this rounded as shown by the dotted lines. Of course, the sides of this joint should appear like those in Figs. 27 and 29.

WIPING BRANCH JOINTS—HORIZONTAL INTO UPRIGHT.

Fig. 31. This joint can be made by an expert workman in its place, but three-fourths of the plumbers cut the upright pipe in order to bend it, so that they may make it on its back. It, however, should be made as follows:—Having prepared the joint as other branch joints, fix the collar, or board blocks, as shown at H K, about $\frac{1}{2}$ in. below the shaving line, then splash your solder well up the soiling and prepared part of the joint, get your solder to the usual working point, and then with a warm cloth wipe from about midway on the other side of the joint, and up over the top L F to about E G C, taking care to keep it round; place your hand under the branch and work the joint from where you began, round the bottom and up to C G E, and off at E. The art of wiping this, as all other joints, is *quickness* without weakness of the nerves. Try one or two by way of practice, and you are sure to win.

I give this hint to these who have declared it to be impossible. Many good plumbers wipe their joints without shifting their cloth from one hand to the other, but I prefer to use both hands.

(To be continued.)

A RAILWAY AT LESS THAN £5,000 PER MILE.

MESSRS. Cornelius and George Lundie, civil engineers, Cardiff, have issued a pamphlet showing how a railway could be made, suited to the requirements of Central Northumberland and the North-Eastern corner of Roxburghshire, at a cost of less than £5,000 per mile, with a prospect of a fair return of profit on the outlay. The line of railway they propose is from Rothbury to Kelso, by way of Thropton, Lorbottle, Whittingham, Clanton, Wooperton, Lilburn, Middleton, Wooler, Akeld, Kirk Newton, Kilham, Paston, Yetholm, Primside, Morebattle, Kalamouth, and joining the North-British Railway at the Heiton Sidings at the south end of Roxburgh Bridge, and probably to traverse the existing North British Railway by means of a mixed gauge to the Kelso Station. The distance from Rothbury to Heiton Sidings, by this route, is about 47 miles, and to the Kelso Station nearly 50. Such a railway would serve a district having an area of about 200,000 acres, of which nearly one half is inclosed and arable land, and the remainder upland pasture. They estimate the annual value of the traffic at £24,500, of which £5,000 is put down under the head of passengers, parcels, and general merchandise. Assuming that 50 per cent. of the gross earnings will cover the working expenses, £12,250 would be applicable to dividend, which, capitalised at 5 per cent., will give £245,000 as the amount that may safely be expended on the railway. They believe that a single line of railway, on the three feet gauge, with gradients not steeper than one in fifty, and with fairly easy curves, well laid with strong steel rails and suitable sleepers, could be made at a price that would fulfil the required conditions. The financial limits, they urge, indicate that a single line on the three feet gauge would prove a self-supporting and fairly profitable concern, and, on the other hand, it does not appear to them that anything greater ought to be attempted. No gradient steeper than 1 in 50 would have to be encountered by the working trains; and locomotives of the greatest power that could be worked on a three-feet gauge might be used, and run at a speed of 25 miles an hour. A break of gauge, they say, is not to be desired; but in this case the question seems to be—Will the district accept a three-feet railway with this disadvantage, or will the inhabitants be satisfied to remain for an indefinite period without a railway of any kind, in the hope that posterity may by some means be supplied hereafter with a railway of the ordinary gauge? The estimated cost of the line is put down at £4,000 per mile, including land.

* The interior of Rochester Castle was illustrated in the *Building News* for Feb. 11, 1879, as No. 18 of the Sketchbook Series, from a drawing of Mr. E. Skewitt.

† All rights reserved.

BUILDERS OF GREAT BRITAIN.

in the undermentioned Towns.

1st July, 1881.

TABULAR STATEMENT of the State of Trade, and the Labour Market, July 1, 1881.

TOWN. State of Trade. In What Branch. Supply of Labor. In What Branch.																
Summer. Rate per wk. per hour.				Winter. Rate per wk. per hour.				Summer. Rate per wk. per hour.				Winter. Rate per wk. per hour.				
54	4 1/2	5	48	4 1/2	5	54	5 to 5 1/2	54	5 to 5 1/2	54	5 to 5 1/2	54	5 to 5 1/2	54	5 to 5 1/2	
49 1/2	5	42 1/2	5	54	5	47 1/2	5 1/2	54	5	54	5	54	5	54	5	
49 1/2	5	42 1/2	5	54	5	47 1/2	5 1/2	54	5	54	5	54	5	54	5	
49 1/2	5	42 1/2	5	54	5	47 1/2	5 1/2	54	5	54	5	54	5	54	5	
54	4 1/2 to 5	48	4 1/2 to 5	54	4 1/2 to 5	48	4 1/2 to 5	54	4 1/2 to 5	54	4 1/2 to 5	54	4 1/2 to 5	54	4 1/2 to 5	
55 1/2	5	44 1/2	5	50	5	44 1/2	5	50	5	50	5	50	5	50	5	
54	24 wk	40 1/2	20 Sw	49 1/2	6	48 1/2	6	54	24 wk	47 1/2	21 wk	54	24 wk	47 1/2	21 wk	
48 1/2	5 1/2	45 1/2	5 1/2	51	5	47 1/2	5	51	5	51	5	51	5	51	5	
54	5	47 1/2	5	51	5	47 1/2	5	51	5	51	5	51	5	51	5	
49	20 1/2	44	18	20	49	24 wk	44	22 wk	49	26 wk	44	24 wk	49	26 wk	44	24 wk
56 1/2	4	50 1/2	4	56 1/2	3 1/2 to 4	50 1/2	3 1/2 to 4	56 1/2	3 1/2 to 4	50 1/2	3 1/2 to 4	56 1/2	3 1/2 to 4	50 1/2	3 1/2 to 4	
56 1/2	5	51 1/2	5	56 1/2	4 1/2	51 1/2	4 1/2	56 1/2	4 1/2	51 1/2	4 1/2	56 1/2	4 1/2	51 1/2	4 1/2	
60 to 70	4	54	4	70	3 1/2	54	3 1/2	70	4	54	4	70	4	54	4	
54	4 to 5	50	4 to 5	54	4 to 5	50	4 to 5	54	4 to 5	50	4 to 5	54	4 to 5	50	4 to 5	
56 1/2	15 1/2	56 1/2	15 1/2	56 1/2	15 1/2	56 1/2	15 1/2	56 1/2	15 1/2	56 1/2	15 1/2	56 1/2	15 1/2	56 1/2	15 1/2	
49 1/2	5	41 1/2	5	49 1/2	5	45 1/2	5	54	5	47 1/2	5	54	5	47 1/2	5	
58	4	47 1/2	4	58	4	47 1/2	4	58	4	47 1/2	4	58	4	47 1/2	4	
55 1/2	4	55 1/2	4	55 1/2	4	55 1/2	4	55 1/2	4	55 1/2	4	55 1/2	4	55 1/2	4	
56 1/2	4 1/2	54 1/2	4 1/2	56 1/2	4 1/2	54 1/2	4 1/2	56 1/2	4 1/2	54 1/2	4 1/2	56 1/2	4 1/2	54 1/2	4 1/2	
48 1/2	6	46 1/2	6	54	6	46 1/2	6	54	6	46 1/2	6	54	6	46 1/2	6	
51	4 1/2	46 1/2	4 1/2	51	4 1/2	46 1/2	4 1/2	51	4 1/2	46 1/2	4 1/2	51	4 1/2	46 1/2	4 1/2	
54	4 1/2	54 1/2	4 1/2	54	4 1/2	54 1/2	4 1/2	54	4 1/2	54 1/2	4 1/2	54	4 1/2	54 1/2	4 1/2	
54	4 1/2 to 5 1/2	44 1/2 to 5 1/2	4 1/2 to 5 1/2	54	4 1/2 to 5 1/2	44 1/2 to 5 1/2	4 1/2 to 5 1/2	54	4 1/2 to 5 1/2	44 1/2 to 5 1/2	4 1/2 to 5 1/2	54	4 1/2 to 5 1/2	44 1/2 to 5 1/2	4 1/2 to 5 1/2	
49 1/2	5	47 1/2	5	54	5	47 1/2	5	54	5	47 1/2	5	54	5	47 1/2	5	
59 1/2	3 to 3 1/2	57 1/2	3 to 3 1/2	59 1/2	3 to 3 1/2	57 1/2	3 to 3 1/2	59 1/2	3 to 3 1/2	57 1/2	3 to 3 1/2	59 1/2	3 to 3 1/2	57 1/2	3 to 3 1/2	
65	3 1/2	48	3	65	3 1/2	48	3	65	3 1/2	48	3	65	3 1/2	48	3	
56	5	50 1/2	5	56	4	50 1/2	4 1/2	56	5	50 1/2	5	56	5	50 1/2	5	
51	4	54	4	51	4	54	4	51	4	54	4	51	4	54	4	
49 1/2	4 1/2	49 1/2	4 1/2	49 1/2	4 1/2	49 1/2	4 1/2	49 1/2	4 1/2	49 1/2	4 1/2	49 1/2	4 1/2	49 1/2	4 1/2	
49 1/2	5	42	4 to 4 1/2	49 1/2	5	42	4	49 1/2	5	42	4	49 1/2	5	42	4	
51	4 to 4 1/2	45	4 1/2	51	5	42	5	51	5	42	5	51	5	42	5	
50 1/2	4 1/2 to 5	40 1/2	4 to 5	50 1/2	4 1/2 to 5	40 1/2	4 to 5	50 1/2	4 1/2 to 5	40 1/2	4 to 5	50 1/2	4 1/2 to 5	40 1/2	4 to 5	
51	5	44 1/2	5	51	5	44 1/2	5	51	5	44 1/2	5	51	5	44 1/2	5	
56 1/2	5	51 1/2	5	56 1/2	4 1/2	51 1/2	4 1/2	56 1/2	5	51 1/2	5	56 1/2	5	51 1/2	5	
56 1/2	3 1/2	44 1/2	3 1/2	56 1/2	3 1/2	44 1/2	3 1/2	56 1/2	3 1/2	44 1/2	3 1/2	56 1/2	3 1/2	44 1/2	3 1/2	
56	4 1/2	44	4 1/2	51	5	44	5	51	5	44	5	51	5	44	5	
52 1/2	5	44	5	52 1/2	5	44	5	52 1/2	5	44	5	52 1/2	5	44	5	
55 1/2	4 1/2	53	4 1/2	55 1/2	4 1/2	53	4 1/2	55 1/2	4 1/2	53	4 1/2	55 1/2	4 1/2	53	4 1/2	
49 1/2	22 wk	47 1/2	21 wk	49 1/2	22 wk	47 1/2	21 wk	49 1/2	22 wk	47 1/2	21 wk	49 1/2	22 wk	47 1/2	21 wk	
53	5 1/2	47	5 1/2	53	5 1/2	47	5 1/2	53	5 1/2	47	5 1/2	53	5 1/2	47	5 1/2	
56 1/2	5	50 1/2	5	56 1/2	5	50 1/2	5	56 1/2	5	50 1/2	5	56 1/2	5	50 1/2	5	
51	4 1/2	45	4 1/2	57	4 1/2	45	4 1/2	57	5	45	5	57	5	45	5	
54	5 1/2	40	5 1/2	53	5 1/2	45	5 1/2	53	5 1/2	45	5 1/2	53	5 1/2	45	5 1/2	
51	4 1/2 to 5	40	4 to 5	51	4 1/2 to 5	40	4 to 5	51	4 1/2 to 5	40	4 to 5	51	4 1/2 to 5	40	4 to 5	
60	3 1/2	40	3 1/2	60	3 1/2	40	3 1/2	60	4	40	4	60	4	40	4	
56 1/2	4 1/2	50 1/2	4 1/2	56 1/2	4 1/2	50 1/2	4 1/2	56 1/2	4 1/2	50 1/2	4 1/2	56 1/2	4 1/2	50 1/2	4 1/2	
49 1/2	5	45 1/2	5	54	5	45 1/2	5	54	5	45 1/2	5	54	5	45 1/2	5	
55	5 1/2	45 1/2	5 1/2	55	5 1/2	45 1/2	5 1/2	55	5 1/2	45 1/2	5 1/2	55	5 1/2	45 1/2	5 1/2	
52 1/2	6	47	6	52 1/2	6	47	6	52 1/2	6	47	6	52 1/2	6	47	6	
60	5	48	5	60	5	48	5	60	6	48	6	60	6	48	6	
51	5	53	5	51	5	53	5	51	5	53	5	51	5	53	5	
55 1/2	6	50	6	54	4 1/2 to 5	50	4 1/2 to 5	56	5	50	5	55 1/2	5	50	5	
53 1/2	4 1/2	47 1/2	4 1/2	53 1/2	4 1/2	47 1/2	4 1/2	53 1/2	4 1/2	47 1/2	4 1/2	53 1/2	4 1/2	47 1/2	4 1/2	
51	4 1/2	44 1/2	4 1/2	51	5	42	5	51	5	42	5	51	5	42	5	
52	5 1/2	47	5 1/2	51 1/2	4 1/2	47	5 1/2	52	5	47	5	52	5	47	5	
54 1/2	5 1/2	44 1/2	5 1/2	49 1/2	5 1/2	44 1/2	5 1/2	49 1/2	5 1/2	44 1/2	5 1/2	49 1/2	5 1/2	44 1/2	5 1/2	
54 1/2	5	50	5	54	4 1/2	51	4 1/2	54	4 1/2	51	4 1/2	54	4 1/2	51	4 1/2	
54	4	54	4	51	4	51	4	51	4	51	4	51	4	51	4	
50	18	22	50	18	22	50	18	22	50	18	22	50	18	22	50	
52	5 1/2	42	5 1/2	54	5 1/2	42	5 1/2	54	5 1/2	42	5 1/2	54	5 1/2	42	5 1/2	
55 1/2	4 1/2	53	4 1/2	55 1/2	4 1/2	53	4 1/2	55 1/2	5 1/2	53	5 1/2	55 1/2	5 1/2	53	5 1/2	
51	4 1/2	54	4 1/2	54	4 1/2	53 1/2	4 1/2	54	4 1/2	53 1/2	4 1/2	54	4 1/2	53 1/2	4 1/2	
48 1/2	6	48	6	49	5 1/2	46	5 1/2	48 1/2	6	46	6	48 1/2	6	46	6	
51	4	40	4	51	4 to 5	42	4 to 5	51	18 wk	45	18 wk	51	18 wk	45	18 wk	
51	4 1/2	48	4 1/2	51	4 1/2	45	4 1/2	51	4 1/2	45	4 1/2	51	4 1/2	45	4 1/2	
56 1/2	4 1/2	51 1/2	4 1/2	56 1/2	4 1/2	51 1/2	4 1/2	56 1/2	4 1/2	51 1/2	4 1/2	56 1/2	4 1/2	51 1/2	4 1/2	
49 1/2	26 wk	48 1/2	24 wk	49 1/2	24	46 1/2	24	49 1/2	21	46 1/2	21	49 1/2	21	46 1/2	21	
54	3 1/2 to 4 1/2	45	3 1/2 to 4 1/2	54	3 1/2 to 4 1/2	45	3 1/2 to 4 1/2	56 1/2	3 1/2 to 4 1/2	45	3 1/2 to 4 1/2	56 1/2	3 1/2 to 4 1/2	45	3 1/2 to 4 1/2	
55	4 1/2	45	4 1/2	55	4 1/2	45	4 1/2	55	5	45	5	55	5	45	5	
48 1/2	5 1/2	41 1/2	5 1/2	48 1/2	5 1/2	41 1/2	5 1/2	48 1/2	5 1/2	41 1/2	5 1/2	48 1/2	5 1/2	41 1/2	5 1/2	
56 1/2	4 1/2	56 1/2	4 1/2	56 1/2	4 1/2	56 1/2	4 1/2	56 1/2	4 1/2	56 1/2	4 1/2	56 1/2	4 1/2	56 1/2	4 1/2	
48 1/2	6	48 1/2	6	49 1/2	5 1/2	48 1/2	5 1/2	49 1/2	6	48 1/2	6	49 1/2	6	48 1/2	6	
49 1/2	4 1/2	53 1/2	4 1/2	56 1/2	4 to 4 1/2	53 1/2	4 to 4 1/2	56 1/2	5	53 1/2	5	56 1/2	5	53 1/2	5	
56 1/2	4 1/2	47 1/2	4 1/2	56 1/2	4 1/2	47 1/2	4 1/2	56 1/2	4 1/2	47 1/2	4 1/2	56 1/2	4 1/2	47 1/2	4 1/2	
55	5	44 1/2	5	55	5	44 1/2	5	55	5	44 1/2	5	55	5	44 1/2	5	
49 1/2	23 wk	47 1/2	21 wk	49 1/2	23 wk	47 1/2	21 wk	49 1/2	23 wk	47 1/2	21 wk	49 1/2	23 wk	47 1/2	21 wk	
50	4 1/2 to 5	44 1/2 to 5	4 1/2 to 5	50	4 1/2 to 5	44 1/2 to 5	4 1/2 to 5	50	4 1/2 to 5	44 1/2 to 5	4 1/2 to 5	50	4 1/2 to 5	44 1/2 to 5	4 1/2 to 5	
52 1/2	4 to 4 1/2	50 1/2 to 4 1/2	4 to 4 1/2	52 1/2	4 to 4 1/2	50 1/2 to 4 1/2	4 to 4 1/2	52 1/2	5	50 1/2	5	52 1/2	5	50 1/2	5	
56 1/2	3 1/2	51	3 1/2	56 1/2	3 1/2	51	3 1/2	56 1/2	3 1/2	51	3 1/2	56 1/2	3 1/2	51	3 1/2	
51	4 1/2 to 5	40	4 to 5	51	4 1/2 to 5	40	4 to 5	51	4 1/2 to 5	40	4 to 5	51	4 1/2 to 5	40	4 to 5	
50 1/2	4	50 1/2	4	50 1/2	3 to 4	50 1/2	3 to 4	50 1/2	6	50 1/2	6	50 1/2	6	50 1/2	6	
54	5	51 1/2	5	54	4 1/2	50 1/2	4 1/2	54	4 1/2	50 1/2</						

made any Return since December, 1880.

Abbreviations : Mason, Ma.; Bricklayer, Br.; Carpenter, Car.; Joiner, Jo.; Plumber, Plu.; Plasterer, Pla.; except ex, Towns marked thus (*) have not made any Return since December, 1881.
W. KNOX, Secretary, 6, Lord Street, Liverpool.

KIRKWALL CATHEDRAL.

SHORTLY after the transfer of the Orkneys and Shetlands from the Danish to the Scottish Crown, Kirkwall Cathedral was handed over by James III. to the Corporation of Kirkwall as trustees for the due preservation and maintenance of the fabric; and, about the year 1814, a certain Mr. Meason, by his will, mortgaged a sum of money to provide the funds for the necessary repairs that might, from time to time, be requisite.

The income arising from this fund has been periodically applied by the trustees, with the sanction of the Corporation, and, as many people think, not always in the most judicious manner.

Several years' income having accrued, the trustees now propose restoring some four windows on the south side of the nave which have been partially blocked up for years, and the stones for this purpose have, so Mr. J. R. Jador, of Wick, says in the *Scotsman*, been already dressed by the local stone-cutters, in accordance with plans drawn up by a local builder.

Many people in the district object to the Cathedral being tampered with any further, except under the advice of some architect competent, from previous experience obtained in connection with ancient ecclesiastical buildings, to form an opinion as to what would be *really judicious and fitting restoration*; but the Town Council and trustees seem inclined to stand on their legal rights, and to consider that they are the best and most fitting judges of what is necessary.

Kirkwall Cathedral is not merely the property of the burgh of Kirkwall, the Orkneys, or even of the United Kingdom, but of the whole civilised world; and the idea of the average baillie, minister, and kirk elder resolving themselves into a committee of taste on the restoration of one of the two remaining cathedrals of Scotland is something too horrible to contemplate. Nothing should be done, either in the way of restoration or even of repair of a building in which, as Sir Henry Dryden remarks, no less than five different styles of architecture can be traced, except under the advice of one of the architects of one of the English Cathedrals, as, with all due deference, no Scottish architect, thanks to the iconoclastic zeal of the 16th century, can be fitted to give an opinion on such a question.

Perhaps, when the attention of the public at large is called to the matter, any further mutilation of the beautiful "stone minster," erected by rhyming Rognvald to the memory of his uncle the holy St. Magnus, may be prevented, and some steps taken to insure for the future the due preservation of this glorious memorial of these hardy Norsemen to whom the English-speaking races are indebted for some of their best and sturdiest characteristics.

The proposed window restoration may be all right; but what most persons in the Orkneys best fitted to form an opinion on the subject feel is, that nothing should be done with so important a historical monument as Kirkwall Cathedral, either at the present time or in the future, except under the very best professional advice.

BRISTOL AND GLOUCESTERSHIRE
ARCHÆOLOGICAL SOCIETY.

THE members of the Bristol and Gloucestershire Archæological Society on Tuesday began their meeting at Clipstow. The headquarters is the Beaufort Arms Hotel, and in the meeting-room a temporary museum was opened. Soon after noon the local committee received the society, and the opening meeting was held under the retiring president, Mr. J. E. Dorington.

Sir John Maclean, who was at this point introduced as the president of the meeting, then delivered his inaugural address. He gave an elaborate description of the Forest district in which the meeting was held, and concluded with some general observations on restoration as follows:—I have alluded to the progress which archæology has made within the time of the existing generation, and I have called attention to the vast and valuable increase of historical knowledge derived from archæological discoveries. I must, however, confess that it has not been altogether gain. As the number of persons who take an interest in our ancient monuments increase, the monuments themselves gradually disappear—not

altogether from natural decay—not by wanton destruction—not by injuries inflicted without evil intention by those who are ignorant of their value—but from other causes. 1st, That very progress to which I have alluded, which spares nothing which lies in its way; 2nd, Through the active, though ignorant, zeal of those who desire to uphold them; and 3rd, By the too lavish use of them by too earnest inquirers. Of the first class, are the ancient works of antiquity which have been destroyed in making railways and other similar works. It was only the other day that I heard that the Dock Company at Gloucester had purchased the site and ruins of Llanthony Abbey for the purpose of making a dock. Of the second, I may more especially allude to what is called the "restoration" of our churches. I verily believe that our ancient parish-churches have suffered more within the last thirty years from mis-called "restoration" than they suffered from violence and neglect during the preceding 300 years. And what has been the cause of all this? I believe one of the chief reasons has been the hurry with which the thing has been done. There has been a perfect mania for the restoration of churches. Doubtless from past neglect a large number required very extensive repairs, and if the works had been limited to that no fault could have been found—or if the restoration had been truly such, if actually needed, instead of violent alterations and fancied improvements, no objection could have been taken. But what has generally been the course adopted? The parish of A has had its church "restored." The parish of B must not, of course, be left behind. Consequently a resolution has been adopted that the church requires restoration. An architect is called in,—it matters not whether he has the slightest knowledge of ecclesiology, and I am very sorry to say few architects have—funds are raised somehow or other, the church is closed, and the whole work must be completed within the year. The architect likes a clean, neat job, and he is paid by a commission on the expenditure. Everything he does not understand is swept away, even the monuments, monumental brasses, and grave-stones are cast aside to admit of the passages being all paved with Minton's tiles. In or about the time limited, everything is turned out speck and span new—the grand old oak roof is replaced by a neat one of deal, the carved bench ends are removed to make way for uniform deal seats, all the plaster is taken off the walls and the rough rubble masonry pointed, which was never done in ancient times, for if the old architects used the natural stone, either in walls or vaults, it was carefully dressed to an even surface for the reception of colour. The mouldings are simplified by being scraped down, and even the mailed effigies of ancient knights or barons, recumbent on altar-tombs, are often ruthlessly pecked over, and every characteristic destroyed, for the purpose of making everything neat and clean. To church-restorers, if there should chance to be any one here who contemplates such a work, I would say: be slow to begin and not over-hasty in going on. One of the most satisfactory restorations I know of was that of a parish-church in Devonshire. It was done, bit by bit, as they could obtain the money in the parish, which was chiefly collected at the offertories at the harvest festivals. All the work was done in the best manner and with the best materials, and it is no drawback to say that the execution of the work extended over 17 years. My advice is, remember that restoration consists in replacing the building in the same condition in which it was when it left the original architect's hands, and if the building be of different periods, or styles of architecture, when that particular work was executed. Remove nothing ancient from the position in which you find it, unless some other "restorer" should have been before you, and misplaced it, and if anything, such as a roof-screen, has been destroyed, renew it, if possible, in the same character as the original one. Do not fancy that the architect whom you employ is more skilful than his ancient brother, and therefore allow no improvements. The extent to which so-called restorations have been carried, and the manner in which they have been executed, make one feel sick at heart. It has now become a rare treat to find an ancient unrestored church. A society has recently been formed for the protection of ancient monuments. I am not a member of it. As regards our ancient churches it has been formed 10 years too late. The mischief has been

done, and it is irreparable. But there are other monuments which require a watchful care. I am shocked to say there is even a proposal to "restore" Stonehenge. On the third point I dare to say a few words, and I do so in the presence of some of my friends who will I hope forgive me. The most interesting and instructive of our ancient monuments are the pre-historic tumuli. Their exploration has added much to our knowledge of the characteristics and habits of the primitive races of this and other countries. But I would humbly ask, Have we not gained from these ancient burial-places all that they can reveal to us, and is not the time come when we should restrain our hands in this direction and seek some other sources of information? Few, comparatively very few, now remain unspoiled, and those few, in my opinion, should be carefully protected and preserved as evidence for future generations. I well know how strong is the inclination, how insatiable the desire, how fascinating the work of exploration; nevertheless I would earnestly say, Waste not! Stay your hands!

Soon after the company left and proceeded to Clipstow Castle, where Mr. G. T. Clark, of Down-lais, gave an address on the castle. A carriage-excursion was then made to Beachley and Sedbury Park, in order to inspect Offa's Dyke, upon which the President made some remarks.

In the evening there was a meeting at the Beaufort Arms Hotel, and papers were read.

PRESERVATION OF TIMBER AND
HOUSE BASEMENTS.

MINERAL solutions forced into the fibres of wood are found to arrest the decay of timber by impeding decomposition by wet rot, and also to prevent the growth of the fungi peculiar to dry rot. A weak solution of corrosive sublimate, or of nitric acid, has been found of service, after which the timber may be painted with white-lead and oil. Timber, such as wall plates, ground joists, and sleepers near the ground, ought always to be creosoted or coated with a solution of coal-tar and fish-oil mixed with finely-powdered clinkers from a forge. All these preventive means are, however, useless in arresting decay under certain conditions. If the timber has not been seasoned or desiccated, the solutions will not enter, the pores being previously occupied by the fermenting juices, and the process, therefore, will not be effectual. Again, if the joists of ground-floors are not ventilated it is of no use to apply remedial measures after the mischief has been done. There are primary conditions, but which, singular to say, are unheeded by nearly all the builders of small tenements around our large towns. The consequence is that few basement floors last more than a dozen years without showing signs of rapid decay.

The building of basements or stories below the ground-level, as most of the breakfast parlours about London are built, prevent, it is true, the use of air-bricks, but then why should builders still persist in having wooden floors in such situations? People like wood better than cold stone or even cement with concrete below; hence there is a difficulty in doing away with wooden floors. But blocks of solid wood can be laid on concrete; and these make a comfortable floor for the feet, and may be repaired at less cost when they do wear out, which is not often. Many buildings have basement floors of these blocks; but it is surprising the average builder is so long getting out of the rut in these matters that he must see it used repeatedly by enterprising builders before he ventures to make the change. A boarded floor on joists of shabby Swedish timber, with scantling only enough for ceilings, or a cold damp floor of cement or stone laid on rubbish, appear to be the only forms of flooring known to the majority of builders of our smaller houses.

The death is announced of Mr. James Boyle, C.E., for 14 years the secretary of the Public Health Committee of Dublin, and through whose energy many of the recent sanitary improvements in the city have been carried out, "as effectually as the resources of the department and the powers given by the Public Health Act have permitted," as one of the Dublin newspapers in an obituary notice remarks. A vote of condolence with the family was passed at Tuesday's meeting of the Dublin Corporation.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

THE BRITISH ARCHÆOLOGICAL ASSOCIATION'S CONGRESS will this year be held at Malvern, and will be opened on Monday, August 22nd, by an inaugural address from the President, the Dean of Worcester, Lord Alwyne Compton, to be followed by an examination of Malvern Priory Church, founded c. 1080, and "presenting in its mixed styles of Early Norman and Late Perpendicular many features of interest and beauty." During the Congress week at Malvern, excursions will be made by carriages and railway to Birtsmorton Court, a moated manor-house of the 14th century; the adjoining church; "Payne's" Place, where Margaret of Anjou took shelter; Tewkesbury battle-field, the restored Abbey Church and old houses at Tewkesbury, Seven-end Manor House, the Rhydd, Madresfield-court, Pickersleigh, a fine specimen of Jacobean and earlier work; Bosbury and Ledbury Churches, Wall's Hill Camp, Much Marcle and Kempeley Church, the latter having some good frescoes on its walls, discovered a few years since; Kidderminster Church, Warshall (close to Habbersley), Bewdley, Ribbesford, Areley Kings for Manor House, &c., Redstone Hermitage, and Astley Church, thence to Moor Hall, by the invitation of Mr. John Brinton, M.P., who will kindly take charge of and conduct the party on the Kidderminster day; Little Malvern, Herefordshire Beacon and Midsummer Camp, an ancient British fortress of large extent; Branshill Castle, a Norman stronghold; and Eastnor Castle and Park, by the kind permission of the Earl Somers. It is also proposed to visit in the following week Worcester and Cheltenham. Meetings will be held every evening in the School-room of the College, by the courtesy of the authorities, at 8.30, for the reading and discussion of papers, after the opening day. The hon. secretaries are Mr. E. P. Loftus Brock, F.S.A., 19, Montague-place, Russell-square, and Mr. W. De Gray Birch, F.S.A., F.R.S.L., British Museum, Bloomsbury, W.C.

BOURNEMOUTH FIELD CLUB.—We are glad to announce that the above society has recently been formed here, the Right Hon. Earl Cairns being president. The inaugural excursion took place at Christchurch, Hants, on the 25th of last month, when the Priory Church and Heron Court, seat of the Earl of Malmesbury, were visited. On Thursday, July 14th, the second excursion of the society took place at Wimborne, Dorset. The first place visited was Dean's Court, through the kindness of Lady Gibson Craig. The members were met by Mr. Craig and Major-General Maclean, who conducted them over the mansion. The windows, containing a large quantity of fine old glass (temp. 1550) chiefly armorial bearings, were much admired, though there was some difference of opinion as to the families to which they belonged. Dean's Court marks the site of the College, a part of the present building being formerly the Dean's residence. The house was considerably added to by Sir William Hanham, third Baronet, in 1725, and contains a complete series of portraits of his family from the time of Elizabeth. Leaving the grounds, the members noticed the old fish-ponds. On reaching the Minster, the members were received, in the absence of the vicar, by the Rev. J. Paget, Mr. W. Fletcher, and Churchwarden Hayter. The hon. secretary, Mr. Mills Robbins, read a paper on "The Early History of the Church." Mr. Fletcher pointed out the chief features of interest in the church, and Mr. Hayter exhibited the ancient documents. Subsequently, at the Vicarage the members were entertained by Mrs. Trotman, after which a hasty visit was paid to the Lepers' Hospital and Chapel, dedicated to God, St. Margaret, and St. Anthony, when the Rev. J. R. Pretymann read a short paper on "The Hospital," and the Secretary exhibited a copy of some of the 15th-century wall decorations.

ROYAL ARCHÆOLOGICAL ASSOCIATION OF IRELAND.—The quarterly meeting of this association was held for the first time in its history at Enniskillen on Tuesday week, and was opened with an address from the President, the Duke of Leinster, in which he referred to the numerous objects in the neighbourhood of the town in which they were met. Mr. W. J. Knowles, of Cullybacky, Antrim, sent up a large collection of ancient Irish beads, of glass, stone, jet, serpentine, sandstone, and quartz, and one of rock-crystal,

accompanied by a descriptive letter and specimens of the fictitious articles often sold to unsuspecting English collectors. Mr. E. Atthill, of Ardvarney, showed specimens of ancient pottery from Indian mounds near Lake Sturgeon, Canada. The Rev. James Graves, hon. secretary, showed photographs of a fourteenth-century processional cross bearing an inscription stating that it was made by "O'Connor of Kerry, the head of his nation." It is identical in size with the famous Cross of Cong, now the chief relic in the museum of the Royal Irish Academy. Mr. Graves also mentioned to the members that the inscription on the Dunvegan Cup, mentioned by Sir Walter Scott, had recently been deciphered, and stated that "Katherine McGreynell, wife of John Macguire, the Prince of Fermanagh, had me made in the year of our Lord, 1493." Mr. Marcus Ward read a paper on the varied fancy exhibited by early Irish artists, and showed a rubbing and coloured tracing from the Hiberno-Romanesque scroll ornamentation in the ancient Church of Maghera, Co. Londonderry, and contrasted therewith the engraving of the same scroll-work given by Lord Dunraven in his work on "Irish Ecclesiastical Remains," proving the inaccuracy of the latter. Other copies of early sculpture and illustrated MSS. of the district were also exhibited.

COMPETITIONS.

MANCHESTER.—In a limited competition for the Manchester offices of the Commercial Union Assurance Company, the design of Mr. Charles Heathcote, architect, Manchester, has been chosen. The other competitors were Messrs. Mills and Murgatroyd, and Messrs. Salomons and Ely. The cost is limited to £7,350.

NASHVILLE, TENN., U.S.A.—Designs are invited for a block of buildings to be known as the Watkins Institute, to be built at Nashville, Tenn. The plan contemplates a block of stores for business purposes, on Church-street, consisting of four stores, with a basement under each of 10ft. clear, and two stories above the stores, the first of 14ft. and the second of 12ft. in the clear. The stores themselves are to be 16ft. clear. Through the centre of this block a hall is to run, 12ft. wide, for the purpose of reaching the public buildings in the rear, presently to be noticed, and also for the purpose of reaching the second and third stories of the block by a stairway at the rear, inclosed and covered in, with suitable openings. The front of this block is to be of stone. The side on High-street, as well as the body of the building, will be of brick. In the rear of the front block, at the distance of 20ft. therefrom, is to be erected another building extending across the lot 75ft. front by 112ft. deep. The first story of this building is intended for a public library and reading-room, and must be not less than 18ft. in the clear; the second story is intended for a public hall and lecture-room, and will be not less than 25ft. in the clear. Access to the second story will be had through the hall of the front block as above described, and also by a circular stairway in the lower front corner of the building on High-street, and with such other means of ingress and egress as will make the building safe against fire. The front of the building on High-street is to be of stone, and that part of the front containing the circular stairway may be run up above the roof into an ornamental tower. The cost of the front block and of the building in the rear, both, is not to exceed the sum of 80,000 dols. Plans may be drawn to a scale of 8ft. to 1in., and such details to a larger scale as may be necessary to simplify any peculiar features. The design of each building should show—(1) Ground-plan of each floor. (2) Front elevation of each building. (3) Such sections, transverse and longitudinal, as may be necessary to illustrate all of the above. The plans must be accompanied with specifications of the details of work, materials, and cost, that will enable those having the matter in hand to understand what is meant by the drawings. The designs are to be sent to James Whitworth, President of the Board of Commissioners of the Watkins Institute, before the first day of September, 1881. They will be at the risk of owners while in transit and in the board's custody. Those designs to which the commissioners may award prizes will be retained, but all others, subject to the casualty of loss or destruction, will, upon

request, be returned to the authors, provided they have been inclosed to the commissioners in a metal or strong paper envelope 4in. in diameter. The Board of Commissioners will select out of the designs sent them the three which, in their opinion, more nearly meet the requirements of these specifications, having in view especially the limited amount of funds at their disposal to accomplish the improvements, and will pay to the author of the design which may be designated by them as No. 1, 300 dols.; to the author of design No. 2, 125 dols.; and to the author of design No. 3, 75 dols. Further information may, we suppose, be obtained of Mr. James Whitworth.

PUBLIC HALLS, BELPER.—The directors have selected the design submitted by Mr. John Johnson, A.R.I.B.A., 9, Queen Victoria-street, London, E.C.

SWANSEA.—In a local report of the proceedings of the Swansea town council on the 13th inst., the Mayor is stated to have said that as to the competition plans for the new street, he had been in communication with the persons who signed their designs "Pro Bono Publico" and "Progress," and he found that whilst "Pro Bono Publico" was willing to accept half the premium (£50) offered for best sketch of buildings for the new street, the architect whose plans were known as "Progress" declined to be a party to any such division. The matter would therefore have to be reconsidered at the next meeting.

WIGAN PUBLIC BATHS.—The baths committee of the Wigan Corporation have awarded the first prize (£20) in the competition for designs for public baths to Mr. George Heaton, architect, Wigan, for his design marked "Vive le Maire." The second prize (£10) was awarded to Mr. H. J. Tait, of Bradford and Wigan, for his design "Experience B." At their meeting on Wednesday week Mr. Heaton was instructed to prepare particulars and quantities, in order that the committee may advertise for tenders. The arrangement of the building includes a first-class plunge-bath for ladies and first and second-class plunge-bath for gentlemen, slipper-baths, and the usual accommodation, including a residence for the manager. The estimated cost of the building is £5,000. A site has been secured fronting the Free Library, and forming part of the Old Grammar School Croft, in Millgate.

WINDERMERE.—We take the following from the *Bowness and Windermere Chronicle*:—"A SUCCESSFUL BOWNESS ARCHITECT.—A prize being offered for the best plan of a new Chapel of Ease for Bowness and Windermere, about fifty plans were sent in from various parts of the country, and by many well-known and eminent architects. On Saturday, the 25th ult., the committee for examining and choosing the plans met, and as is usual in such cases, the plans were examined without prejudice, the letters and names of the architects being kept back till the choice was made. A plan was fixed upon, the motto of which was 'Truth.' After passing all the usual forms of approval and election, the name of the successful architect was found to be Mr. Joseph Pattinson, the fourth son of Mr. Thomas Pattinson, of Elton-grove, Bowness-on-Windermere, now in the employ of Mr. Ferguson, of Carlisle. The announcement has been received with pleasure by all the friends of Mr. Pattinson. His début is early in his career, and bids fair for great success.—Communicated."

The new church of St. Andrew, Rowbarton, near Taunton, was consecrated on Thursday, the 14th inst., by the Bishop of Bath and Wells. The church is Early Pointed in style, and consists of nave, north and south aisles, tower at south-west corner, surmounted by spire and chancel. The external walls are of Westleigh stone, with Douling stone dressings, and the roofs are of Bridgewater tiles. The internal walls are lined with bricks, the floors are laid with Minton's tiles, and the pulpit and font are of Beer stone. Pitch-pine benches seat 500 persons. Mr. H. Spencer is the architect, and Mr. Spiller the builder; the cost has been £2,332, under 45 per sitting.

The surveying committee of the Bath city council have reported to the latter body that as they have no power to superannuate Mr. Davis, the city surveyor, it is desirable that, in consideration of his long services, Mr. Davis be appointed consulting surveyor at a salary.

CONTENTS.

Domestic Brick Architecture	93
The International Medical and Sanitary Exhibition	93
Hospital and Sanitary Construction at the Sanitary Exhibition	95
The Glasgow Municipal Buildings	96
The St. Paul's Ecclesiastical Society at Rochester	97
Practical Notes on Plumbing.—VI.	99
A Railway at Less than £500 per Mile	99
National Association of Master Builders of Great Britain	100
Kirkwall Cathedral	102
Bristol and Gloucester Archaeological Society	102
Preservation of Timber and House Basements	102
Architectural and Archaeological Societies	103
Competitions	103
Our Lithographic Illustrations	104
Building Intelligence	117
Chips	117
To Correspondents	118
Correspondence	119
Intercommunication	120
Parliamentary Notes	120
Legal Intelligence	121
Our Office Table	121
Meetings for the Ensuing Week	122
Tenders	122

ILLUSTRATIONS.

INGLESIDE, PUTNEY.—COFFEE TAVERN AT SEAL, KENT.—FIRST AND THIRD PREMIATED DESIGNS FOR PROPOSED NEW CLOCK TOWER AT BRIGHTON.—DESIGN FOR HOSPITAL.—NEW HOTEL, ROYAL ALBERT DOCK.—PROPOSED NEW AISLE, CHARD CHURCH.

OUR LITHOGRAPHIC ILLUSTRATIONS.

INGLESIDE, PUTNEY (MR. W. YOUNG'S HOUSE).

In building a house for one's self at the present day, the great difficulty in the suburbs of London, is to find a good site. Mr. Young thinks he has been fortunate in securing a site which it would be difficult to surpass anywhere in the neighbourhood of London. Ingleside, named from one of the principal features of the house, the ingle nook and recessed fireplace, is situated on the west hill between Putney and Wandsworth, and about half a mile from the river. The position is high enough to command, from the ground-floor, a full view of the river from Putney to below Wandsworth, with the grounds of Hurlingham and Ranelagh on the opposite side. The object of the architect was to get something a little picture-que without being extravagant, either in idea or cost. The entrance-door is very deeply recessed, with a flat pointed arch, and has been beautifully executed in red brick. The bay window is placed at the corner of the drawing-room, and has a view both south, east, and west. This window is carried up to the second floor, and is finished with a high kind of turret roof. The roof of the house to the Oakhill-road front is hipped, with a bold dormer window running out at the upper part. This window has a deep plaster cove, with decorative ornaments scratched in the plaster, and some Venetian glass bullseyes of different colours introduced as the centres of flowers with very telling effect. The walls are of red bricks, and very bright picked stocks, and the roofs are covered with brown tiles. The hall and staircase, which we may illustrate at another time, is chiefly noticeable for a staircase out of the common, executed in pitch-pine. The little break extending into the drawing-room at the door, is treated as a porch in the room, being only carried up about 8ft. high; above this the walls of the room are square. On the hall side this feature forms a deeply-recessed arch. The principal feature in the dining-room is a deeply-recessed fireplace, with seats at the sides. A drawing of this is now in the Royal Academy Exhibition. The arch is divided into three, by two massive turned pillars, which, with the chimney-piece and the other wood-work of the room, is executed in pitch-pine. The walls of the room are decorated with a Japanese leather-paper for a dado, and above this arching with Russian oriental tapestry. The chimney-pieces throughout are of American walnut and pitch-pine, and were executed by Mr. Robertson, of Kennington-road, from the architect's designs. The stained-glass was done by Messrs. W. B. Simpson and Son and Mr. Brown, and the general contractors were Messrs. Green and King. The painted panels in the case of the dining-room fireplace are from the brush of Mr. H. W. Batley.

COFFEE TAVERN, SEAL, KENT.

This building, which has been erected and furnished at the cost of Charles G. Hule, Esq., is situated at the extreme end of the picturesque

village of Seal, and is of red bricks, with tile-hangings and roof. It contains parlour, large bar, smoking and reading-room, committee-room (capable of being thrown into the reading-room for entertainment purposes), and retiring-room from reading-room, besides kitchen, offices, manager's residence, lavatory, &c. Attached to the bar and smoking-room are wide verandahs to take tables, &c. The walls of parlour are covered with Walton's linesta to height of top of doors, and finished with dado moulding. The gas-fittings are by Messrs. Faraday, of Berners-street, W. The place has been furnished throughout in walnut and black wood, with marble tables in bar. Mr. Hope Constable, of Penhurst, was the builder, and the architect is Mr. Edwin T. Hall, A.R.I.B.A., of 57, Morgate-street, London.

FIRST PREMIATED DESIGN FOR PROPOSED CLOCK-TOWER, BRIGHTON.

The accompanying design was placed first in the recent competition. The building would occupy one of the best sites in Brighton, being at the junction of four main thoroughfares. Accommodation is provided for a public convenience below with the tower above, and forming an extraction shaft to same. The convenience is reached from the road-level by a straight flight of steps, and is lit by glazed areas surrounded by granite balustrades. The spaces left for street refuges are large and quite distinct from the entrance to convenience. The lower portion of tower is Portland stone; the dial-chamber, ironwork; the roof, light wooden construction, dressed with copper. Provision is made for an electric ball which rises on a staff 15ft. high. The staff is wood, covered with copper; and the ball is copper and gilded. When down, the ball is held in a cup-like frame of ironwork, also gilded. The extraction shafts from basement find their outlets at the grille forming base of dial-chamber. The estimated cost of design was £1,000, though £1,500 would probably be spent, as the site would warrant the extra expenditure. Messrs. Thomas Simpson and Henry Branch, of 63, High-street, Brighton, are the architects.

THIRD PREMIATED DESIGN FOR PROPOSED CLOCK-TOWER, BRIGHTON.

The conditions of the competition restricted competitors to placing the centre of the dial 25ft. from the ground, providing a dial-chamber 8ft. square, and surmounting the structure with a staff 15ft. high, on which a ball 3ft. in diameter was to fall. The general dimensions being thus virtually settled, competitors were hampered in design, and precluded from aiming at more elegant proportions. The arrangements for the clock machinery are fully provided for, and as the ground-floor chamber only requires space for the pendulum to swing, the extra space has been utilised in the basement, by the adoption of a half-vault to secure good light and ventilation to the urinal. The clock-works are also hermetically sealed from the injurious air of the urinal. It was proposed to face the structure with white Portland stone, and surmount it with a gilt metal cup into which the copper ball would fall; and it was intended to crown the staff with the figure of Mercury. The design is by Mr. James M. MacLaren, 21, King William-street, Strand, W.C.

SUGGESTED RECONSTRUCTION OF UNIVERSITY COLLEGE.

Mr. G. Francis Jones, of Cockspur-street, Trafalgar-square, prepared this design to illustrate how Professor Marshall's "Circular Ward" plan could be applied to University College, Gower-street, N.W. A description of the design appears in our article on "Hospital and Sanitary Construction at the Sanitary Exhibition," page 96, 2nd column.

NEW HOTEL AND BUFFET, ROYAL ALBERT DOCK.

This building is now in course of erection at the Gallions Station of the new Royal Albert Dock, opposite Woolwich. The materials used for facing are red brick with hand-cut mouldings for the basement and ground-floor stories and the chimneys; rough-cast of a buff tint for the first floor, and tile hangings for the overhanging upper portion. Over the large dining-room is a billiard-room, with access to a promenade formed by the balcony over the verandah of railway-platform, from which a fine view of the docks and shipping will be obtained. The front shown

in our view overlooks the river. The building is being erected from the designs and under the superintendence of Messrs. George Vigers and J. R. Wagstaffe, the architect to the London and St. Katherine Docks Company, the frieze being modelled by Mr. E. Roscoe Mullins. Messrs. Adamson and Sons, of Ealing, are the builders.

CHARD CHURCH, SOMERSET.

The accompanying illustration represents a new south aisle to be shortly erected. In making the required addition, the architect has been guided by precedents at the parish-churches of Cullompton and Ottery St. Mary, where large aisles were added in the 16th century, and the style aimed at in the present case is the latest phase of the Perpendicular. The new aisle is part of a scheme for the general restoration and enlargement of the parish-church, for which funds are now being collected. The architect is Mr. John D. Sedding.

CHIPS

The Tottenham Local Board of Health, at their last meeting, adopted a report by the General Purposes Committee recommending the adoption of a comprehensive scheme with plans and estimates prepared by the board's surveyor, Mr. de Pape, for dealing with the storm-water of the Woodlands and Harringay Park Estates of the British Land Company in the neighbourhood of the Green-lanes. The storm-water will be discharged into the Stonebridge-brook, near the South Tottenham Railway Station. The surveyor was also instructed to prepare plans and specifications for a swimming-bath.

Mr. Mark Fisher has been elected a Member of the Institute of Painters in Water Colours.

With reference to the series of memorial stained-glass windows placed in the Roman Catholic Church of the Sacred Heart, Camberwell, by Messrs. Lavers, Barraud, Westlake, and Co., and referred to a fortnight since, we are requested to state that they were designed by Mr. Philip M. Westlake.

At the Staffordshire Assizes on Saturday a man named John Smith was convicted on a charge of having attempted to murder, by poisoning with arsenic, James Jeffries, builder and contractor, Stone, Staffordshire.

During the progress of building works at Dorchester gaol last week the scaffolding broke, and Mr. Samuel King, the superintending foreman, sustained a broken arm and other injuries, two other men being also hurt. The governor of the gaol had previously sent for Mr. King, and expressed his doubts as to the safety of the scaffolding, another similar accident having only recently occurred at the gaol.

The local board of Cottingham, near Hull, have adopted plans and specifications prepared by Mr. Jacobs, their surveyor, for the drainage of New Cottingham.

The designs for the new town-hall for Eastbourne have just been completed by Mr. Schmidt, surveyor to the local board. They show a series of offices on ground-floor for surveyor, medical officer of health, collector, &c., and retiring-rooms for the magistrates and county-court judge; over these is placed the large hall, 70ft. by 40ft., &c., reached by a central staircase, over which is a tower. The estimated cost of the building is £13,000.

The Matlock Bath local board have instructed Mr. Nicholls, surveyor, of Handsworth, to negotiate with the Matlock Waterworks Company for the transfer to the board, as the urban sanitary authority, of their works, plant, and undertaking.

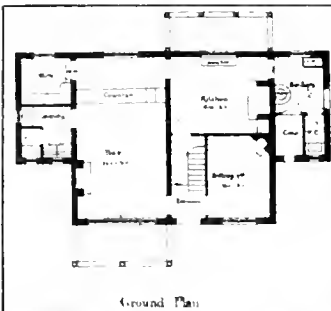
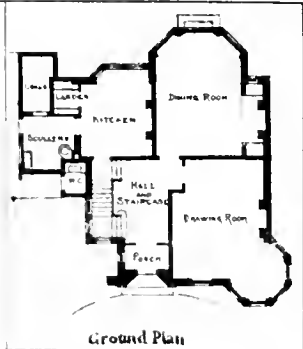
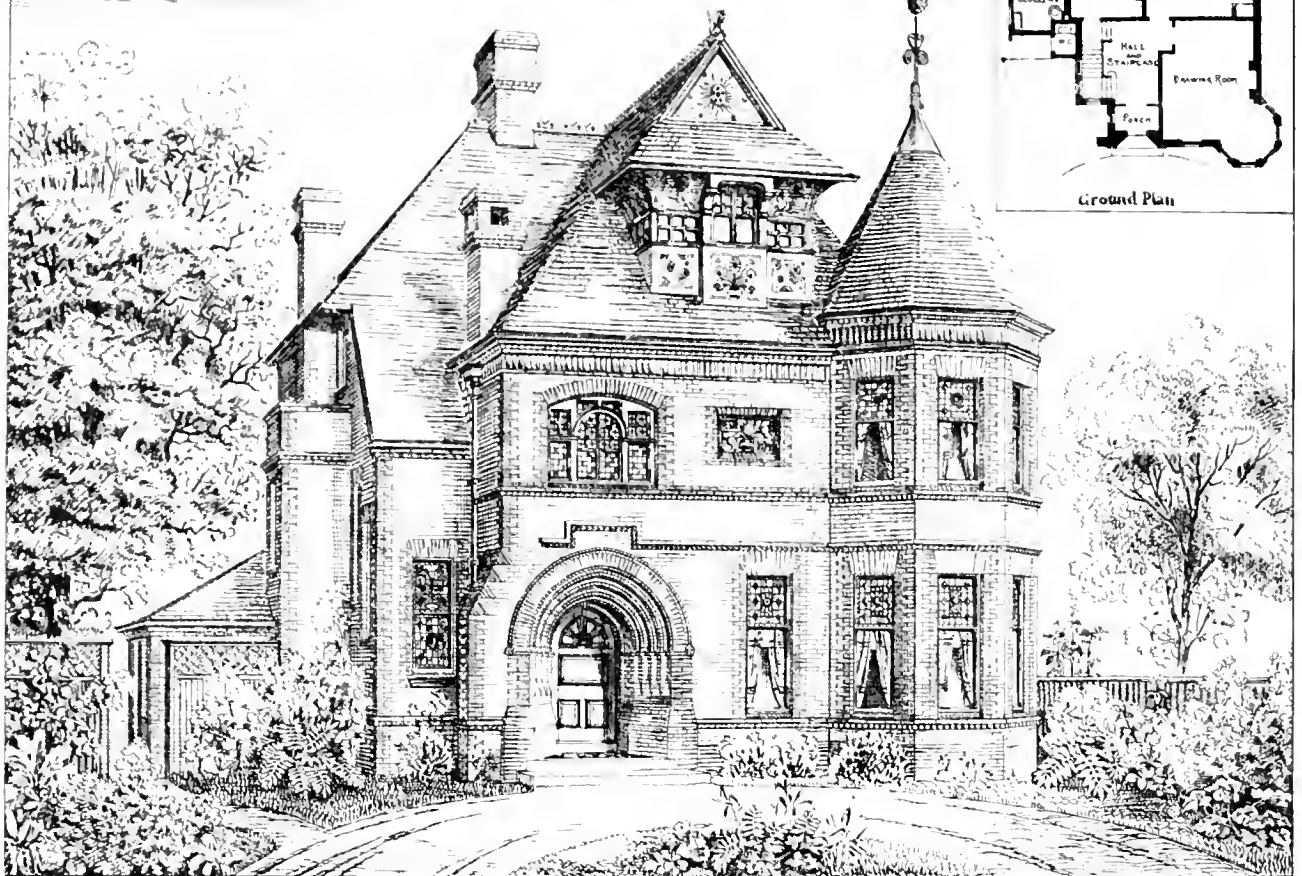
An appeal has been circulated by Mr. Beresford-Hope, Mr. W. C. Cocks, and Mr. Joseph Clarke, in favour of the Royal Architectural Museum, Tufton-street, Westminster, which was founded by Sir Gilbert Scott, and which requires an additional income of £200 a year to keep it afloat.

The harbour trustees of Lerwick, Shetland, on Tuesday week considered and approved plans prepared by Mr. Cay, C.E., for harbour extensions and improvements. The present pier will be extended in solid masonry 220ft. seaward, and the estimated cost of the works is £11,800.

New board-schools have just been completed at Charmouth, Dorset. Mr. Farrall was the architect, and Mr. Pryer the builder.

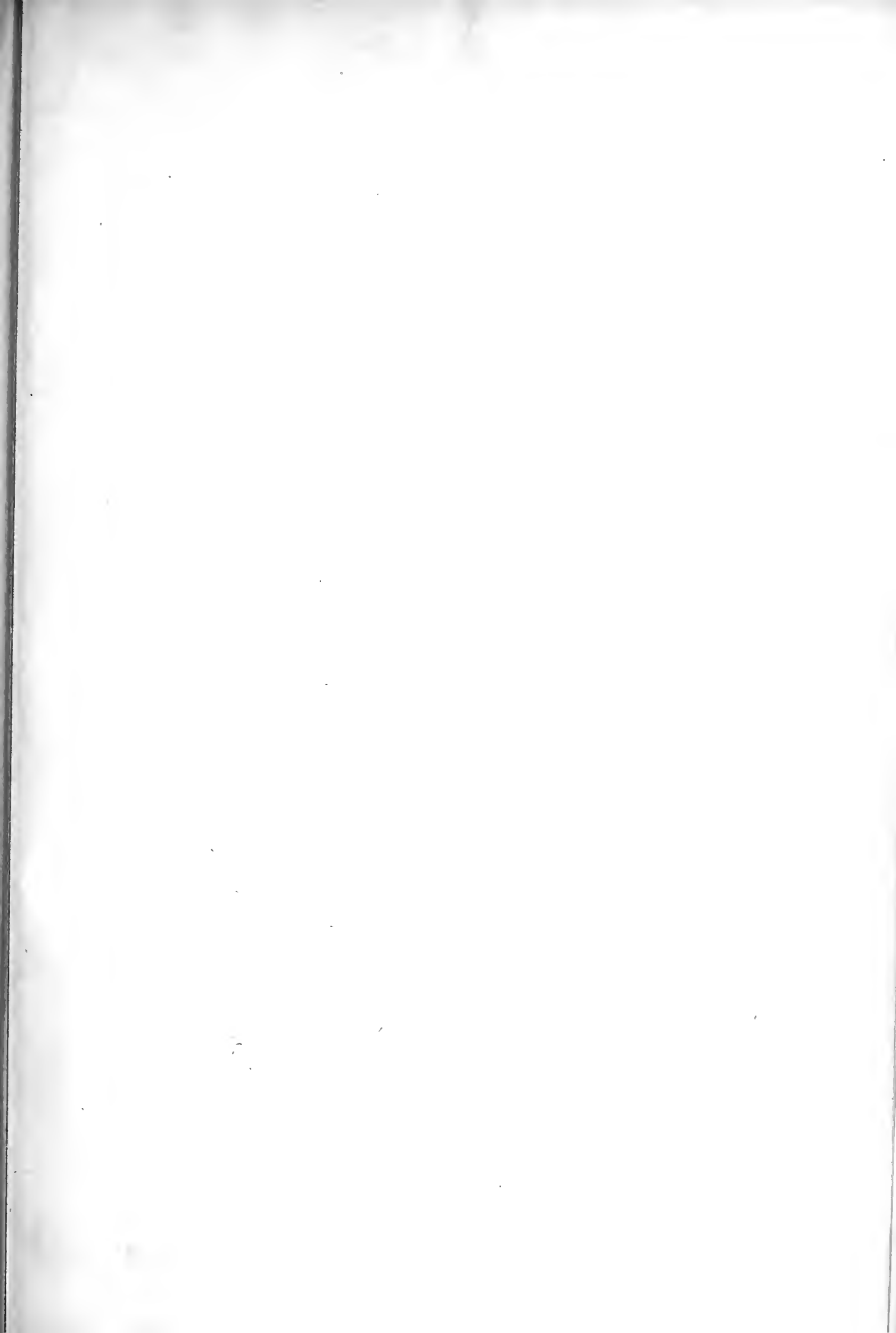
Considerable improvements are about to be made to the grammar-school at Hipperholme, including the demolition of the present residence for headmaster, and the erection of a boarders' house, comprising dining and boarders' halls, drawing-room, kitchen, masters' rooms, and 19 bedrooms. The style of the new building will be Jacobean, and Mr. Richard Horsfall, of Halifax, is the architect.

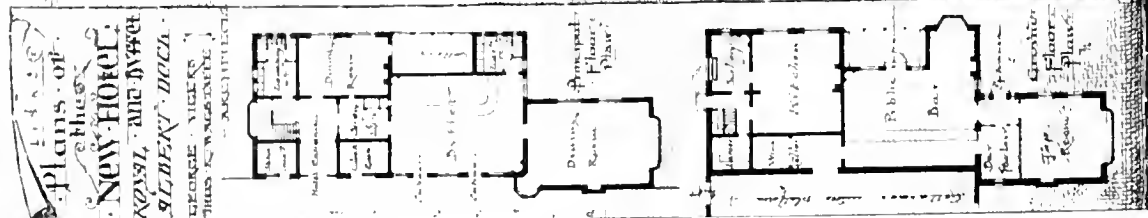
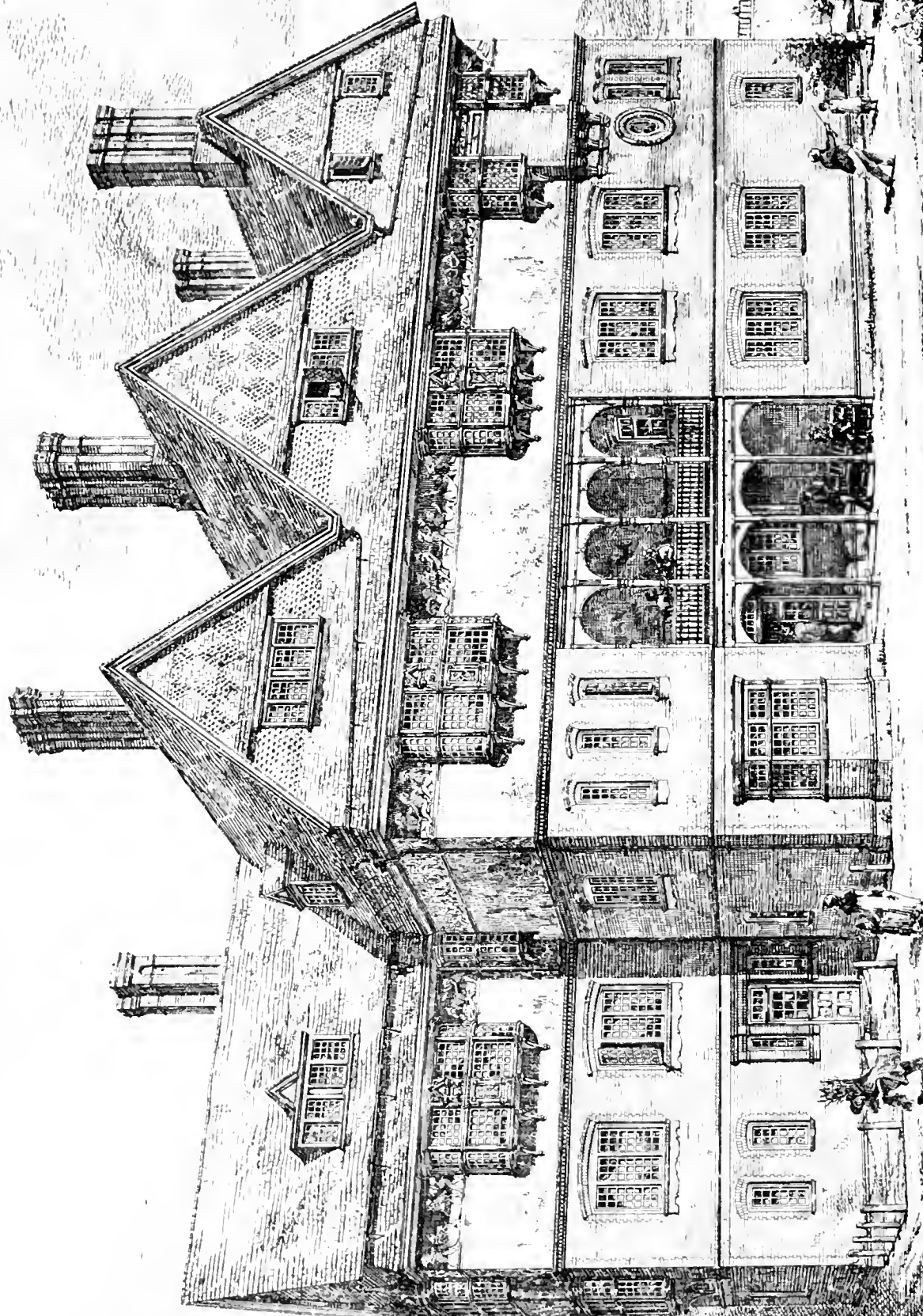
INCLESIDE, PUTNEY
W. YOUNG, ARCHITECT



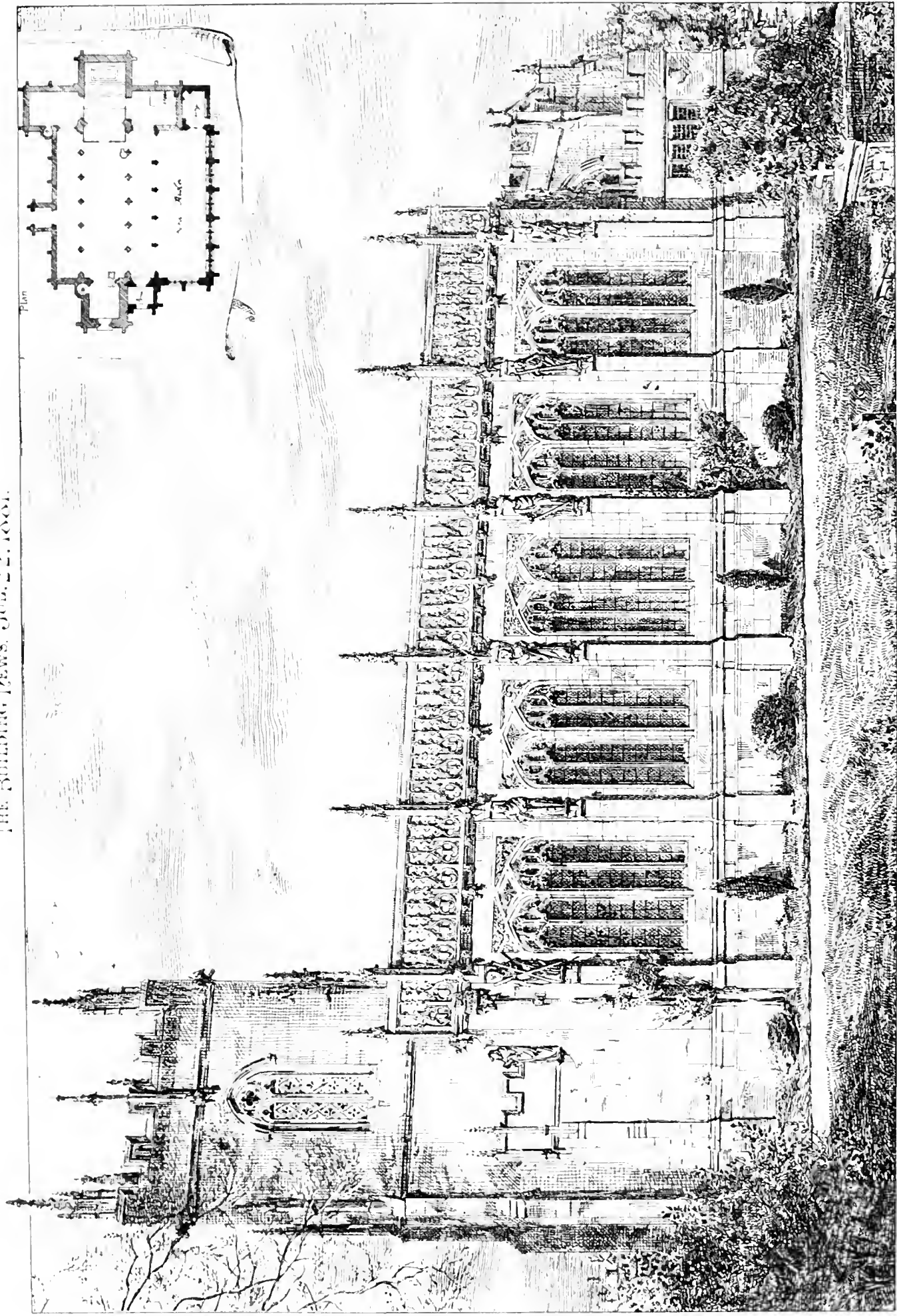
• Coffee Tavern at Seal, Kent •
Edwin T. Hall Architect 57 Moorgate S.E.







The Club, opposite the building, near Avenue of Queen's Square, W.C.



PROPOSED NEW AISLE, CHARD CHURCH.

Photo. Lithographed & Printed by James Akerman, 6 Queen Square, W.C.

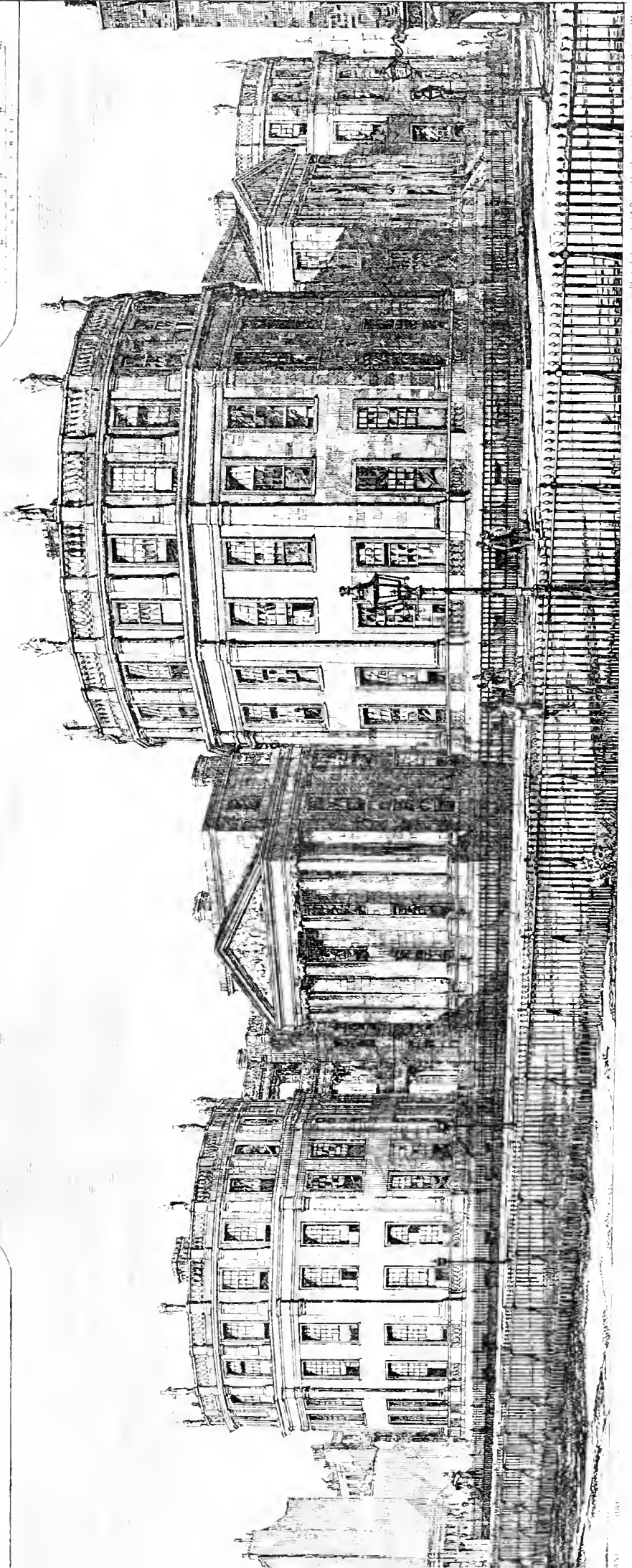
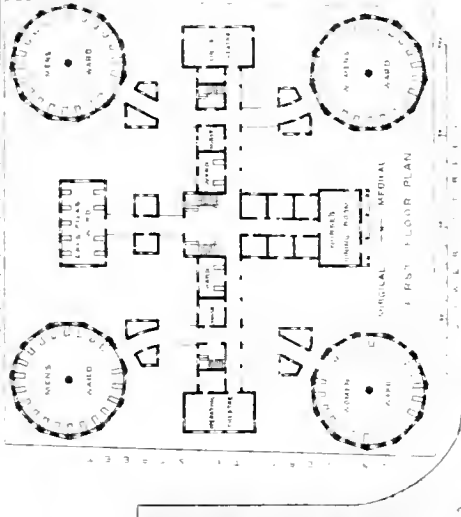
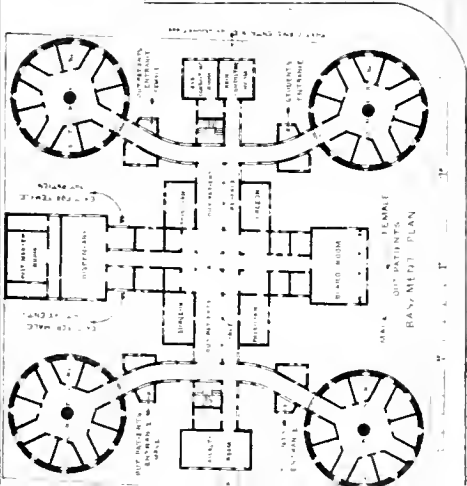
The Building Plans, Jul. 22. 1881.

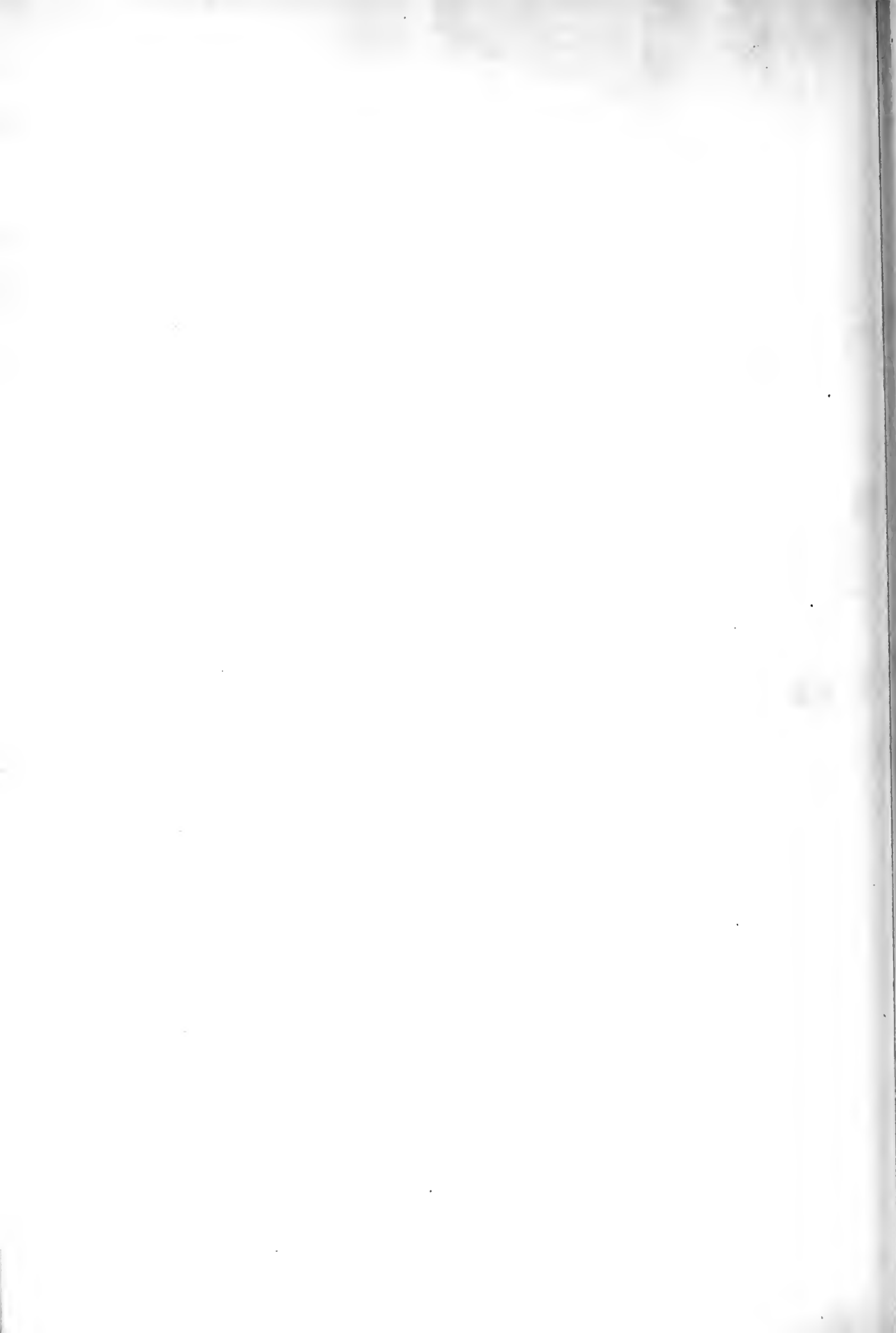
DESIGN FOR HOSPITAL, ADAPTED TO THE SITE OF UNIVERSITY COLLEGE HOSPITAL, LONDON

ON THE "CIRCULAR WARD SYSTEM" OF PROFESSOR JOHN MARSHALL, F.R.S.

12 CIRCULAR WARDS, 21 BEDS EACH. 2 SPECIAL WARDS, 9 BEDS EACH. 10 SMALL WARDS, 2 BEDS EACH. TOTAL 290 BEDS.

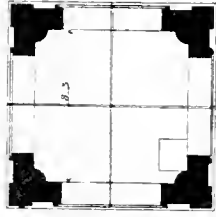
WITH SEPARATE CLINICAL, OUTPATIENT, AND ADMINISTRATIVE DEPARTMENTS.



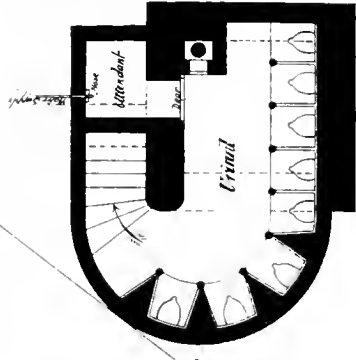


DESIGN FOR CLOCK TOWER BRIGHTON.

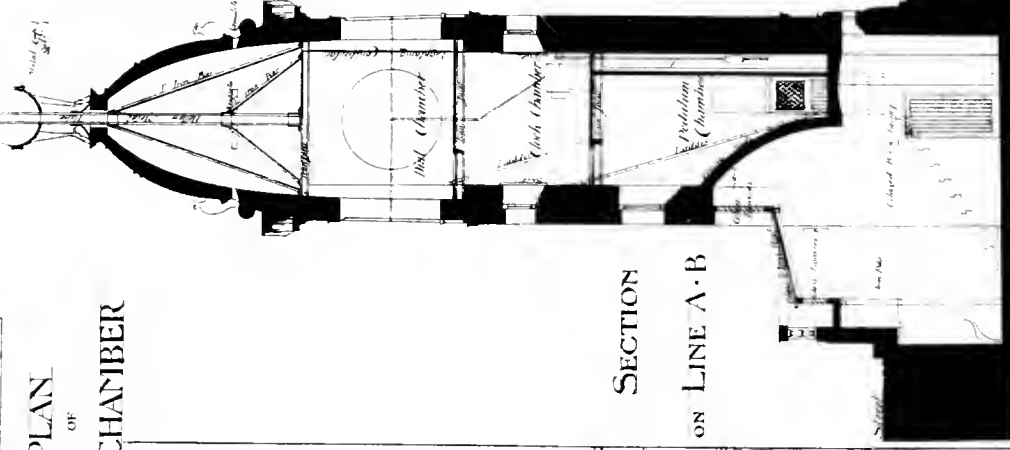
THIRD PREMIATED DESIGN
JAMES M. MACLAREN
ARCHITECT



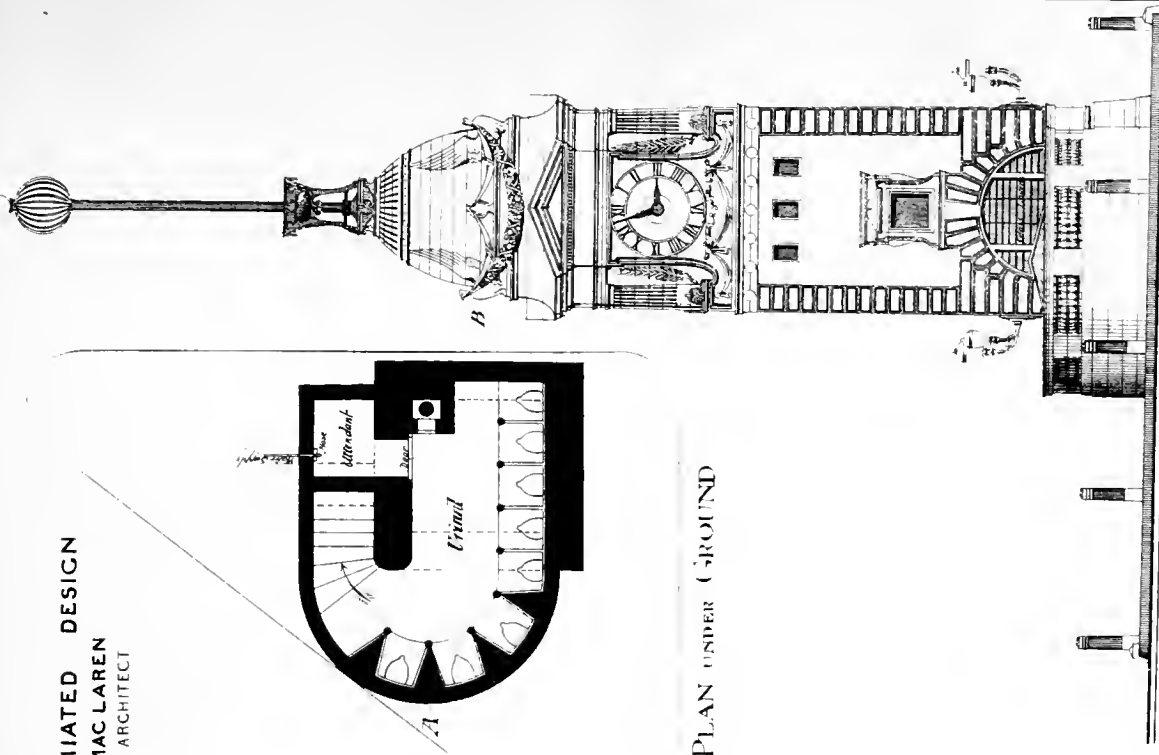
PLAN OF DIAL CHAMBER



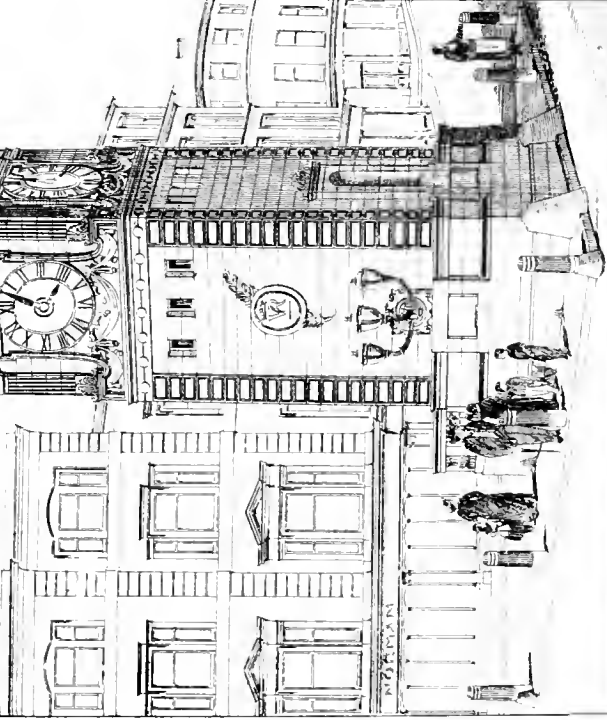
PLAN UNDER GROUND



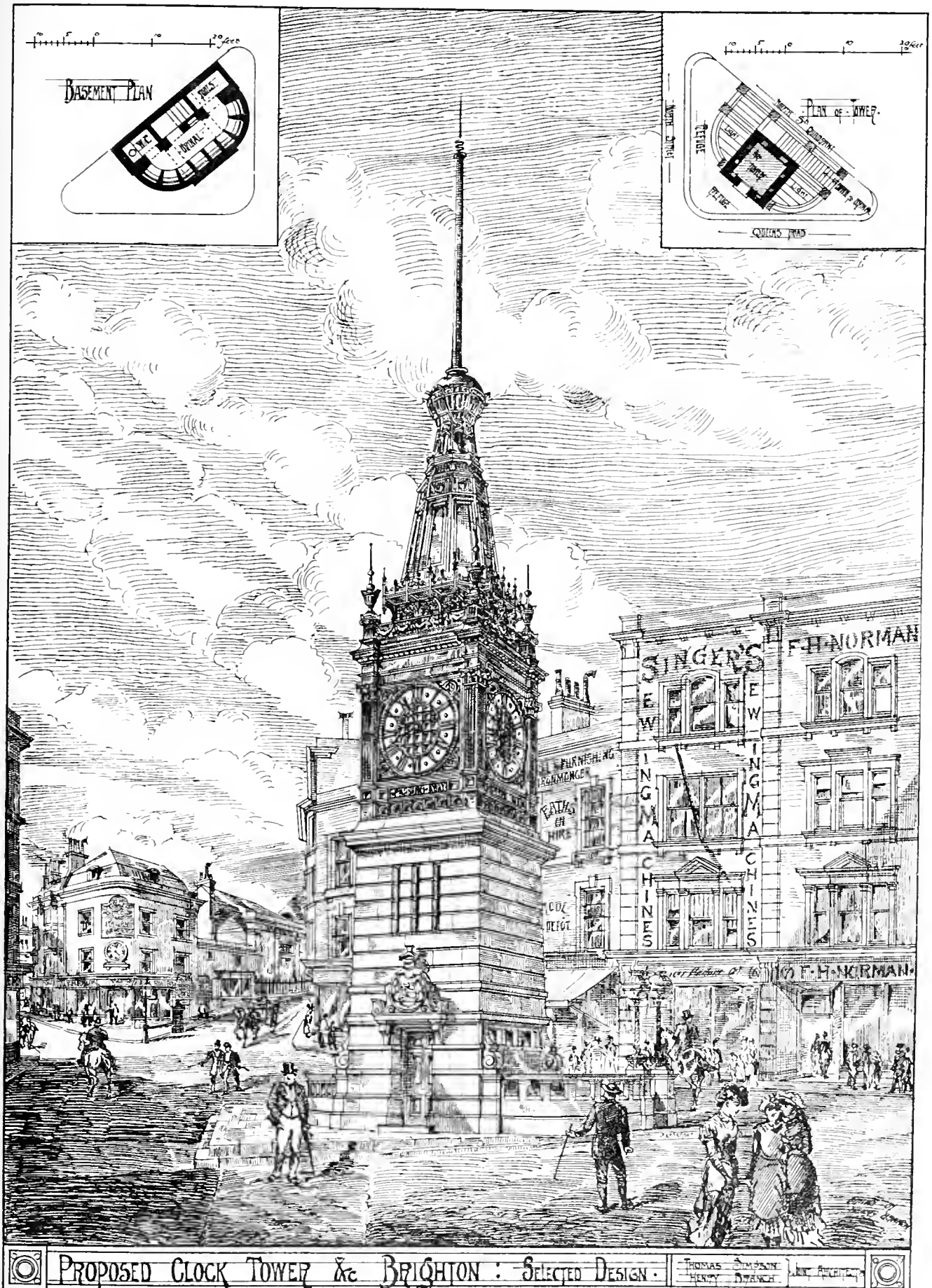
SECTION
ON LINE A-B



WEST ELEVATION







PROPOSED CLOCK TOWER &c BRIGHTON: SELECTED DESIGN.

THOMAS SIMPSON
HENRY DUNN
JAMES BRIGHT

3
Be
open
for
build
high
The
be
et
and
trans
177
kic
com
par
rec
36
th
es
ha
an
is
38
wi
co
lin
an
m
8
w
th
o
s
b
w
e
s
e
v

Building Intelligence.

BRIGHTON.—The Prince and Princess of Wales opened yesterday (Thursday) the New Hospital for Sick Children, on the Dyke-road. The building is Queen Anne in style, and is built of bright red bricks, with terra-cotta dressings. The ground-plan is L-shaped, the one wing of building containing the three wards, and the other the administrative department, entrance, and general offices. To the right of the entrance-hall are house-surgeon's sitting-room, 17ft. by 14ft., lavatory, store-room, and kitchen, 21ft. by 17ft., the latter apartment communicating by speaking-tubes with every part of the house. On the left of hall are reception and committee-rooms, a beard-room, 36ft. by 21ft., matron's-room and stores. In the centre of building is the double-flight staircase, of stone with iron balusters and mahogany handrail. Over the rooms already mentioned are the officers' bed-rooms, &c. The west wing is planned as three wards over one other, each 59ft. by 22ft., and lighted by seven large windows, and at night by two gaseliers. Each ward contains 20 beds, and an infant's swing-cot. The walls of ground and first floors are lined with Mycenaean marble of light colour and purple-veined, with dados of Belgian green marble on ground-floor, and Rouge Royal marble in first floor, the lining of second-floor being of Keene's cement. The floors are packed with layers of asphalt and cement, in which the joists are placed, and on these are floorings of deal and oak. Warming is by a hot-air stove in the centre of each ward, and ventilation by light shafts communicating with Boyle's ventilators in the roof. At the south-west corner of each ward is a bath-room, fitted with Scheele's apparatus, and at the north-west corner are the lavatory and water-closets, fitted with Bostell's Brighton valveless apparatus. These baths and w.c.'s are contained in towers which rise from the angles of the west front of hospital, and contain the water-cisterns. In the eastern wing on top is a supplementary ward for a dozen patients. Messrs. Lainson and Sen were the architects, and Messrs. Cheeseman and Co., also of Brighton, the builders; the cost has been considerably more than £11,000.

CITY AND GUILDS OF LONDON INSTITUTE.—The foundation-stone of the City and Guilds of London Institute was laid on Monday afternoon. The Institute which has the matter in hand is one founded by the Corporation and Guilds of the City of London, and the Central Institution is situated at South Kensington, in the Exhibition-road, between the Indian Museum and the Albert Hall. It will contain 9 workshops, 3 sheds, and a mathematical classroom for the mechanical department; 13 class-rooms for physics, 7 class-rooms for art; 17 laboratories and class-rooms for chemistry, and one workshop for metallurgy; a council-chamber and six other rooms for the management; two lecture-theatres and preparation-rooms, with a large number of students' rooms, and with accommodation for house-keeper, porter, engine-rooms, heating apparatus, giving a total floor-space of 57,605ft. The architect is Mr. Alfred Waterhouse, A.R.A.

HOLBY.—The small but interesting old church of Holby, near York, having undergone restoration and refitting, was reopened for public worship last week. The cost of restoration has been about £1,000. Churchwarden restorers 100 years since had taken down the upper part of the stone building, removed the lead roofs and ancient mullioned windows, and replaced the walls with brick and the windows with sashes. Several feet of stonework, and what is believed to be the base of a very ancient apse, remained untouched. The form and workmanship of these remains pointed to its very early origin, and the architect (Mr. J. R. Naylor, of Derby) taking these points as an intimation of style, has so remodelled the church that it is a credit to all connected with the restoration. Stones with ornament and mouldings as far back as the 12th century have been found embedded in the modern brick walls; these have been carefully preserved, and now form part of the jambs to the apse windows. The whole style and fashion of the present church is in accordance with these decided marks of the early origin of this foundation.

LONGTON.—The public baths erected by the Longton Corporation were opened on Wednesday week. The exterior of the building is of red brick, relieved with white stone facings. The general design is Gothic, a prominent feature in the building being an ornamented clock-tower, provision being made for three dials. The buildings are from the designs and have been under the constant supervision of Mr. A. Hardwicke, the borough surveyor. The builders have been Messrs. Inskip, of Longton; the machinery, boilers, &c., have been contracted for by Messrs. Bradford, of Manchester, and Mr. G. H. Plant, of Longton, has carried out the plumbing work; Mr. Darwin, the manager of the gasworks, having had charge of the lighting arrangements. The whole is estimated to cost £8,000.

METROPOLITAN BOARD OF WORKS.—At the weekly meeting of this board, held on Friday, Baron H. de Worms, M.P., presented a memorial from the Greenwich District Board in support of a proposal to form a tunnel beneath the Thames between Greenwich and Poplar. Having referred to the urgent necessity that existed for better means of communication between the North and South of London, east of London-bridge, it was explained that the present scheme was for a tunnel from the East India Docks-road to the Greenwich and Woolwich main road; the gradients will be one in 40; the length of tunnel beneath the river 600 yards; and the estimated cost, without the approaches, about £500,000—less than half what it would have cost a few years since, the art of tunnel-boring having greatly advanced of late. The memorial was referred to the works committee, as was another from the Lewisham District Board of Works, asking for an extension of the main sewer from Rushey-green to Southend. For the appointment of surveyor's assistant, in the superintending architect's department, the following six candidates had been selected by a committee:—W. M. Hudson, J. Briggs, A. Hemingway, C. H. Love, A. W. Page, and F. W. Pritchard, and, on being put to the vote, Mr. Hudson obtained the post. An application from Rotherhithe vestry, for sanction to borrow £2,000 for granite and York paving works, was granted.

PARKSTONE.—A new church, dedicated to St. John the Evangelist, and erected to supply the needs of Parkstone, was opened at Heatherlands, on Wednesday, or at least that portion of it, the western, which has been completed. The architects are Messrs. Horner and Adams, of Bournemouth, and the builders the Messrs. Alner, of Parkstone. The estimated cost of the completed portion is about £800, and about as much again will be required to finish the building. The portion which was opened on Wednesday will seat about 160 people. The style is plain Gothic, and the church is built of white brick, supplied by Mr. Coles, of Bournemouth, with Bath dressings. It is 40ft. long, by 28ft. wide, and has a south porch and a vestry. The pews are of modern character, and of stained pine; the flooring of the nave is of tiles from the Poole Architectural Pottery. The building has been about twelve months in course of erection.

ST. CATHERINE'S CHURCH (R.C.) WEST DRAYTON.—The Chapel of the Sacred Heart of Jesus in this church has just been completed by the erection of an altar and reredos of stone and alabaster, designed to the style of the church, that of the 14th century. The altar is of the open form, with a stone slab supported on columns in front, and a sculptured wall at the back. The reredos occupies the whole width of the chapel, returning at the sides and terminated by columns carrying angels, it reaches nearly to the roof, and is enriched by a statue of our Lord sculptured in white alabaster, and by paintings by Mr. J. Bouvier. The execution of this work was entrusted to Mr. G. F. Anstey. The side-screens to this chapel and to the Lady-chapel are of stone, forming integral portions of the structure, and have now been completed according to the design of the architect by the execution of the carving, and of sculptured panels containing the Annunciation and the Agony in the Garden. In the baptistry the two-light window has been filled with stained glass, the work of Messrs. Lavers, Barrand, and Westlake, and a stone font erected. The font is octangular in plan, seven of the sides are occupied with panels containing the emblems of the

Passion, and the sacred monogram; the 8th is designed as a niche, having in it a sculptured group of the Baptism of our Lord. The font and carving to the screens were executed by Mr. McCulloch, the whole from the designs and under the direction of the architect, Mr. S. J. Nicholl, of 1, Caversham-road.

WANTAGE.—Tuesday week, being the festival of St. Mary's Home, was chosen for opening the two new wings that have just been added to this school. Mr. Butterfield, who designed the original building, furnished the plans for the new portion, which is built in the same style (Late 14th-century work), the lower part of the outer walls being brick, and the upper part timber filled in with cement. The bricks are from the district, and the building has a string of Bath stone. The building has been erected by Mr. Norris, of Sunningdale, and the clerk of the works is Mr. C. Brown.

CHIPS.

The corner-stone of a new infirmary at the corner of Carleton and Halifax-roads, Dewsbury, was laid on Thursday week, with Masonic honours. The building will be erected of Hipperholme stone, will have a tower 90ft. in height, and will be Gothic in style. The estimated cost is £15,000.

The roof of a terrace of the guard-house at Windsor Castle is being laid with Claridge's Pyramont asphalt. The existing asphalt having failed, it is being taken off, and the concrete on which it was laid is being made good.

The vestry of the parish of Saint Mary-at-Hill have elected Mr. Alexander Peebles, F.R.I.B.A., of Salter's-hall-court, Cannon-street, to be their surveyor, in succession to the late Mr. John Collier, deceased.

Mr. Francis J. Bancroft, a junior assistant employed in the highways department of the Islington vestry, and a student of the Highbury Institute of Art, has passed the examination in advanced building construction at South Kensington. We have noticed with approval Mr. Bancroft's work sent to the recent fine-art exhibitions at the Alexandra Palace and Richmond, Surrey.

At a recent special meeting of the Hornsey local board of health a discussion arose as to the manner in which Mr. Rogers, the surveyor to the board, had carried out his duties of late. It being stated on his behalf that the irregularity of his attendance was due to severe personal and domestic affliction, it was moved that Mr. Rogers be allowed three months' leave of absence, but the board decided by a majority of one that he be granted one quarter's salary and be dismissed at once. This decision was arrived at without hearing Mr. Rogers, who has recently supervised the drainage scheme carried out from Mr. Baldwin Latham's plans, and also completed a scheme of paving the district, at a cost of £14,000. At a subsequent meeting of the board the question of appointing another surveyor has been adjourned till next week.

Extensive additions are about to be made to the college at Pontypool. Mr. George Morgan, of Carmarthen, is the architect.

The capstone of the memorial to Thomas Clarkson, the slave emancipator, which has been erected in the High-street of Wisbech, was placed in position last week by Mr. Henry Pooley, the borough surveyor, and the workmen afterwards dined together in celebration of the event.

The memorial stones of new Sunday-schools in connection with the Wesleyan Church, College-park, Lewisham, were laid on Wednesday week. The buildings will be Early English in style, harmonising with the adjacent church; accommodation will be provided in the main room for about 300 scholars, in the infants' room for 100, and there will also be two class-rooms. The architect is Mr. Charles Bull, of Dashwood-house, Old Broad-street, London, and the builders were Messrs. D. and R. Kinnaird, of College-park, Lewisham; the cost will be about £900.

Amongst the exhibits at the Royal Agricultural Show, at Derby, is a new patent lock-jaw roofing tile, invented and made by Mr. Charles D. Phillips, of Emlyn works, Newport, Mon.; the tiles, which can be made in any clay, lock into one another at sides, top, and bottom, and are said to make an impervious roof at a price but slightly exceeding that of common pan-tiles.

A new school in Kirby-street, Snow's-fields, Bermondsey, was opened by the chairman of the London School Board, on Monday. It will accommodate 300 children, and has been erected from plans prepared in the school-board offices at a cost for building and site of £14,559 11s. 9d., or £13 3s. 11d. per head.

"To a practical man with a taste for mechanics, and the bumps of constructive treat fairly well developed, we can credit no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *Engish Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Engineer*. Price Two-pence of all newsmen, or post free 23d.—31, Tavistock street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 5s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and SIXPENCE for every eight words after. All Situation advertisements must be prepared.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum post free to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33fr. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Mr. CHARLES WILSON, of 13 and 15, Laight-street, New York City, is authorized to receive American subscriptions at the rate of 6 dols. 40c. per annum.

Mr. R. M. TUTTLE, of Titusville, Penn., U.S.A., is also authorised to receive subscriptions at the same rate.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL., Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—V. T.—A. W.—T. H. C.—J. A. and Son.—R. and W.—P. V. and Co.—G. and P.—R. and K.—D. and L.

"BUILDING NEWS" DESIGNING CLUB.

DRAWINGS RECEIVED.—Per, Quiet and Simple, That's my Idea, Tom Finch, Walter, Romeo, Alpha, Desire, K. E. S. W., Trial, June, Pupil J. J. Jock, Hamlet, Vignette, Fiat, Will, Cave Deo, Bon Ton, Merit, Walter H. Rex, Con. In Avant, Bonus Hominus, Jack, Parvis, Unle Buldi, Good Luck to Your Fishing, Lancaster, Montague, Ambition, Tutor, X. L., Finem Respiece, Walter, Iota, Black and White, Veritas Vincit, H. F. in circle, Spes. Our review will be published next week.

ERRATA.

In first col., p. 64, last week, line 34, dele "if," and after "had" insert "letter have." BRISTOL-BUILDER P. TRAP.—In Mr. Davies' letter last week, for "Southbury" read "Lothbury" old church.

Correspondence.

SANITARY PLUMBING, AND PLUMBERS' WORK.

To the Editor of the BUILDING NEWS.

SIR,—Once more I have to address you on account of Mr. Hellyer's lectures; this time, in reference to that of the 13th inst.

At this particular lecture Mr. Hellyer seems to have somehow begun to think my criticism too pungent. When a man sets himself forward as a public lecturer, especially on a subject affecting the health of the whole nation, he must fully expect to lay himself open to criticism, and if he is incessantly making blunders that every practical man should see, he must not allow his temper to get the better of him. To wit: Mr. Hellyer descended to insolence when he publicly announced that I was "not worth smoke," and that he should not answer my letters in the BUILDING NEWS. Why? Because he cannot. Ergo, he does not.

At this lecture Mr. Hellyer provided a very extensive diagram to illustrate to his audience that Bramah used to his closet an ∞ -trap, but this was only as a waste-pipe. I presume, in his strong advocacy of the ∞ -trap, that it did not answer his purpose at the same time to let his listeners know, by showing them a full diagram, that underneath the closet Bramah had a \odot -trap to protect the inefficient ∞ -trap, which, whenever placed in the position shown in his diagram, is constantly a nuisance, and getting stopped up. In your issue of the 15th inst., you report that I said that "in Bramah's closets a \odot -trap was always fixed underneath," instead of which it should have been that "Bramah's own people always fixed the \odot -trap underneath which protected the ∞ ."

Another of Mr. Hellyer's exaggerations is in his comparison of the relative sizes of the pan-closet, and that of the valve-box of the valve-closet. What sort of a valve-box would it be that was only 9in. or 10in. super. wide?

Now, in reference to ventilation, Mr. Hellyer says that "till within these last few years the sizes of ventilating or air shafts were 1½in. to 1½in. on 4in., 6in., and 6in. pipes." This is wrong, for there are plenty of closets now in London which have been fixed at least 50 years, having the same sized air-pipe as soil-pipe carried to the top of the house; if a public lecturer falls into such errors as this, he must fully expect to be corrected.

Mr. Hellyer may perhaps think that I am somewhat severe in my criticisms; but I could not help pitying him at this lecture, when he could not get his glass ventilating model to act properly. One gentleman suggested that perhaps it was "bad ventilation in the room." Did he mean in the pipes? If Mr. H. had taken his ∞ -trap (which was filled with cold water) away, he would have found a wonderful difference in the working of the apparatus.

"H. B." writes in your last issue that I have adopted a new theory in saying that the ∞ -trap has a better chance of clearing itself than the \odot -trap, of all foreign matters, such as gravel, &c. Let me tell that gentleman that 12 years ago I explained in a public room that such was the case, for the reason that the gravel, &c., being heavy, and consequently settling to the bottom, it caught the full impetus of the current of water; whereas the floating matter being at the smaller or inner side of the circle, did not meet with the same force, so was consequently often left unmoved. Any man who understands hydraulics can comprehend this. I still adhere to my opinion that the \odot is far superior to the ∞ -trap, and as he challenges me, I am prepared at any time to prove it, and, in fact, I prefer it to the V or Mansergh trap. "H. B." also thinks I am unfair to Mr. Hellyer; but when a man professes to instruct members of any trade, and in doing so makes palpable mistakes, it is at least someone's duty to try his brother-tradesmen to put him right.—I am, &c.,

P. J. DAVIES, Hon. Mem. A.S.P.

SIR,—In your notice of my last lecture I am made to say that I would not write to your paper. This remark conveys quite a wrong impression. I certainly mentioned the BUILDING NEWS, but not with the slightest disrespect, for it is a paper I always have on my table, and have recommended to many of my friends. My simple meaning in the remark referred to being that I did not intend to write to any paper until the lectures were over; but there is now to be a discussion, and no letter may be needed.—I am, &c.,

S. STEVENS HELLYER.

21, Newcastle-street, 19th July.

BUILDING-STONES.

SIR,—Had the "Bristol Builder" who writes in your last issue given a moment's reflection, he might have seen that the buildings he names are outside the argument, they being all of recent date; for although the fact of a stone decaying within twenty years is conclusive as to its worthlessness, yet its standing well that length of time can be but negative proof of its goodness, as it ought to last two hundred years without much sign of deterioration.

His reference to a townsman linking his engagements is, unfortunately, not a singular matter in the building trade. "Bristol Builder" is doubtless familiar with the fact. For unscrupulous unscrupulousness the building trade is notorious. To shift, to shirk, to cheat,

is too much the rule. I, in common with the generality of architects, I believe, are in the practice of specifying Box-ground stone, leaving it to the clerk of works to see that such is provided; but that the cupidity of contractors, and the ignorance or carelessness of the clerk of works, renders the intention abortive I have long been aware, but failed to see a remedy for it. For the future, however, if I specify Box-ground, I will see that I get it. I shall require the builder to procure the stone from Messrs. Pictor, or some other well-known merchant, and to produce the invoice of same, and I also shall communicate with the stone-merchant on the subject. Owing to Box-ground being a little more expensive to work than inferior sorts of Bath stone, builders will, if possible, avoid its use, and, moreover, the truth about Box-stone is this, as a stone merchant put it to me, "there is good Box-ground, and there is bad Box-ground." It is therefore clear, I think, that in all buildings of importance the architect should confer with the stone-merchant, else there can be no assurance whatever that a good stone is used. The Bath-stone merchant is the only person who thoroughly understands the qualities of this very variable stone, and the onus should rest with him.

Reference has been made to the good condition of the Grosvenor Hotel. The stone certainly there stands well—in fact, the example stands alone; whilst common Bath won't last five years, here is an instance at the quite antique period of fifteen years, and not crumbling! Certainly the Brobdingnagian character of the details is in no small degree the cause of this. The projection of the main cornice and of the balcony are, too, very protective. It is certainly a good example for London, as I hold that the atmospheric influences here are much more deleterious than elsewhere. What I should like to know is this: Is it ascertained what quarry the stone came from, and could more of the same be procured, with certainty as to like durability? As to the example at Kensington, which is not good, as my description was not a mere pictorial one or based on mere assumption, and as I have no disposition to truck it, I am quite willing to take any of my Bath correspondents to the place. There is sufficient reason for not being more explicit. I have been told by one I have taken, that the major part of the decayed stones is "Stoke-ground."

I have previously had the statement of two witnesses that the stone was all Box-ground.

It is queer about this example that it was specified to be Tisbury.—I am, &c.

PHILIP E. MASEY.

SIR,—The letter of a "Bristol Builder" in your last issue calls for some explanation from us as the contractors for the restoration of St. George's Church, Gloucestershire.

The writer says the architect "did not get what he specified," and thus by implication he charges us with dishonesty, and the architect with having been deceived.

We take this opportunity to inform "Bristol Builder" that the change from "Box-ground" stone to that used, was made on our own recommendation, with the full concurrence of the architect, believing as we do that it is in all respects equal to, and in many superior to, Box-ground.

Of the merits of the latter stone we are not ignorant; but we are sure "Bristol Builder" will agree with us, that if as good a weather-stone can be found, free from the objections that Box-ground has, it would be to the advantage of all concerned to recommend and adopt it.

Our experience of the stone we used at St. George's is that it is superior to Box-ground, and hence we advised its use. Our object, however, in writing you is not to discuss the relative merits of particular building-stones, but to clear ourselves from what we feel to be an unfounded imputation, and one, we think, a "Bristol Builder" would not willingly bring against us.

We would have informed him of the facts privately, but could not do this to an anonymous correspondent.—We are, &c.

WILLIAM COWLIN AND SON.

3, Brunswick-square, Bristol, July 20.

P.S.—What does "B. B." mean by a "loony" on the face of a stone? Surely a lining is the outer covering of anything, and not the

callousness to which all exposed Bath stones are more or less liable?

FRESH-AIR VENTILATION.

SIR,—In looking through the notes on sanitary matters in your last week's paper, I notice that your correspondent condemns all manner of ventilation to soil-pipe traps, &c., except that of small pipes carried from the traps to top of roof. Now I must say that he cannot have given the matter a fair trial. Some time ago there were many letters in your paper from eminent men, giving valuable instruction, and advocating the use of fresh-air inlets, full-bore vents, cowls, &c. Having a great deal to do with ventilation at that time, I gave the matter serious attention, and can add my testimony to that of others in saying that the fresh-air method of ventilation is far in advance of any other. Below I give form of specification I adopt, and would further add that I never allow a U-trap, or any metal apparatus with container, to be used on a job, always selecting an earthenware w.c. cast in one piece and containing its own trap.

"SPECIFICATION OF W.C. FOR HOUSE.

"The sewers are to be connected with soil-pipe from w.c. through one of Stiff's (Lambeth) 'Intercepted traps,' the vent-hole next soil-pipe is to be left open, as well as the central vent, but the vent to sewer is to be sealed up. The trap is to be built in a chamber, to which fresh-air is admitted by means of a 4in. socket-drain laid on to same from some convenient position below level of trap, such as through the area walls. The w.c. is to be one of 'Bostel's Brighton Excelsior w.c.'s,' connected with the iron soil-pipe by means of a 4in. lead arm of 8lb. lead, the joints of which must be of red-lead and tow. A 4in. circular iron soil-pipe connected with Stiff's trap as shown, is to be fixed 2in. clear of the walls carried up above the roof and finished at the top with one of Howorth's 4in. Archimedean screw cowls (price 26s.), and the lead soil-pipe from w.c. (which is to be as straight as possible) connected with it by means an iron arm cast on the pipe. The water is to be laid on to w.c. through a 1½in. pipe, &c."—I am, &c.,

WILLIAM H. WILLETT.

Architectural Training School, Hereford, July 19th, 1881.

P.S.—I have caused between 30 and 40 such shafts to be erected within the last three years, and the owners would be only too pleased to recommend them.

WINDERMERE CHURCH COMPETITION.

SIR,—There is a paragraph under the above heading, in your issue of the 5th inst., that is incorrect in several particulars, and I ask your permission to amend them. It is first of all stated that the successful competitor is now a pupil in the office of a firm of architects at Carlisle.

Mr. Pattinson (the successful competitor) is an assistant clerk to a firm at Carlisle, but is about to leave their employ. It is also stated that the design by Mr. Bray, of Kendal, was placed second, and that by Messrs. Holton and Connon, of Leeds, third. This is wholly untrue, as there was no such classification. The committee, after carefully examining the fifty-two designs sent in, reduced the number to six, and from these selected Mr. Pattinson's without placing the others.

I hardly deem it worth while to notice the unworthy insinuation of the last paragraph, which hints that there was favouritism displayed by the committee. Still, in the interest of truth and fair dealing, let me simply say that there is not a word of truth in it. I fearlessly assert that till the envelope was opened bearing the motto of the successful design, not one member of the committee knew who was the author. I may state that two of my own near friends were unsuccessful competitors.

Trusting to your sense of justice to give insertion to this plain statement of facts,—I am, &c.,

EDWARD P. STOCK

(Chairman of the Committee).

Windermere, July 20.

BAGSHOT CHURCH COMPETITION.

SIR,—In November last the committee of the above advertised for designs, a short time only being allowed architects to prepare their drawings. Notwithstanding, however, the anxiety displayed by the committee to get possession of

the designs, seven months elapsed before the unsuccessful competitors had them returned. This competition is only another example of how architects are treated as *docile creatures* to be made use of. On the 20th December last we received the following post-card:—

RE BAGSHOT CHURCH.

The Honorary Secretary, Church Bidding Committee, begs to acknowledge receipt of Messrs. ———'s drawings. The Committee will not meet till after Christmas, but the competition is closed.

Bagshot, Dec. 20, 1880.

After waiting three months we deemed it desirable to remind this lethargic committee of our existence, to which we received the following:—

RE PROPOSED CHURCH.

Bagshot, Surrey, March 13, 1881.

DEAR SIRS,—There has been unexpected delay in settling about this matter, partly through the absence of the President of the Committee, H.R.H. the Duke of Connaught, for a considerable time, but I expect a final meeting will be now held and a decision come to, the result of which I will communicate to you.—Yours truly, (Signed) W. THOS. RAYNE, Acting Hon. Sec.

The onus of delay is here thrown upon the Royal President, who was probably not aware that many architects were upon tenterhooks, anxiously awaiting his return and decision. On receipt of the above communication we cheerfully settled down for another three months, when we again ventured to apply the proverbial "long pole," and remind the committee of their duty to the competitors, when we were favoured with the following (the italics are our own):—

PROPOSED NEW CHURCH.

Bagshot, June 21, 1881.

SIRS,—I will, if you wish it, return your plans at once. A decision will be come to by the Committee as soon as the result of the grand bazaar just held under the patronage of the Royal Family is known.—Yours truly, (Signed) W. THOS. RAYNE, Hon. Sec.

This letter can hardly be termed respectful to those who have given their time and experience with so little prospect of adequate return, whilst at the same time it shows that an act of injustice (to say the least of it) has been committed towards those competitors who carefully adhered to the conditions of the competition, which stipulated £3,000 as the utmost cost of the building, and on the faith of this representation, competitors (ourselves included) based their designs. As will be seen from the letter, the committee, in selecting the design, entirely ignored their own instructions as to cost, &c., by setting up another standard—to wit, the proceeds of "the Grand Bazaar, held under the patronage of the Royal Family." We are not aware what the financial results of this bazaar is; but it is extremely unfair that a design should have been selected which can be built with the nett result, whether of greater or lesser amount than the stipulated £3,000, which clearly appears to have been the case. The last straw was yet to be applied to the camel's back, for our drawings were returned (which, in fairness to the committee we must state, were carriage-paid), prior to which we received the following letter:—

PROPOSED NEW CHURCH.

Bagshot, July 12, 1881.

DEAR SIRS,—In returning your drawings, the Church Committee desire me to thank you for having furnished them, and to express regret at the delay that has unavoidably occurred in making a selection.—Yours faithfully, (Signed) W. THOS. RAYNE, Acting Hon. Sec.

The above is only on a par with the other eccentricities indulged in by this committee. Perhaps some of your readers can inform us who is the unfortunate man?—We are, &c.,

COMPETITORS.

ABBOT'S HOSPITAL, GUILDFORD.

SIR,—Your correspondent, James W. Stevens, in taking exception to Mr. Hardy's title, has himself been betrayed into an orthographical *lapsus*. As an old schoolfellow, may I ask him from whence he gains authority for doubling the final consonant?

Alike on his sonorous-worded monument in Holy Trinity Church, Guildford, and in his will, we find the Archbishop's name spelt *Abbot*, which also similarly occurs throughout the life taken from the "Biographia Britica," as well as in the memoirs of his worthy brothers.

In one case only, and that evidently by an error in transcription, can I find any evidence of the dual t, this isolated instance occurring in the Latin Charter of the Hospital, where the founder's brother, Richard, is referred to. By the bye, the said Charter contains some very quaintly-turned phrases, as to repairs, &c., which might well have been introduced in your descriptive sketch.—I am, &c.,

E. L. L.

Guildford, July 13.

Entercommunication.

QUESTIONS.

[6575].—**Parian Cement.**—I shall be glad if some gentleman well acquainted with the nature of Parian cement would give me his practical opinion upon the following:—The internal walls of a sick-ward are covered with polished parian, salmon tints, in the composition, and having been done for a number of years, the tint is fading, giving the walls and ceiling, which was white, a very patchy and unsightly appearance. Is it possible to restore the tint upon the surface? If not, what is the next best thing to do with it, and how to treat the ceiling? Whatever is applied must be a disinfectant, cheerful in tint, and reflect light. Would paint do, and what kind? It should be finished in a superior manner, if painted, with a polish, not a fatty gloss.—OLD SENSACREAR.

[6576].—**R. A.**—Would some reader kindly inform me how the degree of R. A. is obtained? I am an architectural student in Scotland. That being the case, would I require to come to London to pass an exam. or what? Please give full particulars.—JACOBUS.

[6577].—**Graphic Statics.**—I should be greatly obliged to any reader who would tell me what is the best work on graphic statics peculiarly useful to an architect, and the name of the publisher? I should like an answer from an experienced man.—E. D.

[6578].—**Sun-Sheds.**—I shall feel exceedingly obliged if any reader can refer me to any work or numbers of your journal where I shall find designs of sun sheds or arbours suited for asylum airing grounds. The designs should be simple but artistic, cheap and durable—a combination more easily desired than obtained.—A. SAUNDERS, Medical Supt., Devon County Asylum, Exminster.

REPLIES.

[6545].—**Ruins.**—Although several of our English cathedrals require the hand of the restorer, there are none literally in ruins. The ruined abbey churches are—Alnwick, Bayham, Bylands, Bolton, Croxland, Easby, Fountains, Furness, Glastonbury, Hales, Kirkstall, Netley, Rivaux, St. Augustine's Gateway, St. Mary's (York), Tintern, Wenlock, Whitby.—FRED J. FREEMAN.

[6552].—**Thickness of Piers of Arches.**—I am much obliged to Hugh McLachlan for his answer to my query. I do not know integral calculus, so must use one of the more simple methods given for finding the thickness of piers. Gwilt's formula, as I understand it, seems wrong altogether, for, as shown below, an arch with the piers 20ft. high appears to require thinner piers than one with the piers 10ft. high. It seems to me that, whether the arch is loaded or not, if the piers are increased in height, they ought also to be in thickness. Given a segmental-pointed arch with a span (=*chord*) of 24ft. —rise (=*versed sine*) of 8'4"—the centres being 8'5 below the springing line, and 3'00 on each side from centre line of arch—the radius 17'5—the thickness of arch 2'0—height of pier 10'0. Gwilt's formula is

$$x = \sqrt{2p + \frac{2pd + 2ne - 2me + \frac{b^2}{a^2} + \frac{b}{a}}{a}}$$

The values of these are

$$x = \sqrt{23'288 + \frac{146'402 + 22'232 - 22'607}{10,000} + 2'465} = 1'551 = 5'0\ 8$$

Now, taking a similar arch, but the pier 20'000 instead of 10'000, we have

$$x = \sqrt{26'288 + \frac{146'402 + 22'232 - 22'607}{20,000} + '601} = 7'755 = 4'071$$

The above values were all carefully worked out by calculation, not geometrically, and it was my endeavour to find them from the fewest possible given dimensions, viz., the span, thickness of arch, height of piers, radius, and position of centres with regard to the springing line. All other dimensions required by the formula were calculated.—J. H. M.

[6554].—**Decoration.**—I should suggest a dark brown colour as being the most suitable for your dado.—FRED J. FREEMAN.

[6555].—**Staircasing.**—In answer to "Shrewsbury," get Nicholson's or Riddell's works on "Staircasing."—FRED J. FREEMAN.

[6551].—**Well Puddling.**—Twelve inches thick of good yellow clay, well puddled, is quite sufficient, but care should be taken to have it well rammed. Another ring of 4in. brick in cement will be enough, but I should prefer 6in. thick of cement concrete composed of 1 part Portland cement to 5 parts broken stone slag or brick to pass a ¼in. ring, and 3 parts sand. Puddling should commence at level of stiff clay.—WILLIAM P. RYAN, C.E.

[6562].—**Defective Rain Water Tank.**—The whole of the old cement should be hacked off, and joints of brickwork raked out. The walls should then be rendered and floated with ½ Portland cement, ½ sand, ¼in. thick; cement should be pure. I have never known this to fail. I have constructed several rain water underground tanks, some as large as 15,000 gallons capacity, and have several others in my charge, and in no case has Portland cement failed, if plastering is properly done.—WILLIAM P. RYAN, C.E.

[6566].—**Excavation.**—The measurement of wells is usually taken as they are excavated, the diameter being the leading dimension. To ascertain the cubical contents, multiply half the circumference by half the diameter, and multiply the product by the depth.—G. H. G.

[6559].—**Assize Courts.**—A paper was read at the Royal Institute of British Architects on "Winchester Assize Courts" by Mr. T. H. Wyatt, the architect of the new part of the building, the cost of the new portion being about £22,000, and according to the published paper about 11d. per cubic foot. It was reported in the BUILDING NEWS, April 24, 1874, but according to this the cost

LEGAL INTELLIGENCE.

IN RE BRAID AND GWYNN.—In the Court of Bankruptcy, before Mr. Registrar Pepys, the debtors, who have presented a petition for liquidation, are builders carrying on business in Manor-street, Chelsea, and Vauxhall, under the name of Braid and Co. They estimate their debts at £43,000, of which £22,000 is secured, with assets, £51,000, consisting of stock-in-trade, building materials, plant, freehold and leasehold property, and book debts. Mr. J. Nicholls, on behalf of the debtors, and with the concurrence of creditors for £13,000, applied for the appointment of Mr. G. Baynam, accountant, as receiver and manager of the business, and for an injunction to restrain several actions. It appeared that the debtors had 300 persons in their employment, and their wages, amounting to £600 weekly, would have to be paid. There were also contracts in hand which required completion, otherwise a loss would ensue to the estate. His honour granted the application.

IN RE EDMUND.—This was a sitting for public examination in the Court of Bankruptcy, before Mr. Registrar Brongham. The bankrupt, who carried on business as a builder and contractor, in Colvestone-crescent, Ridley-road, Dalston, recently absconded, and was last heard of in South Africa. Upon the application of Mr. H. Reed for the trustee, His Honour ordered the usual memorandum of non-appearance to be entered upon the proceedings.

BROTHERLY AGREEMENT AND DISAGREEMENT.—At Brighton County-court an action was heard last week, in which Alfred Parsons, a builder, of Western-road, Hove, sued his brother, Albert Parsons, also a builder, of Conway-street, West Brighton, for £44 18s. 6d. as moneys due under building and plastering contracts. There was a counter-claim for £50, for rent; but for plaintiff it was contended that he only lived in one of Albert's houses as a warming-pan till a paying tenant should be secured. The counter-claim was dismissed, and a verdict given for plaintiff for £18.

CHIPS.

The erection of a new gas-holder for the corporation of Halifax has just been commenced at Stoney Roid. The contract has been taken by Mr. J. S. McKnight, and will occupy about a year in execution.

A new church, dedicated to St. John the Evangelist, is in course of erection on the hillside in Auckland-road, Upper Norwood. The architect is Mr. J. L. Pearson, R.A., and the contract for the first section of the work has been taken by Mr. John Shillitoe, of Birmingham, at £10,500, and is now in active progress, the arcade piers of nave having been set and the outer walls being raised at present nearly to the level of window-sills.

The Old Swan Inn at Fenny Stratford, which is stated to have exhibited the same sign ever since the year 1474, is now being pulled down, it having been decided by a limited liability company to erect on the site a town hall, from the designs of Mr. Gotto, of Leighton Buzzard. At a recent meeting of the directors of the new undertaking eight tenders, ranging from £947 10s. to £1,070, were opened for the execution of the scheme, and the lowest, that of Mr. Staniford, of the same town, was accepted.

St. Peter's Church, Cockett, near Swansea, a building erected in 1856, is now in course of enlargement by the addition of an aisle seating 250 persons. The architect is Mr. J. B. Fowler, of Brecon, and the cost about £1,000.

A new chapel is about to be built in the Commercial-road and Norway-place, Limehouse, E., from the designs of Mr. H. J. Hansom.

A museum of arms, which has been for some time in course of formation at Liège, is to be formally opened by the King and Queen of the Belgians on Tuesday next.

A fine-art loan exhibition is to be held at Canterbury, under the patronage of the Duke and Duchess of Edinburgh.

The fourth annual excursion of the Croydon and District Master Builders' Association will take place on Tuesday next, the 26th inst., when the members will proceed by boat from London-bridge to Richmond, dining together at the Star and Garter hotel.

The 13th-century parish-church of Holton St. Mary, near Mayland, Suffolk, is being restored at a cost of about £300. A clean sweep is being made of the old high pews, which are to be replaced by benches; the west gallery is also to be removed, the pulpit and Communion-rail replaced by new ones, the chancel-floor to be raised 6in., and the Communion-table raised another 4in. The stonework is to be restored, and both nave and chancel re-roofed. Mr. Hawkins, of Monks Eleigh, prepared the plans and is carrying out the work.

Our Office Table.

THE establishment of the Technological Examinations rendered manifest another want besides that of instructors, and that is the want of books in which a workman belonging to any particular trade could obtain the information he required about the theory of that trade. A new series of such text-books is now in preparation. It is intended eventually to include all the industries specified in the programme of the City Institute; but at first those branches of manufacture have been selected for treatment in which it appears that text-books are most required. The books will be prepared by writers familiar not only with the scientific principles involved in each trade, but with the practical details. They will be addressed to workmen and apprentices, who may be supposed to have some knowledge of the practical, if not of the theoretical, portions of their business. At the same time—since the books are intended for learners—the possession of such knowledge will not be assumed, but it will be for the most part taken for granted that the student will have in his workshop the opportunity of studying the various processes of which he reads, so that practice and theory may go hand in hand. The series will be edited by Mr. H. Trueman Wood, the Secretary of the Society of Arts, who prepared for the City Institute the revised scheme of Examinations.

PRINCESS BEATRICE opened an Art Loan Exhibition at the Albert Institute, Windsor, on Monday. The exhibition embraces works by Rubens, Michael Angelo, Titian, Canaletto, Otto Weber, Gainsborough, Bristow, E. M. Ward, J. Ward, Gustave Doré, Van de Velde, Walter Field, Greuze, E. W. Cook, R.A., D. MacIise, R.A., Van Beest, Sir Joshua Reynolds, Romney, H. Vernet, Constable, H. A. Bone, Sidney Cooper, Cattermole. The principal contributors are Sir R. B. Harvey, M.P. (Canaletto), Mr. S. Romaine, Mr. F. S. Barry, St. Leonard's Hill; Mr. J. Bowring, Mrs. E. M. Ward (including "Anne Boleyn at the Queen's Stairs, Tower," by the late E. M. Ward), Mr. V. W. Bates, Baron Schroder, Lord Ronald Gower, Mr. R. R. Holmes, Sir G. Elvey, Mr. F. Charlsey, &c. Her Majesty contributes a series of water-colours by Paul Sandby, chiefly of views of Windsor Castle and precincts, date 1750 to 1780, and several works by the same artist are contributed by other residents in the town. Mr. H. Henry sends several large panels of tapestry, some of which were recently exhibited at the Bassano Gallery. In the various rooms there are numerous other artistic exhibits.

THE Bedford Park (Limited) is formed for the purpose of purchasing the Bedford Park Estate at Chiswick. The estate was founded by Mr. J. T. Carr, with the view of securing in a London suburb houses of moderate rental, constructed on sound sanitary principles, and of a distinct architectural and decorative character. "That these features of the enterprise have been appreciated by the public is sufficiently attested by the development of the property during the period of its existence. Upwards of 350 houses have already been erected, and so great is the demand from intending tenants, that the work of building is now being pushed forward at the rate of 150 houses a year." The sum to be paid for the property is £265,850, but the owner agrees that £200,000 shall remain on mortgage for six years, at 4½ per cent. interest, and the balance will be received in cash or fully-paid shares. The capital is £125,000 in £10 shares, entitled to 5 per cent. dividend, and £100,000 in reversionary shares of £4 each to be issued as fully paid; these shares are entitled to the whole of the profits after the redemption of the ordinary shares. The vendor will make over to each subscriber for the ordinary shares one reversionary share in respect of each ordinary share allotted.

On Tuesday the annual outing of the Bristol Master Builders' Association took place, the members visiting Badminton House, the seat of the Duke of Beaufort, arriving there about one. Luncheon having been partaken of, the party were afforded an opportunity of viewing the apartments of Badminton House and the magnificent collection of family portraits possessed by the noble owner. Dinner was provided in the

evening at the Portcullis Inn, when an excellent repast was provided by the host, Mr. Davis. Mr. W. H. Cowlin (president of the association) was in the chair, and there were present Messrs. G. Wilkins, G. S. Nipper, J. Easterbrook, R. J. Crocker, J. Perkins, R. H. Carpenter (Benson and Carpenter), A. Krauss, J. Thorn, G. Humphreys, Lewis, H. A. Ferse, Chapel, J. Bastow, W. Church, S. Edwards, J. Hunter, H. Harris, Shorland, Thomas, Baneroff, G. F. Tuckey, T. Young, G. H. Perrin, Beecham, E. Jones, Marsh, J. Brown, Hannam, Wilkinson, Cloutman, W. Munroe, E. Jones (Emblin and Jones), W. Hawkin, W. Brock, E. Hatherly, A. J. Beavan, W. S. Lawrence, J. C. Wallop, R. G. Crawford, H. G. Curtis, T. Yalland, A. J. Williams, F. Ware, E. S. Wyld, A. Wilkins, Ley Dubin, and W. H. Phillips. Mr. Perrin (Taylor and Low Bros.), proposed the toast of the "Master Builders' Association," and remarked that they were all deeply interested in the toast because they were all bound up in the master builders of Bristol. He trusted that they would have better times in the future than they had experienced in the past year or more. (Hear, hear.) He had much pleasure in coupling with the toast the names of their excellent president, Mr. Cowlin, and their no less excellent vice-president, Mr. Wilkins.—The president and Vice-president having responded, the health of "The Visitors" was submitted by the Chairman, to which Mr. Beecham, Mr. S. Singer, and Mr. Wallop responded.

At a meeting of the Council of the City Church and Churchyard Protection Society held this week, Mr. E. B. Ferrey, F.R.I.B.A., in the chair, the following resolution, proposed by Mr. Henry Wright, Honorary Secretary, and seconded by Mr. H. C. Richards, barrister-at-law, was carried *nem. con.*:—"That the Council of the City Church and Churchyard Protection Society regret the recent attack upon the City Churches, and the threatened wholesale destruction of so many more, which they, on behalf of their numerous members throughout England, pledge themselves systematically to oppose by every means in their power." A large number of new members were elected, including several of the City incumbents, and most of whom have joined since the new attack upon the churches. Mr. Henry Wright stated he had communicated with several members of both Houses of Parliament respecting the Metropolitan Open Spaces Act (1871) Amendment Bill of 1881, that a clause may be inserted in committee exempting City churchyards from the Bill. Mr. H. C. Richards, barrister-at-law, has been appointed standing counsel to the society.

THE Fine Art and Industrial Exhibition at Cardiff, to be opened by the mayor of that borough on Friday next, the 29th inst., promises to be a great success. The exhibits are collected in the Drill Hall, and are divided into three sections, No. I. including paintings, drawings, engravings, photographs, tapestries and art needlework. Under section II. are classified statuary and mosaics, carved and engraved work, armour, pottery, glass, ancient documents and books, while in No. III. will be arranged wrought and cast work in metal, models, machinery in motion, specimens of manufactures and scientific apparatus. The contributions include a selection from Lord Bute's family pictures, Vicat Cole's "Noon," lent by Sir E. J. Reed, some fine tapestries from St. Fagan's Castle, pictures of local interest lent by residents of South Wales, and many works lent from their own studios by artists themselves. There will also be shown a fine collection of ivories belonging to the Right Hon. W. E. Gladstone. An industrial exhibition will be arranged in the gun-room attached to the Drill Hall, consisting of models and machinery in motion. The whole of the exhibition buildings and surroundings will be illumined by the electric light. Any profit accruing from the exhibition is to be devoted to the artistic furnishing and decoration of the Free Library, Museum and Schools for Science and Art, now being erected by the Corporation of Cardiff. A portion of that building having been specially designed for the reception of Works of Art, it is anticipated that the nucleus of a permanent Art Gallery for the Museum will be one of the results of the present exhibition, which will remain open till the end of September.

A GATHERING of scientific gentlemen and others took place on Wednesday afternoon at the works of Messrs. Clark and Standfield, the well-known engineers, of Lambeth, to witness some experiments with an apparatus termed Self-Adjusting Gripping Camel, and which has been invented by that firm with a view to recovering ships and their cargoes which have been wrecked, as well as to remove rocks and other obstructions from the mouths of harbours and rivers. The chief feature in the camel is that it takes hold of the ship completely, and restoring to it the buoyancy which it lost on submergence, brings it to the surface without any of the dangers of cutting the ship by chain attachments, which has always hitherto been the great difficulty with most other inventions for ship raising. The camel consists of a dome resting on a transverse pontoon girder, which is lowered down and lies across the vessel; attached to this are two wedge-shaped jaws which hang down on each side of the ship, and these carry on their inner faces gripping chains, curtains, and bags. These bags are capable of being inflated by air by means of tubes connected with the surface, and each portion of the apparatus can be filled with water or air at will for the purposes of inflation or submergence. The experiments were highly satisfactory, the models acting in every way to demonstrate the feasibility of this new plan for recovering some of the lost treasure seized upon by old Neptune. Miniature rocks and pieces of iron were also seized upon by the machine, and moved about from place to place.

CHIPS.

A fire broke out on Sunday on the extensive new buildings of Messrs. H. Boulton and Co., the Lambeth Potteries, it is supposed through the over-heating of a kiln, and resulted in the entire destruction of a building of four floors in height, 80ft. by 60ft. across, and in the partial destruction of the moulding premises adjoining, a building of three floors, about 200ft. by 70ft. The art department and show-rooms escaped injury.

Mr. E. J. Poynter, R.A., has resigned his office of Director for Art and Principal of the National Art Training School at South Kensington.

The Station Hotel, Inverness, is now rapidly approaching completion, and is fitted up with some very elaborate gasfittings, the gasaliers in the refreshment and coffee-rooms being especially handsome. They have been supplied by Messrs. Jones and Willis, of Birmingham and London.

Mr. Richard J. Collier, in a sale this week at Woodford Bridge, sold a plot containing about an acre and three quarters for £1,726.

The water commissioners of Stirling are about to construct, under powers given by a newly-passed private Act, an additional reservoir on the Touch Hills, from plans prepared by their engineer. The estimated cost of the undertaking is £15,000.

The Auckland burial board on Thursday night opened 42 tenders for laying out the grounds and erecting the buildings for the new cemetery, in accordance with plans prepared by Mr. J. P. Pritchett, of Darlington, whose plans were selected by competition. The consideration of the tenders was eventually adjourned till after legal sanction has been granted by the vestry.

For some time past complaints have been made about the offensive smells from the street-sewers at Portobello, near Edinburgh, and the town council adopted plans prepared by Mr. W. A. Carter, C.E., for remedying the evil. The improvements had consisted in relaying some of the sewers on the south side of the town, and in placing flushing tanks above the various conveying tanks. The alterations were formally inspected by the town authority the other day, and pronounced to be an efficient remedy.

The parish-church of Torpenbow is about to be resented and otherwise restored. The architect is Mr. John A. Cory, of Carlisle.

The Liverpool board of guardians have adopted plans prepared by Mr. T. Mellard Reed, of that city, for providing additional bedroom accommodation at the Hightown industrial school, at an estimated cost of £1,000.

A vicarage is about to be built for St. Lawrence's parish, near Ramsgate. Mr. Ewan Christian, of Whitehall, S.W., is the architect, and Mr. W. H. Port, the builder.

A brass lectern has been placed in South Pether-ton Church as a memorial of the late Lieut. H. W. Toller. It was designed and executed by Messrs. Singer, of Frome.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (TO-MORROW).—Royal Architectural Museum Sketching Club. Visit to Northfleet and Swanembe. Train from Charing cross, 2.15 p.m.

THURSDAY.—National Health Society. "The Science and Art of Sanitary Plumbing." By S. Stevens Hellyer. Final Lecture (No. VI.) Society of Arts room. 7.30 p.m.

FRIDAY.—"The Science and Art of Sanitary Plumbing." By S. Stevens Hellyer. Re-delivery of Lecture VI. Society of Arts room. 7.30 p.m.

Holloway's Pills.—These famous Pills purify the blood, and act most powerfully, yet soothingly, on the liver, stomach, kidneys, and bowels, giving tone, energy, and vigour to the whole system. They are wonderfully efficacious in all ailments incidental to females, and, as a general family medicine, are unequalled.

Douling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to

CHARLES TRASK,
Norton-sub-Hamdon, Ilminster, Somerset.
—[ADVT.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates. General Repairs and Alterations Executed. Experienced Workmen always in readiness, and sent to any part of the country.—[ADVT.]

BATH STONE.

BOX GROUND,

THE BEST FOR ALL EXTERNAL USE.

CORSHAM DOWN

CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.

(See trade advt. on p. XXV.) ADVT.

TENDERS.

Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ABERDEEN.—For repairs at Aberbrat, near Menai Bridge, for Mr. J. Richardson. Mr. R. G. Thomas, Menai Bridge, architect:—

Humphreys, W.	£300 0 0
Jones, H., Menai Bridge (accepted)	256 0 0

Messrs. Bennett Bros., Liverpool, tender accepted for grates, ranges, chimney-piece, painting, and decorating, &c.

ACTON, W.—For the erection of new folding-room at the Steyne Mills Laundry, Acton, for Messrs. Rush and Co. Mr. E. Monson, Jun., Grosvenor House, The Vale, Acton, W., architect. Quantities supplied:—

Eydman, E., Acton	£387 0 0
Maton, C., Kew	347 0 0
Dorey, J., Brentford	338 0 0
Nye, W., Ealing (accepted)	319 5 0

ACTON, W.—For the erection of house and laundry in Stratford-road, Acton, W., for Mr. T. J. Howell. Mr. E. Monson, Jun., Grosvenor House, The Vale, Acton, W., architect:—

Whiteman, T. W., Acton (accepted)	£600 0 0
-----------------------------------	----------

ROGERSWADE.—For building an engine-house in Rose-lane, for the Fire Brigade, for the vestry:—

Twelvevices (accepted)	£200 0 0
------------------------	----------

BIRMINGHAM.—For buildings, for the Mosely and Bal-sall Heath Institute, Birmingham. Mr. W. Hale, architect. Quantities supplied:—

	A.	B.	£
Taylor, S.	...	...	£4,100
Smith, T.	£2,350	£1,650	4,000
Barton, W. H.	2,297	1,636	3,933
Moffatt, J.	2,170	1,563	3,733
Matthews, W.	2,198	1,528	3,726
Burnley, J. and Sons	2,028	1,559	3,587
Brooks, W.	2,075	1,589	3,665
Smith, B. N.	2,090	1,449	3,538
Bowen, J.	1,990	1,485	3,474

A. Lecture-hall, stage, and retiring-rooms. B. Front building, class-rooms, second lecture-room, and caretaker.

BRENTFORD UNION, ISLEWORTH, W.—For the erection of new wing to infirmary, for the guardians. Mr. E. Monson, Jun., Grosvenor House, Acton, W., architect. Quantities by Mr. F. T. W. Miller, 6, Guildhall Chambers, Basinghall-street:—

Reading, C. W., Belgrave	£4,080 0 0
Shuff and Co.	4,080 0 0
Stevens and Bastow, Bristol	3,850 0 0
Nightingale, Lambeth	3,797 0 0
Vernon and Ewens, Westminster	3,790 0 0
Haynes, H., Alpertown	3,750 0 0
Taylor, T., Uxbridge	3,701 0 0
Gibson, G., Southall	3,469 0 0
Jones and Co., Gloucester	3,450 0 0
Brinsden, T., Brentford	3,425 0 0
Hiscock, T., Hounslow	3,399 0 0
Beauchamp, J., Brentford	3,375 0 0
Maton, C., Kew	3,350 0 0
Claridge, C., Banbury	3,300 0 0
Dorey, J., Brentford (accepted)	3,090 0 0

BRIGHTON.—For new classrooms, vestry, &c., to the Congregational church at Cliftonville. Messrs. Holford, Clayton and Black, 152, North-street, Brighton, architects:—

Cheeseman and Co.	£500 0 0
Barnes	857 0 0
Lockyer	836 0 0
Nureombe	767 0 0
Parsons and Sons	740 0 0
Creswell (accepted)	703 0 0

CARDIFF.—For Cardiff Church. Mr. H. Northcroft, architect. Quantities supplied:—

Wall and Hook, Brimscombe	£10,500 0 0
Estcourt, Gloucester	8,989 0 0
Stevens and Bastow, Bristol	8,649 0 0
Shepton, Cardiff	8,310 0 0

CAASHALTON.—For the erection of a cottage in Croft-road, Crashalton, Surrey, for Mr. P. C. H. Jay. Messrs. Ebbetts and Cobb, architects. Quantities supplied:—

Clarke and Bracey	£257 0 0
Langley and Hickham	568 8 0
Humphries	529 0 0
Richardson, J. G.	529 0 0
Stewart	528 0 0
Ward	520 0 0
Evans	498 0 0
Holt	466 13 3

CLYDE, SALOON.—For the erection of house and shop next Buffalo Hotel, Market-square, for Mr. W. C. Cooke. Mr. Thomas H. Letts, 60, Queen Victoria-street, London, E.C., architect:—

Cooke and Jordan, Clun (accepted)	£253 0 0
-----------------------------------	----------

COCKWOOD, DAWLISH.—For stables, coachhouse, and coachman's residence, for Mr. Wm. Partridge, Cockwood. Mr. W. E. Williams, Tiverton, architect:—

Cole, W., Stacross (accepted)	...
-------------------------------	-----

CROYDON.—For repairs to schools, for the Croydon School Board:—

South Norwood:—	£80 0 0
Hollidge, W. J. (accepted)	...
Brighton-road:—	70 0 0
King, G. (accepted)	...

CROYDON.—For the basement portion in concrete of a villa to be erected in Haling Park, Croydon. Daniel R. Dale, 8, Union-court, Old Broad-street, E.C., architect. Quantities by W. Birdseye, 99, Gresham-street, E.C.:—

Hoare and Son (accepted)	...
--------------------------	-----

For the superstructure:—

Marriage, W., Croydon	£4,204 0 0
Smith, T. W. and Son, Islington	4,190 0 0
Maiden and Harper, Croydon	4,170 0 0
Barton, Walthamstow	4,146 0 0
Faulkner, Old Kent-road	4,123 0 0
Hoare and Son, Blackfriars-road	3,987 0 0

DEPTFORD.—For forming and paving certain new roads in St. Paul's, Deptford, for the Greenwich district board of works:—

Mowlem and Co. (accepted) at £298 for Heston-street, £152 for Heald-street, and £43 for Florence-street, East.	...
--	-----

DEPTFORD, S.E.—For the enlargement of the new school in Gordon-road, Deptford, by 400 places, for the London School Board. Mr. E. R. Robson, F.S.A., architect to the board:—

Atherton and Latta, Crisp-street, Poplar	£3,533 0 0
--	------------

* Accepted.

[a. Cost of school buildings only (including closets, &c.), £2,215; (b) Tar pavement and playground, £152; (c) Boundary walls and gates, £317. Special expenditure properly chargeable to site—(d) Extra depth of foundations, £219. Total, £3,533. Cost per head of (a) £7 0s. 9d.; total cost per head of enlargement, £8 16s. 7d.]

EARLSWOOD, COVENTRY.—For extension of watch factory, for Mr. Waddington. Mr. W. Tomlinson, Coventry, architect:—

Worwood	£163 0 0
Barnard and Wootton	156 0 0
Haywood	153 0 0
Turner, Coventry (accepted)	128 19 0

EAST DERHAM.—For the supply of engine, boiler, and pumps, in connection with the new water supply, for the local board of health. Mr. W. H. Nankivell, surveyor:—

Dodman, A., Lynn (accepted)	£404 19 0
-----------------------------	-----------

[Twenty-five tenders, ranging from £307 10s. to £761, were received.]

ENFIELD HIGHWAY.—For rebuilding The Roehuck, for Messrs. J. Carter Wood and Co. Quantities by Mr. E. Crutchley, 3, Poets' Corner, Westminster:—

Curtis	£2,410 0 0
Field and Sons	2,286 0 0
Toms	2,126 0 0
Boyce (accepted)	1,970 0 0
Tyers	1,264 0 0

FENNY STRATFORD.—For the erection of a town hall.

Mr. Gatto, Lighton Buzzard, architect:—

Brown, Buckingham	£1,670 0 0
Spencer, Atherstone	1,395 0 0
White, Dunstable	1,381 0 0
Smith and Son, Olney	1,291 0 0
George, Stantonbury	1,200 0 0
Gates & Taylor, Fenny Stratford	1,130 0 0
Whiting, Heath-and-Beach	1,000 0 0
Stamford, Fenny Stratford	947 10 0

* Accepted.

FOREST GATE.—For building a stable in Station-road, for Mr. G. Roberts. Mr. E. Brown, 18, Hanbury-street, Spitalfields, architect:—

Dyer and Son (accepted)	...
-------------------------	-----

GREENWICH.—For entries into sewers and jobbing works during three years, for the Greenwich district board of works:—

Wheeler, East Greenwich (accepted), 10jd. p.c. below schedule prices.	...
---	-----

HAVESTOCK HILL.—For alterations, additions, and new studio to 12, Mansfield Villas, Havestock Hill, for Mr. D. Bax. Mr. H. C. Pollard, surveyor:—

Years, J. and Co. (accepted)	...
------------------------------	-----

HAMILTON, N.B.—For carrying out works of drainage in the district of Greenfield, for the Hamilton town council:—

Murray, H., Hamilton (accepted)	...
---------------------------------	-----

HACKNEY.—For building three shops in the Broadway, London Fields, for Mr. J. Elves. Mr. E. Brown, 18, Hanbury Street, Spitalfields, architect:—

Marr, C.	£2,673 0 0
Nixon, T.	2,617 0 0
Wood, F. and F. J.	2,567 0 0
Uff, J.	2,455 0 0
Johnson, J. H.	2,353 0 0
Sturmer, W.	2,277 0 0
Salt, S.	2,255 0 0
Hawkins	2,100 0 0

HUTTON CRANSWICK.—For Mr. Dosser's cottages. Mr. W. Howe, Beverley, architect:—

Dickinson, T. T., Driffield ...	£486 0 0
Gage, M., Driffield ...	480 0 0
Pape, G. and R., Beverley ...	435 0 0
Barnes, J., Beverley ...	390 0 0

Whole Tenders:—

Watson, C., Cranswick ...	289 8 6
Smith, R., Cranswick ...	287 0 0
Gage, M., Driffield ...	285 0 0
Dry, C., Driffield ...	275 10 0
Smith, J., Jun., Cranswick ...	270 2 6

Mason:—

Wilson, T., Driffield ...	22 0 0
Hickson, W., Driffield ...	19 15 0
Bannister, Beverley ...	18 10 0

Joiner:—

Morris, A., Driffield ...	175 0 0
Dickenson, T. T., Driffield ...	155 10 0
Harrison, T., Driffield ...	146 5 0
Ling, G., Hull ...	136 0 0
Rudd, T., Driffield ...	130 0 0
Petch, W., Driffield ...	115 10 0

Glazier and Painter:—

Stabler, J., Driffield ...	19 0 0
Wilson, G., Driffield ...	12 10 0
Worthington, J., Beverley (Glazier) ...	4 10 0
Riby, G., Beverley (Painter) ...	10 10 0

KENSINGTON.—For alterations and decorations to 17, Kensington Garden-terrace, for Mr. A. Stuart:—

Vears, J. and Co. (accepted) ...	£750 0 0
----------------------------------	----------

LAYTONSTONE.—For alterations to business premises at Laytonstone, for Messrs. F. Dutch and Co. Mr. Daniel R. Dale, S. Union-court, Old Broad-street, E.C., architect:—

Farr and Co.	£437 0 0
Hoare and Son ...	425 0 0
Arber (accepted) ...	390 0 0
Barton ...	351 0 0

LLANTIRISANT.—For repairs and alterations at Toney-refill schools, for the Llantirissant School Board. Mr. J. Evans, architect:—

Davies, H. (accepted).

LLANTIRISANT.—For the erection of schools at Williams-town, for the Llantirissant School Board. Mr. J. Evans, architect to the board:—

Knell, Hopkin ...	£2,344 0 0
Lloyd and Davies ...	2,290 0 0
Morgan and Jones ...	2,210 0 0
Morgan, D., Treoky (accepted) ...	2,100 0 0

[Architect's estimate, £2,172 2s.]

LLYSDULAS.—For new farm buildings on the Llysdulas estate, for the Hon. Lady Neave. Mr. R. G. Thomas, Menai Bridge, architect:—

For new farm house, Tydu, near Amlwch:—	
Jones, H. and Son ...	£450 0 0
Jones, H.	450 0 0
Thomas, O.	415 0 0
Pritchard, W. and O.	397 0 0
Humphreys, W.	390 0 0
Thomas, W.	380 0 0

For new farm house and buildings, Tydu, near Beaumaris:—

Pritchard, W. and O.	£34 0 0
Jones, H.	8 5 0 0
Humphreys, W.	750 0 0
Thomas, W.	739 0 0

MARYLEBONE.—For alterations and additions to 48, Baker-street, for Mr. W. J. Jameson:—

Vears, J. and Co. (accepted) ...	£391 0 0
----------------------------------	----------

MANCHESTER.—For the erection and completion of the Atlas Box Works, Sackville-street, for Messrs. Burgen and Co. Mr. Fred. R. L. Edwards, Manchester, architect:—

Union Land and Building Co. ...	£1,680 0 0
Cherry, E. J., Manchester ...	1,634 14 0
Herd, J.	1,497 0 0
Burgess and Galt ...	1,450 0 0
Southern and Sons, Salford ...	1,415 0 0
Davies & Mawdsley, Manchester* ...	1,383 0 0

* Accepted.

MANCHESTER.—Schedule of prices for excavating and brickwork required to be done in the foundations of the Atlas Box Works, Sackville-street, for Messrs. Burgen and Co. Mr. Fred. R. L. Edwards, Manchester, architect:—

P. Hodgkinson C. Normanton

Digging out and carting away for the first ft. in depth. ...	Per cub. yd. 2s. 4d.	Per cub. yd. 2s. 3d.
Ditto second ditto ...	2s. 10d.	2s. 8d.
Ditto third ditto ...	3s. 9d.	3s. 2d.
Ditto fourth ditto ...	4s. 9d.	3s. 11d.
Ditto fifth ditto ...	5s. 9d.	4s. 6d.
Common brickwork in blue lias line ...	11s. 9d.	11s. 0d.
Common brickwork in Buxton lime ...	10s. 8d.	10s. 4d.

* Accepted.

MENAI BRIDGE.—For new schoolroom at Menai Bridge, for the Welsh Calvinistic Methodists. Mr. R. G. Thomas, Menai Bridge, architect:—

Edwards, H.	£700 0 0
Evans, R.	693 0 0
Jones, R.	690 0 0
Pritchard, O. G.	690 0 0
Pritchard, W. and O.	690 0 0
Humphreys, W.	598 0 0
Jones, H., Menai Bridge (accepted) ...	570 0 0
Williams, D.	550 0 0

MENAI BRIDGE.—For new house and shop, Menai Bridge, for Mr. E. Williams. Mr. R. G. Thomas, Menai Bridge, architect:—

Jones, H., Menai Bridge (accepted) ...	£280 0 0
--	----------

MENAI BRIDGE.—For new dwelling-house, Menai Bridge, for Mr. R. Jones. Mr. R. G. Thomas, Menai Bridge, architect:—

Jones, H., Menai Bridge (accepted) ...	£300 0 0
--	----------

MENAI BRIDGE.—For new farm houses and buildings on the Baron Hill estate, for Sir R. L. M. W. Bulkeley, Bart. Mr. R. G. Thomas, Menai Bridge, architect:—

For new farm house, Tanrall, near Conway:—

Evans, R.	£332 16 0
Roberts, E., Conway (accepted) ...	300 0 0

For additions to house, Llywydau, near Conway:—

Evans, R.	428 0 0
Parry, M., Henthryd, Conway* ...	320 0 0
Roberts, E.	287 0 0

* Accepted.

For new cow houses, Talycarn, near Conway:—

Parry, M. (accepted) ...	190 0 0
--------------------------	---------

For new farm house, Dufnia, near Menai Bridge:—

Thomas, W.	347 0 0
Humphreys, W., Beaumaris (accepted) ...	280 0 0

For new farm house, Feram, Red Wharf, Anglesey:—

Thomas, W.	380 0 0
Jones, H.	379 0 0
Thomas, O.	360 0 0

Humphreys, W., Beaumaris (accepted) ...

For new farm house, Gwen Fro Isa, near Llangefni:—

Williams, H.	540 0 0
Owen and Williams ...	385 0 0
Pritchard, J.	317 0 0

Humphreys, W., Beaumaris (accepted) ...

For new cow-houses, Plas Penrynnydd, near Llangefni:—

Humphreys, W.	390 0 0
Pritchard, J., Gaerwen (accepted) ...	338 0 0

For new granary and sheds, &c., Dragon Du, near Llangefni:—

Jones, H.	390 0 0
Humphreys, W. (accepted) ...	325 0 0

For new cow houses, granary, &c., Castellor, near Menai Bridge:—

Hughes and Owen ...	587 0 0
Jones, Henry ...	482 0 0
Jones, Hugh ...	405 0 0
Humphreys, W. (accepted) ...	348 0 0

MONESFIELD.—For entrance lodge, for Mr. G. Peabody Russell, at Monksfield, Quarry, Isle of Wight. Mr. R. J. Cornwell Jones, A.R.I.B.A., architect:—

James, Binstead (accepted) ...	£235 0 0
--------------------------------	----------

NEWPORT, MON.—For various works, for the town council:—

For making up of Albert-terrace:—

Wilkins, J.	£151 6 0
Cox, W.	148 10 0
Francis, J. (accepted) ...	135 12 0

For drainage of Bassalleg-road:—

Thomas, T. and Son ...	£85 0 0
Jenkins, J.	73 0 0
Francis, J. (accepted) ...	72 0 0

(Surveyor's estimate, £76.)

For alterations to Temple-street foot-bridge:—

Fairbank, J.	£71 0 0
Francis, J. (accepted) ...	68 0 0

(Surveyor's estimate, £70.)

NEWPORT, MON.—For building the new Free Library, for the town council. Messrs. Watkins and Son, architects:—

Thomas, G., Pembroke ...	£3,500 0 0
--------------------------	------------

[Mr. C. Miles's tender was originally accepted at £3,335, but withdrawn on account of differences as to clauses in contract.]

NOTTINGHAM.—For the erection of mineral water premises, for Mr. Edward Bousner, Nottingham. Mr. Frederick Jackson, architect:—

Bell and Son ...	£1,176 10 0
Marriott and Wartonby ...	1,157 10 0
Each Hind ...	1,119 0 0
Middleton, R.	1,050 0 0
Smith and Attewell ...	1,029 18 10
Huskinson and Jefferys (accepted) ...	1,014 0 0

NOTTINGHAM.—For the raising of master's house of All Saints' Schools, Nottingham. Mr. Frederick Jackson, architect:—

Bell and Son ...	£163 0 0
Smith and Attewell ...	150 10 0
Middleton, R.	150 10 0
Huskinson and Jefferys ...	145 14 0
Marriott and Wartonby (accepted) ...	135 0 0

OUTLON.—For the erection of infirmary and buildings in connection, at Outlon workhouse, for the Mutford and Lotherland Incorporation. Mr. E. Goff, Lowestoft, architect. Quantities by the architect:—

Wilkins and Guymer ...	£3,570 0 0
Whiting and Skipper ...	3,430 0 0
Bennett and Newson ...	3,393 0 0
Calver ...	3,380 0 0
Holsworth and Son ...	3,357 17 0
Beckett and Mason ...	3,345 17 0
Watson ...	3,329 0 0
Swatman Bros. ...	3,110 0 0
Youngs, Norwich (accepted) ...	3,093 0 0

Architect's estimate, £3,250.

RYDE.—For a pair of houses, coal-store and stablizer, for Mr. H. Moore, at Ryde, Isle of Wight. Mr. R. T. Cornwell Jones, A.R.I.B.A., architect. Quantities supplied:—

	Houses.	Coal Store and Stabling.	Total.
Stevens & Sons, Southampton	£1,423 0	£823 0	£2,246 0
Jenkins Bros., Ryde ...	1,351 0	784 0	2,135 0
Light and Co., Landport ...	1,332 0	770 0	2,102 0
Barton, I., Ryde ...	1,330 0	740 0	2,070 0
Earwaker, Southsea ...	—	—	2,050 0
Jolliffe, Sandown ...	—	—	1,980 0
Sibley, Ryde ...	1,157 15	598 10	1,756 5
Saunders, Ryde ...	1,120 0	625 0	1,745 0
Meador, J., Ryde ...	985 0	665 0	1,650 0
Salter, Ryde ...	890 0	661 0	1,551 0
Hutchings, Binstead (accepted) ...	915 0	596 0	1,511 0

SOUTHWARK, S.E.—For the enlargement of the Lant-street school, Borough, by 400 places, for the London School Board. Mr. E. R. Robson, architect to the board:—

Grover, J.	£4,791 0 0
Kirk and Randall ...	4,585 0 0
Staines and Son ...	4,549 0 0
Tongue, W.	4,497 0 0
Jerrard, S. J.	4,473 0 0
Higgs and Hill ...	4,443 0 0
Nightingale, B. E.	4,253 0 0
Shepherd, W., Bermondsey New road (accepted) ...	4,273 10 0

[(a) Cost of school buildings only (including closets), £2,595 10s.; (b) cost of tar pavement and playground, £49; (c) cost of covered playground (boys), £150. Special expenditure properly chargeable to site—(d) extra depth of foundations, £151; (e) cloak accommodation and coal cellar for entire school, and rebuilding lower flight of girls' staircase, £1,328; total, £4,273 10s. Cost per head of (a), £6 9s. 9d.; total cost per head, £10 13s. 7d.]

STAINLAND.—For the masonry work in connection with new board schools at Bowling Green, Stainland, near Halifax:—

Helliwell, E. and J. (accepted) ...	£1,007 0 0
-------------------------------------	------------

[The tender of Godfrey Harrison was originally accepted at £902 10s., but was subsequently withdrawn.]

SYDENHAM.—For alterations and additions to The Downs, Lawrie Park, Sydenham. Messrs. E. and W. H. Nash, architects:—

Greenwood ...	£1,693 0 0
Bowyer, J. and C. ...	1,680 0 0
Jerrard, S. J.	1,680 0 0
Jarrett, C.	1,494 0 0
Coles, C. (accepted) ...	1,479 0 0

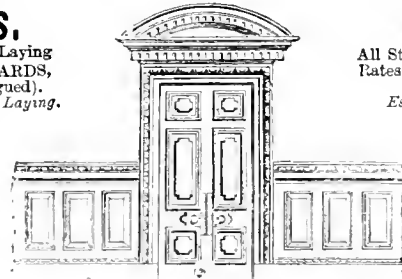
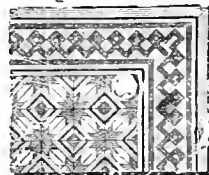
TURPIN,
22, QUEEN'S ROAD
BAYSWATER, LONDON, W.

MANUFACTURER OF

The Best and Cheapest

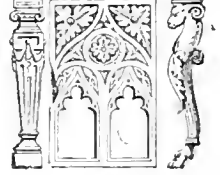
PARQUET FLOORINGS.

130,000 ft. super. in Stock, ready for Laying
RIGA INCH OAK FLOOR BOARDS,
1s. per foot super. (grooved & tongued).
Immense Stock always ready for Laying.



WOOD CARVINGS.

All Styles executed for the Trade at Special Rates. Skilled Artisans sent to all parts of the country.
Estimates and Designs on Application.



ARTISTIC JOINERY

THIN PARQUET

Turpin's Patent. 5-16 inch thick, prepared on deal back laminations, equal in wear to inch Solid Parquet. Used for Veneering old existing deal floors, and is susceptible of removal at pleasure. See Construction.



ORNAMENTAL
PARQUET.
DEAL
BACKING.

SUNDERLAND.—For warming and ventilating the new schools, Stockton-road, Sunderland, with their new hydro-caloric apparatus. Mr. J. P. Pritchett, architect:—

Weeks and Co., Chelsea (accepted) ... £2,17 6

TRESCAWAN.—For new farm yard on the Trescawan estate, for Captain G. Pritchard Rayner. Mr. R. G. Thomas, Menai Bridge, architect:—

Jones, H. ... £2,550 0 0

Owen, D. (Unsuccessful) ... 1,800 0 0

Humphreys, W. ... 1,700 0 0

[All cartage and stone supplied by the proprietor.]

WALTHAM GREEN, S.W.—For the erection of three shops on the Ravensworth House estate, Fulham-road, Waltham Green. Mr. E. Monson, Junr., Grosvenor House, Acton, W., architect:—

Lyford, G., Hammersmith (accepted) ... £2,000 0 0

WALLINGTON.—For completing three houses at Wallington, Surrey, for Messrs. Parkers. Mr. A. B. Rooke, architect. No quantities:—

Rose ... £1,750 0 0

Hazell ... 1,610 0 0

Young and Cochrane ... 1,470 0 0

Uff ... 1,410 0 0

Knight ... 1,280 5 0

Richardson, J. O. ... 1,297 0 0

Baxter ... 1,130 0 0

BEST BATH STONE.

Westwood Ground, Box Ground, Gombe Down, Gorsham Down, and Farleigh Down.

RANDELL, SAUNDERS, & CO. LIMITED,
CORSHAM, WILTS.

Bath Stone.—Every description and the best quality supplied direct from his own Quarries by
ISAAC SUMSION, NEWARK STREET, BATH.
Quarryman and Stone Merchant. Established 1791.
Prices delivered to any part, furnished on application.
—(Adv.)

SITUATIONS VACANT.

APPRENTICE to the Glass and Sign-writing WANTED. First-class opportunity for a respectable lad. Also an Improver wanted—Apply, 203, Camberwell New-road, S.E.

APPRENTICE WANTED to General House Repairs and Plain and Ornamental Paperhanging, &c.—For particulars, apply by letter, G. STAPLES, House Decorator, 7, Maiden-road, Kentish Town, London.

ARTISANS' LABOURERS', AND GENERAL BUILDINGS COMPANY (Limited)—Resident Practical Building Superintendent required for the Erection of Houses, Making of Roofs, Sewers, &c., on the Queen's Park Estate. Salary, £250 per annum—For particulars of duties and other information, apply by letter to the Secretary, 34, Great George-street, S.W.

BELLHANGERS, GASFITTERS—WANTED, MAN able to take new Work and Jobbing; state age and wages required.—A. PREVOST, 3, Bloomfield-road, Eding Down, W.

Bronze Chasers.—WANTED. MEN accustomed to large or small work—Apply, RY. and Co., Eccleston Ironworks, Farnico.

BUILDING MATERIALS.—A Company manufacturing Red and White Facing Bricks of the best quality, would be glad to make arrangements with TELLER having connection with first-class Builders for SALE on COMMISSION—Address, G. A. D., at Horncastle's Central Advertisement Office, 61, Cheapside, E.C.

CARPENTERS (good) WANTED for fitting.—Apply to Mr. NORRIS, William street, Sittingbourne.

CARPENTERS and JOINERS (several good)—Mr. FOURCREN, Palmerston road, Hockhurst Hill.

HANDYMAN WANTED to do odd Repairs, Bricklaying, Carpentering &c., on house property, and to make himself generally useful, constant situation to a good man. None need apply who have not a good character. LANSFORD and SONS, College and Devonshire Wharves, Camden Town.

LEAD GLAZIER WANTED; also Glass Cutter—Apply, 66, Hatfield-street, Stamford-street, S.E.

NOTTINGHAM SCHOOL OF ART.

The Second MASTERSHIP of this School will, owing to the appointment of the present Second Master to the Head Mastership of the Leicester School of Art, become vacant on the 1st of October next.

The salary is £1,400 per annum.
Applicants must hold one or more Third Grade Certificates of the Science and Art Department, and must be prepared to give general assistance to the Head Master in the instruction of the various classes. As a rule the last hour of time will be unoccupied from 12.30 to 1 o'clock p.m. on each working day.

No classes are held on Saturdays.
Applications, stating age of candidate, with testimonials of recent date, to be forwarded to the Secretary, School of Art, Nottingham, of whom further particulars can be obtained, must be sent in not later than the 16th of August, 1881.

HENRY A. GOODFELL, Secretary.

PAPERHANGER—Youth as Improver to stone and Painting—Letter only, stating how long been in the trade and wages. W. H. R., 23, Minors.

PLASTERERS—WANTED, a few steady MEN—D. FINCH, Builder, Woodland's Estate, Enfield.

TO PARENTS and GUARDIANS.—Articled PUPIL WANTED, in an Architect and Surveyor's Office. Premium required.—Apply, H. E. LAVENDEL, 30, Freer-street, Walsall.

TO YOUNG ARCHITECTS desirous of commencing business.—An OPENING is OFFERED by a gentleman giving up practice. Capital required, from five hundred to one thousand pounds.—Address, with full particulars, A. H. W. Abbott, Newsgate, G. Davies-street, Berkeley-square, London, W.

WANTED, a well-educated YOUTH (about 17 years) as Pupil by an old-established Builder in the East of London.—Address by letter, in the first instance, to BUILDER Mr. W. W. Howard, 15, Coleman-street, E.C.

SITUATIONS WANTED.

ARCHITECT'S ASSISTANT desires ENGAGEMENT in a London office. Perspective, working and detail drawings. Good references.—E. N., 39, Sydney-street, Fulham-road, S.W.

ARCHITECT'S DRAUGHTSMAN desires a RE-ENGAGEMENT, is now in the office of a well-known provincial architect; 3 years' experience in domestic and Church work.—T. B. 29, Lune-road, Lancaster.

ASSISTANT (Architect and Surveyor's) desires an ENGAGEMENT. Perspective, surveying, and general office routine. Good knowledge of quantities, &c. 3 years' experience.—F. T. HOLORAN, St. Catherine's, Lincoln.

ASSISTANCE (1s. 6d. per hour occasional, via post), by first-class practical Designer and Draughtsman; 15 years' experience. Contract, detail, and perspective drawings, specifications, quantities, &c.—"ARCHITECT," 5, Great James-street, W.C.

ASSISTANT (Architect's) WANTS SITUATION in London; age 23, 13 years' experience. Details, working drawings, designs, quantities, and perspective. Salary moderate.—X., care of T. S., 10, Huntley-street, Bedford-square, London.

ASSISTANT (Architect and Surveyor's), with 6 years' experience, desires a RE-ENGAGEMENT. First-class Draughtsman; geometrical, working and detail drawings. High class perspectives in pen-and-ink. Quantities, specifications, and good land surveyor. Hard worker. Excellent references. Terms, 30s. per week.—Address, "ALPHA," 23, Ford-street, Derby.

DRAUGHTSMAN (good) WANTS OCCUPATION, at home or otherwise. Any kind of drawings, tracings, &c., neatly and expeditiously executed. Highest references.—Address, H. M. 24, Burton-crescent, W.C.

EVENING EMPLOYMENT required by a fully-qualified Assistant, to ink, finish off, or trace drawings, at home or otherwise. Terms moderate.—L. G., 2, Rosemead-road, Shepherd's Bush, London, W.

GLASGOW MUNICIPAL BUILDINGS COMPETITION.—Architect's Assistant wishes SITUATION (London preferred); nine years' experience. Proficient in classic, competitive work, and perspective. Also a curate working drawings, details, levelling, and surveying.—Address, T. ROBERTSON, Grainger-works, Ayrton-road, Pollok-shields, Glasgow.

JUNIOR ASSISTANT desires ENGAGEMENT in Architect and Surveyor's Office; 5 years' present situation.—W. COATES, 7, St. Martins, East Leicester.

THOROUGHLY Competent Architectural Assistant requires RE-ENGAGEMENT in Provincial or London Office. Good references given. Age 25.—Address, J. G., Longfield Wake, Green-road, Moseley, Birmingham.

TO ARCHITECTS.—A Young Man (just completed his articles) wishes for an ENGAGEMENT as Junior Assistant, is a good draughtsman, and has a knowledge of quantities and surveying; good references.—Apply, A. B. 2, Town Bank-terrace, Ulverston.

TO LONDON ARCHITECTS.—The Advertiser (22) desires an ENGAGEMENT in a London Office. Geometrical, working, and detail drawings. Quick draughtsman in outline, perspective, both exterior and interior, and can sketch fairly. Furniture and detail drawings of coloured decorations from rough notes.—Address, CHAS. H. SIMPSON, late pupil, and care of Mr. Chas. Noel Arnold, York Diocesan Surveyor, Architect, Whithy, to whom reference may be made.

TO ARCHITECTS.—A clever, trustworthy Assistant DISENGAGED. 12 years' experience. Good examples in colour, and with first-class references.—J. T. 23, Derby-terrace, Derby-road, Uxbridge.

ADVERTISER is desirous of an APPOINTMENT in a Builder's office with a view to partnership. Has had some experience both at bench and in office, satisfactory references required and given.—Apply by letter only, giving full particulars, to S. G., Office of the Building News, 31, Tavistock-street, Covent-garden, W.C.

BELLHANGER, Hot Water, and Gasfitter (first-class), seeks SITUATION.—J. B., 8, Woodstock-street, Oxford-street, W.

BRICKLAYER, Plasterer, Slater, &c., with Handy Lids, wants EMPLOYMENT. References.—JONES 50, Kirkwood-road, Peckham.

BRICKLAYER (good jobbing) and Plasterer.—EMPLOYMENT WANTED.—G. SMITH, 15, Bromfield-road, Union-road, Clapham, S.W.

BUILDER'S CLERK requires SITUATION. Well acquainted with bookkeeping and the general routine of a builder's office. Good draughtsman. References to London builders.—A. Z. 3, Paradise-terrace, Hickey.

CARPENTER and JOINER wants JOB; wages moderate.—WALTERS, 5, Evans Cottages, Lower Kennington-lane.

CARPENTER and JOINER wants JOB, day or piece, where he can take his boy.—W. C., 41, Hatfield-road, East Dulwich.

CARPENTER wants JOB, bench or jobbing.—Address, J. V., 103, Hanbury-street, Mile End New Town.

CARPENTER and JOINER.—Young Man wants JOB, good at bench, wages 8s.—T. C. 3, Florence-road, Grove-lane, Hackney.

CARPENTER (good jobbing) wants EMPLOYMENT, town or country; wages moderate.—Address, J. M. 33, Queen's-street, Horseferry-lane, S.E.

CARPENTERS and BUILDERS.—A Young Man requires a SITUATION as Improver or to work under another man.—H. GAUNER, 151, Monck-road, Victoria Park, E.

CLERK OF WORKS for Buildings or Gentleman's Estate. First-class reference.—X., care of Mr. G. Pike, 57, South-street, Exeter.

GASFITTER, Hot Water, and Bell-hanger.—EMPLOYMENT WANTED by a steady Young Man.—Apply to J. E. 111, St. Katherine-road, Notting-hill.

GASFITTER, Bellhanger, and Lock-smith wants EMPLOYMENT.—GASFITTER, 68, King-street, Regent-street, W.

GAS, Bells, Hot Water.—EMPLOY-MENT by thorough good General Hand.—H. H. 30, Tufston-street, Westminster.

HANDYMAN wants EMPLOYMENT who can do painting, distemper, repairing roofs, drain, bricklaying, masonry, and other building repairs; good references any part.—J. W., 12, Croydon-street, Marble-hill, W.

PAINTING, &c.—JOB WANTED by 2 good men; piecework.—K., 69, Langbourne-buildings, Finsbury.

PAINTER'S and BUILDER'S WORK WANTED by a Young Man used to painting, distemper, &c. 6d. per hour.—50, Queen-street, S.W.

PLASTERING or CONCRETE WORK WANTED. Labour only, or as Foreman. Good references as to competency.—Address, A. NORRIS, 41, College-place, Camden Town, N.

PLUMBER wants a JOB.—COTTON, 47, Pembroke-street, Caledonian-road.

PLUMBERS.—Improver, with tools or materials, in good shop, wants a JOB; 6 years' experience; wages 6d. Address, C. S., 3, Golden Lion-place, Aldersgate-street, City.

PLUMBER (experienced); fill up time painting, glazing, &c.; SITUATION WANTED.—PLUMBER, 25, Ballspond-road.

PLUMBER (good), &c., wants JOB or CONSTANCY.—Y. Z., 39, Lockley-street, Limehouse, E.

PLUMBER and 3 Branch Hand.—Young Man wants PERMANENT SITUATION (jobbing preferred).—T. M., 172, Spa-road, Hammersmith.

PLUMBING JOBS (piecework) WANTED by an experienced Workman.—G. G., 78, Broomfield-street, Waltham.

STONE-CARVER wants RE-ENGAGEMENT in a good monumental yard, with a knowledge of masonry and lettering. A constant job preferred.—Address, C. BENNETT, Lower Maudlin-street, Barnstable.

THREE-BRANCH HAND, Plumber, Painter, Glazier, wants a SITUATION. Can fill up time at all house repairs.—T. FITZGERALD, 69, Marylebone-lane, London, W.

WANTED, EMPLOYMENT in Mea-suring-up Brickwork, &c., or measuring from drawings, by a practical man. Many years Builder's Foreman. Terms (by hour) moderate.—A. JONES, 39, Woodchester-street, Harrow-road, W.

THE ARCHITECTURAL TRAIN-ING SCHOOL, ST. NICHOLAS SQUARE, HEREFORD.

Pupils, from 12 years of age and upwards, prepared for the profession in all branches. Thorough outdoor practical knowledge, &c. Terms from £70 per annum, with board.

WILLIAM H. WILLETT,
Professor of Architecture, Drawing, &c., at various Colleges, and Head Master of the Hereford Art School.

THE LONDON DRAWING OFFICE,

No. 58, London Wall, E.C. For the execution of high-class ARCHITECTURAL DRAUGHTSMANSHIP. Perspectives outlined, etched, or coloured. Designs, Detail and Working Drawings, Tracings, &c., on moderate terms. Etchings for Photo-lithography. Competition work. Manager, Mr. E. H. LLOYD. Pupils required.

PERSPECTIVES in Pen and Ink, and other Drawings made at moderate charges.—J. O. BUCKLE, architect, 10, Adam-street, Adelphi, W.C.

PERSPECTIVES and other DRAW-INGS made, coloured, etched, or finished in any style, on moderate terms, by W. PRINCE, 107, Disraeli-road, Fulney, S.W.

MANCHESTER and NEIGHBOUR-HOOD.—Drawings prepared for all kinds of work. Quantities taken off, works measured up, and accounts adjusted. Surveys and Levelling.—CHARLES P. CRAPP, Architect and Surveyor, 65, Market-street, Manchester.

COMPETITION WORK.—A HIGH-CLASS SPECIALIST, with 20 years' successful experience, offers CONFIDENTIAL ASSISTANCE. Own residence.—EXPERIENTIA, 45, Albion-grove, Barnsbury, N.

PERSPECTIVES, General and Work-ing Drawings, Details, Sketches, &c., prepared in any style, and on the lowest terms. Specimens shown, and references given. First-class work guaranteed.—T. N. L., 37, Walbrook, E.C.

TO ARCHITECTS.—TEMPORARY ASSISTANCE rendered on moderate terms. High-class Perspectives coloured or etched, finished drawings from rough sketches.—Address, A. K. A., 21, King William-street, Strand, W.C.

CRICKET.—An Eleven, the Fast and Present Assistants of an Architect and Surveyor's Office, desire to PLAY A MATCH during the season, near Town, with an Eleven from any other Office on similar terms.—Communications to J. W. STEVENS, 6, Southampton-buildings, Holborn.

CHARVED OAK PULPIT and PRAYER DESK, with all the Pews, FOR SALE, comprising several thousand feet of good deal framing, now in the Church of St. Peter, Vere-street, Oxford street, to be removed after the 25th inst.—For terms, apply to CORNISH and OAYLIT, Builders, North Walsham.

SECOND-HAND GENERAL JOINER, MORTAR MILL, and 8 H.P. PORTABLE ENGINE FOR SALE, in first-class order.—Apply, CHARLES POWELL and Co., 60, Gracechurch-street, London.

THEODOLITE WANTED, 4in. to 5in., modern manufacture, and in first-class condition.—state price, name of maker, &c. London replies only.—T., 6, Edin-burgh-terrace, Shepherd's Bush, W.

THE BUILDING NEWS.

LONDON, FRIDAY, JULY 29, 1881.

TOWERS, AND THEIR TREATMENT.

THE value of the diminution of towers has been dwelt upon by a few writers, though it is strange that architects will build them with straight parallel sides, in utter neglect of the optical principle that we see things in spherical perspective. The late Viollet le Duc speaks of the value of a gradual diminution or tapering in towers and façades, and mentions several examples where the profile has been made to conform to the law. So also Sir Edmund Beckett, in his "Book on Building," has pointed out the importance of a gradual diminution in all towers, and cites the Canterbury central tower and the Victoria tower, Westminster, as instances where no attempt has been made to follow so plain a rule, the consequence of which is that they look top-heavy. It might have been added that, but for the natural law of perspective which makes an object diminish as it recedes from the eye, the top-heaviness would be positively painful to contemplate, and the amount of diminution due to this cause may be observed in any photograph of a lofty tower taken near it. The same writer says if towers have no set-offs they should be made to taper at the rate of about 1 in 120. Several old towers confirm the value of the rule, and are made to batter upwards with the obvious advantage that they look higher, and are, in reality, more stable. When set-offs are made, the stages are best regulated in height by some gradation. The upper stage looks well if less in height than the next one, the set-offs being obtained at the levels of the window-sills, or the buttress weatherings. In the design of pinnacles a setting inwards at their base is a decided improvement, and the old builders seem to have paid more attention to these features than modern architects, at least in regard to their profile. The towers of Worcester, and especially of Gloucester Cathedral, give us some idea of the elegance to be derived from a gradation in the tower and buttresses, and the tower of Tewkesbury furnishes a better example of the same principle, one that has been accepted by no less an authority than Mr. Street, who, in his Academy Lectures, mentioned the principle of gradation, and illustrated his remarks by referring to Giotto's campanile at Florence, where the architect has observed a kind of rhythmical law in spacing the stages. On the contrary, its rigid straight angle lines, as in the central tower of Canterbury Cathedral, look stiff and metallic, and the same remark applies to many modern specimens of tower-building.

In examining more minutely some of these towers, and many of those which abound in Northamptonshire and Somersetshire, we find a considerable set-off at the principal horizontal divisions. In one or two instances, as at Kingsthorpe Church, Northamptonshire, the walls sensibly batter, but as the horizontal string-courses and stages gave so excellent an opportunity for the diminution, it is reasonable to conclude that the builders adopted in preference so easy a means of preserving a pyramidal outline. At Tewkesbury Abbey, for instance, the set-offs occur just below the parapet, and again between the plain part of tower and the lower range of Norman windows. These set-offs are simple weatherings or splays. They add much to the quiet dignity and stable effect of the central tower. It is rather curious to observe the Early Norman builders fully recognised the advantage of diminish-

ing the thickness of their walls in this manner, and no doubt it was the desire to make their towers stable which chiefly prompted them. Probably they derived their notion from the round towers of Ireland, or the brochs found in North Scotland, in both of which classes of towers a sensible tapering of the outline is met with. The round towers on the coasts of Norfolk and Suffolk may also be instanced. Considerable diminution in three set-offs occurs at St. Alban's, another Norman tower; the flat buttresses are broken into two stages at the top of about equal height, and on each of the splayed weatherings the walls are set in. Earl's Barton, Northamptonshire, well known as a type of Saxon workmanship, shows three well-marked set-offs at the string-courses, and the stages have a pleasing gradation, the upper one being much lower, and the two middle stages about equal. The well-known tower at Raunds, a fine Early English example, has a very gradual diminution, though the spire is excessively lofty for the tower.—*BUILDING NEWS*, p. 378, Vol. XI. The tower and spire at Ellington, in Huntingdonshire, show a better type.

The western towers of York indicate a pleasing gradation or diminution in the angle-buttressing, which leads the eye well up; but the central tower is less satisfactory, the buttresses being straight and unbroken. Need we mention the towers of Wells and Exeter? At Durham, the central tower has a particularly pleasing effect from a distance, owing to the diminution and the broken profile due to the angle-buttresses. Lincoln and Lichfield, both imposing examples of tower and spire growth, are no exceptions to the rule, and the Late Gothic towers of Boston, Lincolnshire, and Taunton, in Somersetshire—the former especially—owe much of their beauty to the gradation and profile. Many an unknown and comparatively neglected building or ruin affords abundant proof of the universality of a rule which has been questioned by many modern architects. Those who know Ulverscroft Priory will find a beautiful but ruined tower, of extreme delicacy in outline, and whenever an example may be found which contradicts the principle, it will be discovered that any beauty it possesses resides almost entirely in the detail.

One of the most noticeable instances of a building where the sides are built perfectly vertical occurs in the ancient west front of St. Denis Abbey, mentioned by Viollet le Duc, and the same writer alludes to a like defect in several fronts dating from the end of the 12th century, especially the church of Notre Dame at Mantua. The effect of these is to make the façade appear wider at the top. The whole question of outline is involved in the subject, and no one has spoken with more authority on this point than Le Duc himself. He, in one place, recalls the importance of attending to the design of the angles of edifices, and especially alludes to the value of preserving a clear outline by accentuating the angles by features in bold relief. The inserted angle column is one of the expedients used by architects whose materials were small, to give a sharp outline. Usually the shaft is of a single piece of stone or marble. There is a mechanical advantage gained by a stiff rigid angle to a tower: it throws the weight towards the centre and prevents settlement, though how very few of our architects ever think of this use, or introduce the angle pillar for such an intelligent purpose. It is rather used as an unmeaning ornament. The front of Notre Dame, Paris, has been mentioned as another example of the knowledge, taste, and study of its builders, and if the two towers had been completed by the spires intended, it would no doubt have been a fine façade. The angle treatment of the towers, the massive, well-graduated buttresses,

and the manner in which the open upper gallery was designed to lead the eye to the spires, are certainly noteworthy, though, unfortunately, the latter never having been completed, the façade has a heavy appearance. There is sufficient left, however, of the intention to show that the apparently unmeaning termination of the buttresses was really evidence of a desire to make an agreeable transition from the tower to the spire.

To the credit of the Renaissance architects, the great value of diminution by well-arranged set-offs was quickly appreciated, and Wren, whose towers are perhaps the best of his works, has shown his skill in many of them.

THE SMOKE-ABATEMENT EXHIBITION AT SOUTH KENSINGTON.

THE idea of holding an exhibition of apparatus and inventions connected with the prevention of smoke has been warmly taken up, and the movement already bids fair to produce important results. Very numerous applications have, we learn, been received from manufacturers and patentees for space to show their inventions, and on behalf of these who have novel plans to bring forward in competition for the valuable prizes which are to be offered, the Board of Trade have agreed to afford provisional protection for six months to all inventions duly entered in accordance with their regulations. The owners of smokeless coal, anthracite, and various kinds of patent fuel are also on the alert, and every effort will be made to bring the merits of these materials before the public. We are informed that among the applications for space, the makers of mechanical stokers, special furnace doors and furnaces, improved boiler settings and fire-bars will be well represented, and it is intended, as far as may be, to show these contrivances in actual operation, either at the Exhibition, or on boilers and furnaces which have been kindly offered for this purpose by steam-users and manufacturers in the vicinity of the Exhibition buildings at South Kensington.

The practical trial of the inventions submitted to the committee of experts will, in fact, constitute one of the special features of the exhibition, and the reports of the investigations of the judges respecting the merits of the various appliances will, it is hoped, be of great service to the public in demonstrating the value of the objects shown in the exhibition. There will doubtless be many difficulties in the way of thoroughly testing the different inventions; but arrangements will be made for comparative trials directed to ascertain their power of preventing the formation of smoke and other noxious gases; their economy as respects fuel and saving of labour in stoking, &c.; their wear-and-tear on the boilers, and the actual work done as tested by the volume of water evaporated in a given time; flue temperatures, &c. In addition to boiler-furnaces, the committee will also have to adjudicate on improved kilns and oven-furnaces; on gas-producers and apparatus for the use of liquid fuel; and on domestic grates without number. Several important inventions are spoken of as coming from America, and manufacturers from France, Belgium, and Germany will be represented.

The use of smokeless coal and anthracite is almost unknown in this country for domestic purposes, and although many manufacturers are now prepared to supply fireplaces in which such coal can be consumed, we doubt if the public will readily adopt this kind of fuel. The absence of flame and the impossibility of stirring and poking an anthracite-coal fire will be regarded by many as a great objection. There is, perhaps, scarcely any bad habit more deeply rooted

among Englishmen than that of constantly meddling with the fire and an anthracite fire thus treated speedily becomes extinguished. The so-called "base-burners," so much in use in the United States, where the heat of the glowing coal is seen through mica plates, are among the best of the contrivances in common use for burning smokeless coal, and, with this class of stove, an enormous economy in fuel is, undoubtedly, attained. A single stove placed in the hall or the centre of the house, will warm all the upper rooms, and the amount of care and attention required in keeping them alight is reduced to a minimum.

We are not likely in this generation, or for very many years to come, to relinquish our open fires; indeed, we very much doubt whether there would be any real advantage attained in doing so, for we gain in wholesome ventilation what we lose in wasted coal; but there are, undoubtedly, many ways in which our modern fireplaces can be made more efficient in consuming the gases thrown off from the coal, and in imparting warmth to the room. Indeed, we can scarcely conceive any apparatus more ill-adapted for its purpose than the cast-iron grate generally found in London dwelling-houses. It is a very low estimate to take of their disadvantage when we assume that three-fourths of the coal burned in them is totally wasted. When we apply a simple calculation to the number of fires actually alight on any winter's day in the metropolis, and assume that one-half of the coal only is squandered, the amount of loss we find to be going on is truly astounding, and we know of no field where inventive genius can be more profitably employed than in providing us with some means of remedying this vast source of wastefulness. Not only is the value of this coal entirely lost to us, but, above and beyond this, an unascertainable amount of injury is caused to the citizens of London by the foul smoke and gases spread around us in the atmosphere from, say, upwards of a million chimneys, conveying away the unconsumed fuel from our houses.

The Committee who have taken in hand the task of warring against smoke-production, both by manufacturers and private individuals, only need to point to a few days of genuine London fog to bring home to all of us the truth of these facts, and the importance of the work in which they are engaged, to every Londoner. How can we estimate the value of the lives sacrificed during such a fog to the atmosphere which chokes and stifles us? Is it possible to calculate the cost of artificial illumination in so many hundred thousands of dwellings? But though a day of dismal "black fog" brings home to us so vividly the discomforts of the production of London smoke, and reminds us so forcibly of the error of our ways, we must not forget that a pall of smoke is ever hanging over London, with its long train of evils. It blackens our public buildings, spoils our flowers and gardens, pollutes our water-supply, and brings with it a thousand petty discomforts, to many of which, from long habit, we have become so much accustomed that we barely notice them.

It is easy enough to write about the evils of London smoke, and London is not by any means the only sinner in this respect, for many, and, in fact, most of our large towns, suffer quite as much as we do from the "smoke nuisance," and there is a tract of country near Birmingham which we designate as the "Black Country," which has to endure almost perpetual darkness, from the atmosphere of coal-smoke which hides the sun.

Now we are told, and we know it to be a fact, that smoke is an altogether unnecessary annoyance; it is quite possible to burn coal without producing any smoke, and coal thus burnt will give out more heat, and serve the

purpose for which it is employed far better than fuel which disperses upwards of half its weight unburned into the atmosphere. With a perfect knowledge and appreciation of this fact, why is it that we continue to waste coal in the way we do? It is hard, indeed, to give any satisfactory answer to this. Some will tell us that it is because builders continue to put in the commonest and cheapest stores with which Sheffield and Glasgow can supply them, and because architects are utterly indifferent whether the rooms they design are properly warmed or not, and whether the houses they construct are duly ventilated. There is a good deal of truth in this, and we fear a great many architects will plead guilty to the charge of too much indifference in these matters; they will urge the absence of any real knowledge concerning the working of the inventions which are now being so diligently pushed by enterprising firms, and the impossibility of altering the grates and flues in existing houses. It is the want of this correct information which the smoke abatement exhibition is designed as far as possible to remedy, and if it in any way realises the hopes of its promoters, much real good may be effected by it. The public will, at any rate, be able to see the actual working side by side of all the best appliances for consuming and preventing smoke both for industrial and domestic purposes, and in the lectures and reports which are promised to us by those best qualified to pronounce an opinion, we may see some way out of our present difficulties.

It is now very widely known that the chief objects we must set before us is to avoid making smoke. It is far easier to prevent smoke than to consume it when once formed, and every appliance for burning fuel which leads to the production of smoke may at once be condemned as faulty in its work, and unsuited to its purpose.

It is easy to demonstrate that the problem of smoke consumption is far more simple for the manufacturer than it is in the private dwelling-house, and any ready plan of altering our modern open firegrate so as to render it a perfect smoke-preventer is manifestly out of the question. There are many ways, however, in which we can vastly improve our firestoves, and numerous inventions will be submitted to the judges which aim at the solution of this problem. Some patentees propose to add the fresh coal at the bottom or side or back of the incandescent fuel; others feed the fire by means of hoppers, in which the green coal, *i.e.*, the fresh charge of coal, is partly coked before it reaches the bars; while others, again, make the entire grate reversible, and turn the fire upside down each time fresh coal is to be added. Some would have us prevent the formation of smoke by the use of anthracite and smokeless coal. This fuel, though it has much to recommend it, will, we are afraid, beslow in commanding public favour, owing to the difficulty in lighting it and the want of flame. A whole school of smoke-doctors boldly advise us to discard coal altogether for domestic purposes, and to use gas both for our living-rooms and kitchens, and it is impossible to deny that gas has very many important advantages. There is, however, much prejudice against gas to be overcome before this mode of firing becomes widely used, and the gas companies will have to spend more money than they seem prepared to do in London in educating the public, and especially the working classes, in the convenience and economy arising from the employment of gas for cooking and warming. The proposal of Dr. Siemens to supply gas of two qualities—the one a cheap variety for heating, and the other a pure and high-standard gas for lighting, is well worthy of the most careful consideration.

Then we have another school of thinkers who propose to us to warm our houses and

public buildings entirely with steam or hot water, and, we believe, a company has actually been formed in America to warm an entire town by means of steam laid on in pipes like gas or water. This plan of warming, supplemented by some carefully devised system of ventilation, has more in its favour than the Continental stove system, which will never, we are convinced, become popular in this country. Scarcely any large house in modern Paris is without its "calorifer," an apparatus for the production of hot air; and throughout Germany the close stove is to be found nearly in every room. At the exhibition we may expect to see what can be accomplished by these appliances, and may learn what is good in them and what to avoid.

Much advantage we hope also will come from the experience manufacturers will give to the value and economy of the various gas-producers. There are few industrial purposes for which a gas which can be produced at 3d. per thousand feet will not be cheaper and more efficacious than coal, and when used in gas-engines motive power can be obtained at less cost than from steam. We have been informed that from some experiments recently carried out by Messrs. Crossley with the Otto engine, it was found that 3,000ft. of gas costing 9d. would do the work of 1,000ft. of common coal-gas at 3s., and that the consumption of 1-4lb. of anthracite coal per hour produces the work of one horse-power nominal. This is superior to the work done in the largest and best compound engines, which, as is well known, require 2lb. of coal per horse-power per hour.

Electricity as a lighting agent must ere long, to a very great extent, supersede the use of gas, and a great impetus will doubtless at the same time be given to the use of gas for many purposes to which coal is now applied. To predict that electricity will ruin the gas companies is to close our eyes to the value and advantages of gas for many industrial purposes for which at the present time it is little used, owing to the run upon it as an illuminant. When once the gas companies are deprived of this their virtual monopoly, they will soon see the urgent need of furnishing gas of a cheaper kind for heating and manufacturing purposes, which will be its chief use in the future. Respecting the urgent call that exists for such an exhibition as that proposed, there can be no two opinions, and we heartily wish the promoters may be able to realise their expectations, and effect some marked improvement in the atmosphere of London.

THE INTERNATIONAL MEDICAL AND SANITARY EXHIBITION.—II.

CONTINUING our notice, we find in the eastern quadrant, Messrs. Bellman and Ivey have a stall in which they display several specimens of their Scagliola, including column-shafts, pilasters, wall-linings, pedestals, and other decorative accessories. The specimen of shaft made by this firm for Carpenters' Hall is noteworthy for the excellent imitation and perfect polish which have been attained. Messrs. Bellman and Ivey show how well the material can be used to conceal iron cores, stanchions, and other supports. These can be inserted before erection, or the polished column can be cut and placed round the core of iron or brick. At the Art Union premises at Carpenters' Hall, and the Grand Hotel, Charing-cross, this plan of masking the supporting cores has been carried out with success. The "Eureka" Concrete Company, whose exhibits we briefly referred to in our last, have on view a speciality of some interest to those who desire to promote economy in the laying of gas and water-pipes. The inventor, Mr.

Nichols, lays the pipes in cement concrete grooves cast for the purpose, so as to obviate the inconvenience of taking up roads and pavements for laying. The "concrete gas detector" is a small chamber with a movable lid, by which means escape of gas can be instantly detected. It can be placed in the middle of the roadway over the main piping or on the pavement. A sectional drawing shows the method of laying the blocks and pipe. The model of stable gives a good idea of the cleanliness and surface-drainage insured by concrete paving. This paving can be laid from 8d. per foot, specimens of sewers 4ft. by 2ft. at 12s. 6d. per foot run, and sinks at 1s. 8d. per foot super, are exhibited also.

At Stand 362, Mr. Walker, East Dulwich, London, and Leeds, exhibits a large collection of architectural decorations, fire-proof flooring, stable, carriage, and foot-pavement, steps, sinks, stones, and sewers; the decorations are in solid red concrete, all of which are particularly good in design and rich in colour, comprising Queen Anne pilaster, large Classic cornice, window-head, window-sills, brackets, corbels, and steps, and being made of fire-proof material, is suitable either for internal or external decoration, as it would not in the least be affected in the case of fire or the most severe frost. Work of the same kind has been exposed for the past six winters, and shows no signs of deterioration, but is harder than when first fixed in its place. His granite and iron-slag concrete pavement and flooring we have only lately referred to. It is laid *in situ* on a bed of broken ballast, and becomes exceedingly hard and compact. Being laid in a soft state, it can be made to imbed iron joists and bars, and thus protect them from the action of fire; and this form of laying floors is now recognised as the strongest and most indestructible. Such concrete construction, 6in. thick, has been found to resist a breaking-weight of 15cwt. to 20cwt. to the square foot. We notice a sewer with lap joints made of concrete, with an invert in one solid piece, having a flat base. Mr. Walker's concrete railway platforms have been found to answer the highest expectations for strength.

Messrs. Faraday and Son have a display of ventilating gas pendants and fittings. The gas pendant is clear of pipes, and insures a good draught, and the risk of gas-leakage or the fall of corrosive dust are avoided. The Argand burner is non-corrosive, and has a lever check to regulate the flame, while the opal glass screen throws a soft light. We notice, also, some sconces and brackets of good workmanship.

Mr. James Howorth exhibits models and specimens of his revolving Archimedean screw ventilators, which are well known to our readers, and we here draw particular attention to a new patented screw exhaustor and blower, which has been contrived to meet the great want of ventilating the lower stories of manufactories and mills. The exhaustor is an Archimedean screw, working in a cylinder placed horizontally. It can be easily fixed to a wall on brackets, or to roof timbers, the exhaust being driven through a window or a tube, and can, in fact, be applied in any situation, either for the purpose of exhausting or blowing. For ventilation of mines the blower might be applied with advantage. Messrs. Kite and Co. show the siphon system applied to ventilate house-drains. There is an exhaust tube fitted with the ventilator, and another tube with an inlet ventilator fixed thereon. The exhaust is fixed at one end of the drain, and the inlet at the other end, the former rather the highest. When there is no current of air outside, the siphon principle comes into play; at other times the action is facilitated by the exhaust and inlet ventilators. The stable, dormer, and cowshed forms are well-contrived, and of slightly appearance.

Hayward, Tyler, and Co. show a large number of articles connected with modern sanitary engineering; but those to which they attach the greatest importance are the result of endeavours to provide substitutes for the "pan closet" which shall satisfy all sanitary requirements, and also be simple, inexpensive, and easily fixed. First comes their "Full Flush Valveless" closet, with patent flushing arrangement. The closet is of the "hopper" type, of very careful design, and exceptionally handsome appearance, but the closet is not sold without the whole flushing arrangement, the object being to insure satisfactory flushing in all cases where the "Full Flush Valveless Closet" is specified. As the price is only 50s. for the best closet, and 45s. for the plainer make, it is within the range of all purchasers, a comparison of prices showing that the ordinary pan-closet with flushing arrangements (which is not nearly so handsome in appearance) comes to nearly 60s., and the cheaper pan closets to about 45s. The patent flushing arrangement consists of a flushing cistern giving a flush of two gallons to conform with the requirements of the water companies, and a patent water-locking valve which prevents the cistern valve closing until the full flush has passed. The flush descends with excellent effect, owing to the make of the flushing rim, and the absence of any impediment between the cistern and the pan. It is almost needless to point out all the advantages secured by this arrangement, and it certainly is well worthy of notice. The closet, with its dish, &c., are made to go exactly into the place of an ordinary pan-closet without (in most cases) any alteration of the seat. The other closet that we notice is a valve-closet, which scarcely differs in appearance from the most expensive made, and in working powers seems identical; but, by careful organisation in the manufacturing departments, and saving of all superfluous expense, Hayward, Tyler, and Co. are able to sell it at prices which enable it to be used in numberless places where hitherto the "pan-closet" has been considered the only resource, on the ground of its comparative cheapness.

Messrs. Comyns, Ching, and Co. have several outlet ventilators made on the principle of T. Boyle's patent, the object of which is to allow the escape of vitiated air from rooms without the risk of back-currents. A series of light valves made of mica, very sensitive, and hung on copper hooks, compose these ventilators. Some are cased externally in the turret form, and others act simply on Arnott's principle, and are fixed in the chimney-breast. The inlet ventilator is simply a circular plate, and can be regulated at pleasure. Messrs. R. Bullivant, Tagliaferro, and Co. are the makers of an air-tight and noiseless sliding sash-window which they exhibit by a model. There are no beads to remove in taking the sashes out, and the weights are not attached to the sash in the usual way by a cord, but a guide-bar of hard wood is introduced, which works in a groove in the frame, and to this the weight is attached. The guide-bar has a spring packing to keep the sash in place, which prevents it rattling, and excludes dust and draught. We understand this sash has been used in the New Law Courts. We also find 2in. deal ovolo sashes of this construction costs 1s. 1d. per foot super. Passing the stall of Messrs. Joseph Kaye and Co., who show a new door-fastener and furniture, in which the old-fashioned plan of turning a handle is superseded by a knob, which is pushed backwards, the bolts having revolving ends—worth the attention of architects, the Spongy Iron Domestic Filter Co., and several other exhibitors, claim a word, but we select a few useful appliances shown by Messrs. Benham and Sons. We notice especially a disinfecting oven, having jacketed sides, heated by steam, which

can be used either moist or dry, and another very convenient oven for gas. The hospital cooking-stove of this firm is certainly the essence of compactness. It can boil, steam, bake, roast, and stew, and is a useful appliance for colonial use. The hospital sink, of enamelled iron, and other exhibits for heating, laundry, and ventilating purposes, are worth inspection. Wherever gas is used, Benham's ventilating globe light, or some like expedient of carrying off the vitiated air, is essential. Mr. R. Renton Gibbs has done much to simplify and economise hot-water apparatus, and other heating appliances. We may notice with commendation his very compact patent furnace, 3ft. high by 19in. diameter, which can be placed in any underground chamber or cellar below a hall. From this furnace a "flow" and "return" pipe is led into an ornamental coil-case, which forms at the same time a useful sideboard in the hall. We remark also the "Renton Gibbs" boiler for heating buildings, the peculiar feature of which is that the fire-box is contained in a tubular arrangement of water-pipes or bars, inclosed on the upper half with firebricks, and set in ordinary brickwork, the price of which is £8 per lineal foot. The "air-cleansing" apparatus is an admirable screen; the glass V-shaped troughs or prisms are fixed as in a Venetian blind, and form a succession of troughs, over which water falls from one to the other till it is drained off below. Through the horizontal slits between the water and troughs the air enters, after being cooled and cleansed of impurities by passing through the sheet of water. The water may be scented or otherwise treated. Gibbs' hot-water grate, in which a coil of pipe is fitted to a common grate, is a decided novelty. The pipes, in fact, form the bars, and can be made to heat the bedrooms above.

Messrs. Hobbs, Hart, and Co. exhibit several specimens of their well-known locks and fittings. The locks manufactured for asylums, hospitals, and prisons are the perfection of contrivance, and we may mention the specialities known as the "Protector," applicable to all locks, rendering them unpickable. The patent "Progress" safes are certainly all that can be wished for, combining security with convenience.

Messrs. J. L. Bacon and Co's. stall is a very instructive one. The coil of pipe bent cold shown under pressure of 3,400lb. per square inch and twisted into a knot at the upper end is interesting, as showing the ductility of wrought-iron pipe. Messrs. Bacon's hot-water apparatus consists of specially made wrought-iron tubes 1 5-16in. external diameter; they are connected by sockets screwed right and left hand, which are not affected by expansion. An automatic valve fixed in a cistern at the highest point keeps the pipes full of liquid at a certain pressure, which can be regulated. The boiler is, in fact, a series of tubes bent in tiers in the furnace. A drawing of the drying closet apparatus fixed at Milton Union Workhouse, shows a very effective method of drying by hot water. There is also a model to show how hot-water pipes can be placed behind gratings to form a skirting to a room. Very little room is taken up, and the projection is not more than that of an ordinary skirting. The firm shows a section of heating the new hospital at Antwerp by steam, in which a complete system of heating and ventilation is indicated. The Gothic coil-case coloured, and another case of a Renaissance design, painted white and gilded, are clean and delicate castings, suitable for interiors. We alluded last week to the exhibits of Messrs. A. Smith and Stevens. We may here mention their self-feeding grates for anthracite coal; also Messrs. Verity's combined boiler and coil ("Osborne") for heating halls, conservatories, &c., by gas, a very compact and bright-looking apparatus made in copper

and brass, polished or ornamented with repoussé panels. Messrs. Strode and Co. have an improved bath-heater, which heats a bath to 110° in half an hour. The heater is supplied with gas, and any water supply may be made available. Messrs. Fraser and Co. have a disinfecting apparatus, which is not only portable but cheap; heat is the agency employed. As a clean and sanitary flooring nothing equals parquetry, and we find Messrs. Howard and Sons are the chief exhibitors of this class of goods. Several excellent specimens may be seen in the hall, between the arcade and quadrant, the price of the simplest pattern being only 6d. a foot.

We alluded last week to some important sanitary fittings and ironmongery exhibited by Messrs. W. Tonks and Sons; among these we mentioned an admirable architrave ventilator (Currall's patent), which can be fitted to the head of any door or window, and becomes either an inlet or an outlet, according to the condition of the room. Mr. Mark Judge's modification is quite an architectural addition which the most aesthetically-minded could not find fault with. Currall's perforated plate or window inlet is another useful form of aperture for admitting air. The fresh air, as it enters, is directed upwards, and diffuses equally. The chimney-broast outlets, with funnel-shaped apertures, are neat and efficient outlets, and do not admit smoke. Few modern appliances for lighting equal the excellent "Libra Light" of Mr. Hopkinson. The oil is contained in a central vase, easily refilled, even when the lamp is burning; there is little or no attention required; the burner only has to be removed when a new wick is required, and the oil is kept up to the light by a beautiful contrivance known as Hopkinson's patent valve, which is constantly admitting as much oil as the light consumes, and no more. We recommend those interested to examine the very handsome lamps at the exhibition, where every explanation will be given by Mr. W. W. Hopkinson, the manager of the Libra Valve and Lamp Works. The Libra light is indeed an even, continuous light, perfect and artistic in form, and saving all trouble of trimming and loss of time.

Of sanitary closets and fittings, we may add to our former notice of Messrs. Doublton's exhibits, an excellent flush-out closet in connection with a vacuum waste-preventer, by which a single pull gives a full two-gallon flush of water, the force of which is greater at the end; also the aerating filter, invented by Mr. Bailey Denton, the merits of which we have before pointed out. By the aeration of the filtering materials any organic matter becomes oxidised, as a kind of intermittent filtration takes place. It is automatic in action, and is made of stoneware and carbon, and can be applied wherever cisterns exist. Messrs. Beard, Dent, and Hillyer show some capital specimens of plumbing, and a patent "vortex" closet. The cast-lead V dip-trap, the "ventilating drain connector for R. W. pipes, &c.," and the "artisan" closets are clever modifications. We notice also stoneware traps, water-waste preventers, lavatories and closets, a drain interceptor, and other arrangements for disconnecting soil-pipes from drains. Mr. Henry Owen has also a capital double-trapped closet, made of one piece of earthenware, divested of all complex levers and contrivances. It can be easily fixed by screws to the floor. The upper siphon is ventilated by a pipe carried through the wall, and the flushing-rim round the basin effectually washes the latter. The "ventilating valve-closet," having a vertically-hung valve, has some decided merits; the outlet from basin is out of sight in front, and there is a siphon forming part of valve, which forms the overflow. The tip-up lavatory, urinal, and slop-sink is an excel-

lent combination for saving room, well adapted for offices, &c.

Messrs. W. Ingham and Sons, Wortley, Leeds, are the manufacturers of an effective trap known as "Brown's patent accessible siphon trap." It is made of glazed stoneware with a loose lid forming the upper segment of the siphon, which gives easy access to the trap and outlet. A flat sole is cast, on to the trap, which affords a good bedding. There is an upright junction for ventilation. Another speciality is Adam's "automatic trough flushing closet," made of fireclay, in which a siphon discharges the contents. The glazed-brick fireplace, with played sides and back, is artistically designed; the chimney-piece is of wood, painted a dark grey green, relieved by tiles of brown and green; a double-trapped ventilating gully may also be noted for its simplicity. Especial mention must be made of Messrs. N. Braithwaite and Co.'s patent siphon for closet cisterns, the advantages of which are simplicity in the siphon arrangement which can be fitted to any cistern, and the avoidance of valves at the bottom, which are a constant source of trouble and leakage. The siphon is placed over the side of cistern, and is fitted to the service-pipe, the other end is connected to a cylinder in which a piston works. When this is raised by the lever the water is forced into the pipe over the side of cistern, thus setting the siphon in motion, and allowing the water to flow until the compartment is emptied. Nothing can be more efficient, as there is no complex machinery to get out of order, and no packing to decay.

Mr. J. Parker's "automaton dry-earth closets" and commodes are admirably adapted for cottages and country-houses. They are intended for dry earth or ashes, have pull-up handle and pail receptacle. The chair-pattern commodes are made in deal, painted or varnished, or in grained oak or mahogany, at moderate prices. Messrs. T. Smith and Co., of Old Kent-road, exhibit a large collection of sanitary stoneware drain-pipes, junctions, siphon and other traps, closet-pans, gullies, sewage-carriers, &c.; the Wortley Fire Clay Co. also show Jackson's patent water and gas-tight joint in stoneware tubes, which consists of an annular space between the spigot and collar filled with liquid cement by an aperture at the top of collar; Mr. W. Ramsay exhibits a model showing Jewell's system of drainage and ventilation, by "double siphon out-traps," in connection with soil and ventilating pipes and siphon closets; and in this category we may mention J. Woodward's excellent "wash-out" closet, lavatories, and sinks; Pearson's well-known "trapless twin basin closets," exhibited by Messrs. Capper, Son, and Co.; Hayward, Tyler, and Co's "full-flush valveless closet"; J. Bolding and Son's closet and trap (the "National"); J. Warner and Son's valve closets with improved basins; and some others, examples of all which will be found in this department of the exhibition. The traps and stoneware pipes shown by Mr. P. J. Davies merit particular attention.

The specimens of plumbing-work exhibited by various journeyman plumbers will be viewed with interest. Messrs. Smith and Barnes, plumbers, direct attention to a new system of making joints with spirit-lamp without pot, ladle, or irons. The specimen joints shown, invite inspection for their workmanlike qualities and cleanness. By the process adopted, the danger of fire in premises is avoided. We notice also some good "wiped" joints by J. W. Fuller, F. Shepherd, J. Vance, and others. Mr. Davies shows wiped solder-joints and bend, also a breeches-piece and trap, out of 6lb. lead made in three pieces in eight hours work. We also notice a knot-trap of 2in. pipe specimens, executed by Mr. E. Lyne, in Messrs. Benham and Son's employ. The

designs for sanitary plumbing for a town mansion, exhibited by Mr. Fairchild, a journeyman plumber, showing an exhaust and inlet arrangement, is an example of the extension of sanitary principles among the working craft. These exhibitions of plumbers' work are admirable illustrations of recent lectures on sanitation.

Messrs. Quirk, Burton, and Co. show specimens of their patent tin-lined lead pipe, in which a block-tin inner tubing is incased by one of lead. The two metals are said to be inseparable. As a security against the baneful effects of the action of water on lead, nothing can be better as a means of conveyance. The cost per lineal foot is about the same as lead pipe; for beer establishments the tin-lined lead pipe is no doubt a desirable substitute for lead, and ought to be used for all malt liquors.

At Stand 300 in Section XIII. the Albisima Paint Co. exhibit a selection of sanitary paints, made from zinc, which are well worth attention. These paints are non-poisonous, the colour is not affected by gas or atmospheric influences, they mix well with any colour, and work well; their use is decidedly economical, and we are disposed to accord them a very high place, on all accounts, among the most recent substitutes for white-lead that have come under our notice. Mr. R. Adams' converging and regulating spring-hinge for double action and rebate-framed doors, the door-spring and slam-check, the fanlight openers, the weather-tight sill-bars and bolts for casements are worth notice; we may also draw attention to Phillips' reversible window, made by J. Tomlinson and Sons, of Leeds, and an improved water-bar for casements shown by Smith and Turner. Benj. Turner's adjustable slam-spring and hall-door porter are probably equal to anything in the market. Notice may also be taken of Simpson's double-paned sashes (E. T. Gething), C. R. Stevens' steam and hot-air heater, W. Hellier's instantaneous water-heater, a substitute for the ordinary apparatus; G. T. Tonks' frictionless balanced supply valve, and the furniture shown by Messrs. Steel and Garland.

Last week we spoke of the principal drawings exhibited in the west gallery, but our notices were necessarily brief. It must have been rather a curious idea of classification which prompted the exhibition committee to place the architectural drawings and the surgical instruments together. The bills on the staircase directing visitors with the words "To the surgical instruments and architectural drawings," at least suggest a want of affinity, though the architecture, such as it is, is chiefly in relation to buildings dedicated to Esculapius. We mentioned last week a drawing for a proposed hydropathic establishment at Bournemouth. The plan of this building, we may now add, comprises a central hall, square, or nearly so, surrounded by corridors, and lighted from the top. Round the hall are arranged the drawing and dining-rooms, bedrooms and dressing-rooms, the bath-rooms being placed on one side. The author, Mr. H. H. Bridgman, has adopted a free red brick Italian style, and the building has a central tower, covered by a domical roof, and will have an elevation of considerable height. The same architect has a drawing of a Board school. Mr. C. O. Ellison's views and plans of the Liverpool Eye and Ear Hospital, and the Shropshire Eye, Ear, and Throat Hospital, will be looked at with some interest, though perhaps not regarded as perfect models of arrangement. All rooms have a separate connection with foul-air chamber; and we notice in one case the fresh air is introduced at the sides of the windows, the woodwork of which form channels. A detail of a self-acting ash-screening closet (Morrell's patent), illustrates an economical arrange-

ment, in which unscreened ashes from fire-place may be thrown in, and by the inclined screens the fine ashes only are discharged on the faeces. There are three openings provided, one for emptying vault or removing the pail, another for removing the cinders, and the door at top for throwing in the ashes. The Sanitary Appliance Company are the exhibitors. The "Quick Charging Siphon and Pneumatic Sewer Ventilator" are the names of appliances illustrated by drawings by M. J. and L. H. Adams. The former is for flushing purposes, and appears to be an effectual means of applying a siphon. The "Charcoal lung or punkah" is another interesting model of an appliance for sick-rooms. It is composed of a kind of sheet or netting of hempen strands, with a cylinder at the top which is charged with caustic soda. This liquid drops into a trough in which the sheet or netting dips at its upper part. It is thereby constantly kept charged with fluid, all excessive of moisture being drained off by another trough at the bottom. The carbonic acid and sulphur gases are absorbed by the alkali. A drawing shows the same principle fitted to a van for the purification of the underground railway tunnels. Trays of slaked lime with water tank over are the means employed. Amongst other drawings we see a series of sections and plans illustrating a theatre at Brussels, the "Royal de la Monnaie," drawings of a sea-water vessel for conveying seawater to London, a system patented by John Hayes, C.E., and Mr. W. L. Vernon sends some large plans and photographs of Hastings and St. Leonard's, with statistics relating to the climate, health, and drainage of these watering-places.

THE WATER QUESTION.—XII.

CAPACITY OF RESERVOIRS.

A RESERVOIR to hold temporarily a glut of water, and discharge it gradually, may be called a dam, to distinguish it from a reservoir proper, to equalise the flow of water during long periods of time. Whether a reservoir proper or a dam be made in any position where it may be desired to place the land under a system of water conservancy, will always depend upon whether in that position or within reach of it there is a demand for a general supply of water the year round, for houses, or manufactures, or irrigation, or for power away from the stream itself; or whether a demand would be created by first establishing a means of supply. In many matters of trade the supply waits upon the demand, but in water supplies the contrary has been found to prevail, and not in water supplies only; and in taking measures to secure any portion of the uplands or midlands of a river basin from taxation or contribution to funds to be expended in preventing floods in the lower lands by making upon the land itself such works of water conservancy as may be sufficient for the purpose, it is advisable to consider whether in every case where a dam only may be necessary, it may not be profitable to make a reservoir in such manner, and of such capacity as will be sufficient not only for the one purpose but for both, because, for any given quantity of water, within certain limits, it is more economical to store it in one reservoir than in two. Both purposes, however, cannot be economically provided for in one reservoir where the demand for water supply is equal to the available quantity yielded by the drainage area appropriated. When this is so, and the storage room is duly apportioned to the drainage area, the necessities of the case require that as much water as possible shall be kept to meet a drought, and, therefore, the reservoir might be full

or nearly so, when a great rainstorm occurs, and in such a case a dam becomes necessary, in addition to the reservoir; and its position should be below the reservoir; otherwise, a flood-water channel along the margin of the reservoir will be necessary; but when made below it the dam receives the flood waters which pass over the waste weir of the reservoir, and lets them go down the valley in any regulated quantity desired, provided that be sufficient to empty the dam before another great flood occurs. Where, however, the demand for a water supply is not equal to the whole available quantity from the appropriated drainage area, one reservoir may be made to serve both purposes, at least until the demand for water supply amounts to the limit of supply.

In the first place, however, it will be preferable to consider here the two cases separately, and first that of a reservoir for the supply of water for any purpose.

The storage capacity of a reservoir large enough to equalise the flow of water over a long drought, or two or three shorter ones with intervening winter rains of less than the usual amount, and so that the annual rainfall is made to yield its daily average quantity throughout long periods of time, can be found when the past rainfall daily for a long time has been ascertained, the number of dry days in the future being assumed to bear the same relation to wet ones as they have done hitherto, and that the past average yearly quantity of rain will continue the same; then the capacity of any reservoir may be easily found, being measured by the longest period of defect of supply into and discharge out of the reservoir.

It is, therefore, calculated on a basis altogether different from that upon which the space is to be calculated which will be sufficient to receive and hold temporarily, and discharge regularly, an excessive flood of water. Such a reservoir is most economically proportioned to its drainage area when it is of that capacity which is sufficient only to store and equalise the flow of the rainfall of three or four of the driest years coming together, and this has been found, by examination of numerous tables of rainfall, extending over a long series of years, to be about one-sixth less than the average of all the years, and therefore is ascertained by first finding that average from the records of any particular locality, and deducting from it one-sixth part, which leaves a depth which can be economically dealt with. Thus if 42in. be the average rainfall, 35in. will be the depth to reckon upon. From that is to be deducted the depth evaporated, absorbed above the reservoir and given out below it, and that entering into the growth of vegetation. All these sources of loss are sometimes together called "evaporation" simply. This varies with the nature of the ground on which the rain falls, on the form of the surface, and on the humidity or the dryness of the air in general of the locality, and this latter quality varies much in different parts of the country; but the average "evaporation" from all kinds of surface and all localities in England and Wales is estimated to be very nearly 14in. in depth. If it were 14in. where the rainfall to be dealt with is 35in., the available depth would be 21in. in a year, and, in the absence of exact measurements in every part, that depth would be supposed to extend over the whole area draining down to the site of the reservoir. It may not be so where the area is very extensive, and this may have been one of the reasons why expected quantities of water have sometimes not been yielded by a drainage area of given extent; but it is the nearest approximation to the truth which can be made, and some concession towards it may be considered to be made in deducting one-sixth from the known average rain-

fall of one or two places in the area; although in some cases that quantity has been found actually to pass over the waste weir of a reservoir, thus furnishing a direct proof that with such reservoir-room as has been there adopted that part of the water could not be stored.

In waterworks practice the available quantity is conveniently reckoned per thousand acres of the drainage area. Upon an area of 1,000 acres a depth of 21in. of water would yield an average daily quantity of

$$1000 \times 43560 \times 1.75 = 208,800 \text{ cubic feet,}$$

365

of which about two-thirds might be used for supply to houses, manufactures, or for power away from the stream, or for irrigation, leaving one-third or thereabouts to the stream itself; or rather, this latter would be first apportioned, leaving two-thirds for other purposes, and the apportionment would stand thus—

$$\begin{array}{rcl} & 208,800 \text{ c.ft. per day} & \\ \text{One-third} = & 69,600 & \text{,, ,. to stream} \\ \text{Two-thirds} = & 139,200 & \\ & 6\frac{1}{2} & \end{array}$$

870,000 gallons per day for supply,

and so on per 1,000 acres, within limits, defined by our knowledge of the real average rainfall over any area, the certainty of the calculated average increasing with the number of places of observation over a given area, but becoming too uncertain for use when the area is very large and the places of observation few.

The quantity above set down for the stream would render it more powerful in dry weather than it would be without a reservoir. The average flow of the stream in this case during dry weather would probably not be more than two-thirds of the quantity above stated, for a great number of measurements of the dry-weather flow of streams has shown an average of about 30 cubic feet per minute per 1,000 acres of the drainage area. This, no doubt, varies with the nature of the ground from which the water flows, being greater or less as the ground is more or less absorbent. Where the ground in the upper and middle portion of a river-basin consists of chalk, oolite, or sandstone the dry-weather flow forms a larger part of the whole quantity flowing off the ground than where it is of hard and impervious rocks, with the steeper surfaces which always accompany those harder rocks; and the kind of ground which affords a medium dry-weather flow between these extremes is that which consists of alternate formations of sandstone and shale, or of oolite and lias clays, in either case covered in parts with clay and gravel.

The rainfall observations, if sufficiently numerous, will show on an average of years that where the annual quantity is great the number of rainy days is greater than in those parts of the country where the rainfall is comparatively small [this is not, as it might seem to be, a necessary consequence], and so, although more water per day is discharged from a reservoir per 1,000 acres of its drainage area in the former situations than in the latter ones, the loss of water is oftener replenished, and in proportion to the frequency of this action the capacity of the reservoir may be smaller. The experience in England during the last 25 or 30 years has been that, in order to equalise the flow of water day by day during three or four consecutive years of least rainfall, the capacity of a reservoir should be sufficient to yield about 120 days' supply where the rainfall is frequent, and 240 days where it is infrequent; but it is here assumed that the reservoir is full at the commencement of a drought, whereas it may not be so if the previous winter's rain has not yielded a surplus over the regular supply sufficient to

fill up the reservoir completely, and in this view the capacity should be increased, perhaps, to 150 days' supply in the one case and 300 days' in the other. From a casual examination of Mr. Symons's annual records of rainfall, it appears often that nearly as many rainy days occur in the Southern and Eastern counties as in the Western and Midland counties, although the rainfall in the latter is much greater; but the days set down as rainy in the records include those on which 1-100th of an inch of rain falls, and this is so little that it adds nothing to the run of the streams.

The rainy days, the frequency of which affects the capacity of storage reservoirs are not so numerous. To make rainfall observations more useful in practical questions of water supply, the streams should be gauged at the same time as the rain; but as things go, the way to the truth of a thing is through a multitude of blunders on questions of fact—facts quite easily obtained if political questions did not stand in the way of the health of the people, or rather, it may more properly be said, if the health of the people were not of secondary consideration in politics to some others of less worthy ambition. The facts ought to be established at the public expense, then opinions founded on them would afford sufficient scope for the emulation of practitioners in this matter as well as in some others. However, in this particular matter, the last quarter of a century's experience has shown that a reservoir may be depended upon for a supply of water in dry seasons if its capacity corresponds with the above statement, on the testimony of those engineers who have had the greatest experience in the matter. If in the example where 21 in. is the available annual depth of water over the area of 1,000 acres, the proper number of days of supply were, from its position, 180, the capacity of the reservoir would be

$208,800 \times 180 = 37,581,000$ c. ft.
Deduct the dry weather
flow from 1,000 acres at
30 cubic feet per minute 7,776,000 c. ft.
22,808,000

or, 30 million cubic feet capacity, which is at the rate of 30,000 cubic feet per acre of the drainage area.

BRISTOL AND GLOUCESTERSHIRE ARCHAEOLOGICAL SOCIETY.

THE meeting of this Society, which commenced on Tuesday week as reported on p. 102, was continued on the Wednesday and Thursday following. On Wednesday morning, the members set out in carriages for an excursion which comprehended St. Briavels and Tintern. The curious little village of St. Briavels afforded scope for much investigation, the church, which is a handsome structure, being, however, only second in point of interest to the Castle, which is a mere ruin. According to Giraldus, the castle was built in the reign of Henry I., by Miles Fitz-Walter, Earl of Hereford, to check the incursions of the Welsh, and to strengthen the authority of the Norman kings in this part of the country. Fitz-Walter appears to have been the first constable of St. Briavels and warden of the Forest of Dean. His eldest son, Roger, was the founder of the Abbey of St. Mary de Bene, at Flaxley. It is recorded that King John paid a visit to the Castle in 1207, and on four subsequent occasions. In 1205 this monarch conferred the constableness upon John de Monmouth, and Bigland, in his county history, arranged a table of his successors, of whom there were 27, the last holder of the ancient office being Henry Somerset, Duke of Beaufort, from 1811 to 1878, since which time the duties have been undertaken by the Commissioners of Woods and Forests. Houses have been built close up to the edge of the old moat, the greater part of which has lately been drained, from sanitary considerations. The castle is on a sharp shoulder, not on the summit of the hill, and it is constructed of old sandstone

brought from St. Briavels Common, about a mile distant. The double tower of the gateway entrance is still inhabited, but the remainder of the building is in ruins, and many of the walls, through dilapidation, will ere long be level with the ground. Inside the gate on the right is a fine old kitchen, the chimney being nine feet wide, with an iron plate bearing the arms of Queen Elizabeth. The walls are nine feet thick. The original dog-wheel, inside which the dogs ran to turn the spit, still remains. The roof of the twin towers is no longer weather proof. Its few remaining rooms will soon cease to be habitable, and the tower itself will, unless repaired, soon be destroyed. The Rev. W. T. Allen acted as guide to the party, and he explained some of the leading features of the castle, and also gave particulars respecting the church. Leaving St. Briavels the archaeologists proceeded to Tintern, making a halt on the way at St. Margaret's Grove for the inspection of a portion of Offa's Dyke. They also stopped occasionally to enjoy the magnificent prospect. At the Beaufort Arms Hotel, Tintern, luncheon was provided, and afterwards the Abbey was visited, and the ruins, which are pretty familiar to tourists, were once more enlarged upon by Mr. T. Blashill, who dwelt upon the remains of the pile in an interesting manner. The society left Tintern for Piercefield Park, where they were entertained by Mrs. Clay, and then they re-entered their brakes and proceeded to Chepstow.

At the evening meeting, Mr. W. C. Heane, contributed a paper on "The Grange, in the parish of Flaxley." He said the Grange estate, together with a farm adjoining it called Saint White's, were parcel of the possession of Flaxley Abbey. They were in the parish of Flaxley, but formed outlying part of it, being separated from the mother parish by the parish of Little Dean and part of the Forest. The Grange itself was a three-storied house of Tudor, or perhaps Jacobean, architecture. Nowhere on its walls could a date be seen, nor had he found any mention of the building of it. It gave one the idea of not having been completed, but as if it had been intended to build the house to form three sides of a square, with a quadrangle in the rear, and that the third side or wing was never built. There was a tradition that part of the house was burnt down, but he could find no evidence of this. The house was situated in a pleasant valley and was formerly surrounded by trees,—elms and firs, a few of which still remained. It was fast becoming a ruin, as no care had been taken to keep the roof in repair.

Mr. T. Henry Middleton contributed "Notes on the Church of Micheldean." No part of the existing church, with the exception of the font, appeared to be earlier than the beginning of the 14th century. This earlier period, which belong to the Decorated period, consists of a somewhat narrow nave with a south aisle, at the west end of which stands a tower and spire, and opening into the tower, on the south side, there is a small porch. On the north there were originally two Decorated aisles, but the northernmost of these has been rebuilt during the Perpendicular period, probably to gain increased width, when Robert Gryndour founded his chantry here. The eastern part of the chancel is modern, and a vestry has been added at the north-east. A number of modern windows have been inserted of various styles, in some cases not in accordance with the date of the work around them. On the whole, the church is a fine and interesting one, in spite of the loss of its fittings, and the thorough "restoration" it has undergone. In the tower there is a fine peal of bells, on which appear the following inscription:—"Success to the Rudhills of Gloucester," "Peace and good neighbourhood," "God preserve our Church and State," and various others. The earliest feature of the former church is the font, which is Norman, and tube shaped. The upper half has been lost, and the remaining half is turned upside down, and has the basin cut in what should be the base.

On Thursday morning the farewell meeting of the society took place at the Beaufort Arms Hotel, under the presidency of Sir John Maclean. It was resolved that the next place of meeting should be at Stow-on-the-Wold, and that the selection of president be left with the Council.

At the close of the meeting the party had an excursion which comprehended a visit to Lydney Park and Speech House.

Some of the members inspected the old church at Lydney. The structure, in the Early English style, has chancel, nave, and aisles, and a square tower on which stands a steeple that forms a prominent object in the landscape for several miles around. There is a well-preserved cross on the summit of a pyramid of stone steps in the centre of the town, and in olden times the priests used to preach from here.

At Lydney Park Mr. Bathurst received the archaeologists at the Higher Camp. Inside the mansion the party inspected many remains found in the locality, and then Canon Searth gave some particulars of the camps and the remains of a villa discovered in the park. He said they had three points to deal with: the first was a small camp that seemed to have been an outpost, and was probably occupied long before the Romans came. That was separated by a valley from the large camp, and they would follow the Roman road to it. It had been denied very positively that it was a camp at all, but he thought anyone would see it was not only fortified, but very strongly fortified, and unfortunately for the strong authority Professor Hubner, who denied it was a camp, he never was on the ground, and he had found fault with Mr. King for making the assertion in his book, and he had said all previous writers were in error. Having been over the ground five times he (Canon Searth) knew pretty well the fact, and he could say it was strongly fortified at the only assailable point. He then adverted to the remains of the temple, and said it was of the ordinary plan of a Greek or Roman temple. The house, too, was of the plan of every Roman dwelling, all built round the central court, generally the principal chamber in one of the sides of the square, and a number of small chambers going off on each side, and a cloister running round the principal court. There was ample accommodation for bedrooms, and they were content with less space for sleeping than people were now. The place evidently belonged to a person of some importance, as no one would have had a building of that kind unless he was a person of distinction. It had not been shown that he was the priest of the temple, and all he could say was, if the priest lived there he had got a very good parsonage. In the temple an interesting pavement was opened, and the place was stated to have been built or restored from the offerings at the shrine of the god Noden, to whom there were votive tablets. The question arose, who was the god Noden? He was not in the Roman pantheon, but it was well known the Romans adopted any local god they found. Antiquarians were in doubt as to who Noden was; some thought he presided over physie, others thought he presided over the growth of corn; and others, again, said "No, he presided over the Severn and the Wye," and the Romans shrewdly conjectured the man who had command of the Roman fleet lived there. It was not at all improbable the occupant of that villa was in communication with Caerleon, and had something to do with the vessels of supply then anchored in the Severn. They had there not only the villa perfect in form, but the temple perfect, the bathing arrangements, and the chambers of the priest probably, and all surrounded by a fortified inclosure. At some distance was the reservoir which supplied the baths, as the watercourse had been traced.

The party, at the conclusion of Canon Searth's address, proceeded to view the remains which he had described, and then they were entertained at luncheon at the Old House by Mr. Bathurst.

The party next started for the Speech House—so called from its being intended for the use of the ancient court of "The Speech." It is a substantial building situated on the flat top of Speech House Hill, 572 feet above the sea, and is stated to have been commenced shortly after the passing of the Act for the preservation and improvement of the Forest of Dean in 1668, but it was not finally completed until 1680. There is an inscription cut in the lintel of the stable door bearing the date 1676, while over the front entrance leading to the court-room is an escutcheon bearing the initials and crown of Charles II., with the date of 1680. The uninclosed ground upon which the building stands is called sometimes "The King's Walk," after the Merry Monarch, and other walks are named after distinguished personages. The court room is at present the only official portion of the house, and is used between court days in summer, when there are several visitors, as a dining-room.

After leaving the Speech House the members separated in different directions, some going by way of Gloucester, others across the Severn Bridge, and the proceedings in connection with the Chepstow meeting of the Bristol and Gloucestershire Archaeological Society were brought to a termination.

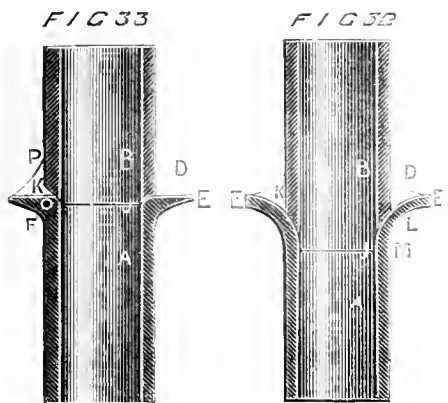
PRACTICAL NOTES ON PLUMBING.* VII.

By P. J. DAVIES, H.M.A.S.P., &c.

TAFT FLANGE AND BLOCK-JOINTS—THE TAFT.

THE taft is after the style of the copper bit-joint, so far as regards its shape, but is made with coarse instead of fine solder. These joints may be made by the unskilled workman; in fact, some plumbers call them the "duffer's joints," and, in a measure they may be right; but, nevertheless, that does not alter the quality of the joint, and I must tell these facetious ones who choose to dub them by that ignominious title, that, when properly made, they are four times the strength of the so-called plumber's-joints, often made by those who run them down. Let us examine this joint.

Fig. 32 shows in section the general shape this



joint is made. The flanged part E, is first opened with the turn-pin to the desired width, then the outer edge is worked back with the mallet or otherwise, to the shape shown between E K J (more often as at E L M, by the skilled and unskilled workman).

On turning it back when doing the flange in this manner, only open with the turn-pin very gradually; by adopting this precaution, you may, with your mallet, &c., thicken your pipe just as you please; but I must contend that it is not practically necessary, as the solder runs down and unites the ends or sides of the pipes at these intersecting points, thereby causing them to become one solid mass of metal; but should there be the slightest objection to this point, then go to work and make the point as at Fig. 33.

Here the flange may be knocked over to as thick again as the pipe, and the spigot end, or B, not allowed to enter quite so far as that at Fig. 32. The preparing of this we will for the present let stand over; but, at any rate, *let it fit well*. Next the soldering.

Here is a very great advantage gained: for, in the first place, not more than a quarter of the solder is required about the actual joint to obtain the same strength, which I, as an engineer and plumber, together with some of the very best authorities of the day, on the strength of lead pipes, &c., say that it is as strong as any other part of the pipe: in fact, when testing this joint, not one burst within $1\frac{1}{2}$ in. of the joint. The pipes used for these experiments were:—

$\frac{1}{2}$ in.	from No. 14 to 30.
$\frac{3}{4}$ in.	„ No. 22 to 42.
1 in.	„ No. 30 to 60.
$1\frac{1}{2}$ in.	„ No. 42 to 52.
$1\frac{3}{4}$ in.	„ No. 48 to 84.
2 in.	„ No. 96.
4 in.	7lb. to 12lb. to the foot made.

There were from 40 to 50 joints made by myself, simply as a test of economy. I shall

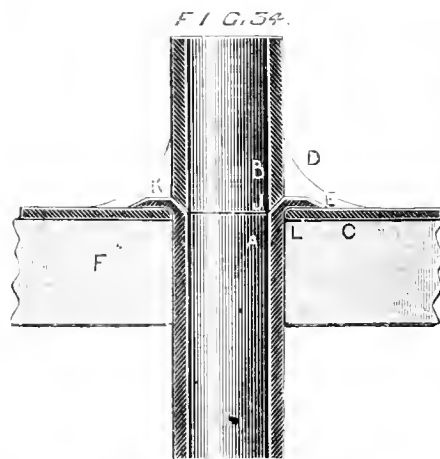
* All rights reserved.

give the result in pounds to the square inch when treating of the strength of lead pipes.

There is also another advantage attached to using the taft-joint—viz., you can employ almost anything in the way of solder, or, if you like, can burn the joint with lead as follows:—Place a small wad of blotting-paper at about A, (or a piece of rag tied to the end of a piece of string, threaded through the pipes), and fill up the pipe with sand; then prepare the end of B, place it in as shown, and send some more sand down this pipe to about B; you can get it solid by letting through a few shots just to run the sand down. Next fix a collar round the pipe A, and bank it up with sand to about E; then, by first wrapping a little piece of sheet-lead round the edge of the flange to the desired height of the joint, you can with sand bank up the outer part of the sheet-lead and run your joint as follows:—Take a ladleful of nearly red-hot lead and keep pouring it round the joint until the pipe and lead are thoroughly amalgamated; have a small stick to push into the hot lead, to try if it is quite solid should be used. Your joint is now burned together. Caution.—Take care that your pipes are thoroughly fixed independent of each other, or they will part in the burning. Force the sand out with a force-pump, or as best you can. I did not intend to describe lead-burning here, but have done so to show that any kind of solder, or even lead, can be used to these joints.

FLANGE.

Fig. 34. These joints, in shape, are exactly the same as the taft joint, the difference being that the joint is made on a kind of base, say the floor



boards, or in cisterns, roof work, &c., as shown at F, Fig. 34; there is also used by some plumbers a flanged piece of lead, as shown at C; this is for the purpose of extending the size of the joint, and to save turning the end of the pipe so far back; it also prevents the solder running through the boards, should they be cracked or otherwise bad.

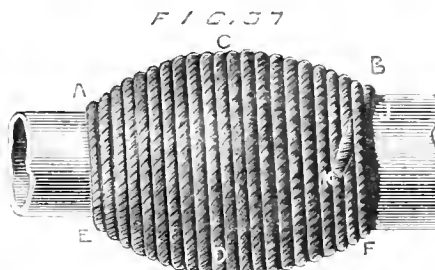
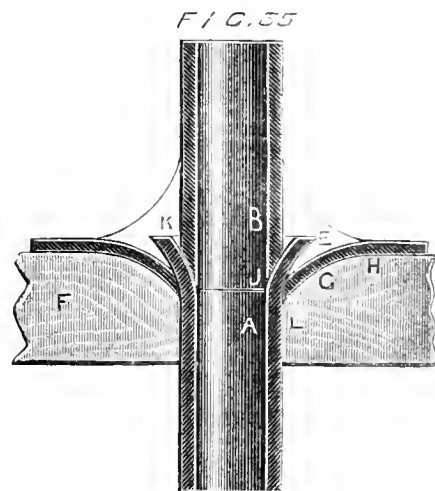
BLOCK JOINTS.

Fig. 35. These joints somewhat resemble the flange joints, excepting that the flange C is first worked or knocked into the hollowed block, as at L C H, and shaved; then the end of the pipe is shaved from E to L, and pushed up through the prepared flange. Take the turn-pin, and open this end, being careful not to drive the lead too hard against the flange. Shave the inside. Now prepare the pipe B, and be sure that your shaving is long enough, as those not acquainted with this joint are apt to be deceived. All being ready, proceed to solder your joint in the following manner:—

Take a ladleful of good hot solder, and splash it on as quickly as you possibly can, to get up the heat; wipe the joint by taking one good sweep round with the left hand, take the cloth in your right hand, and begin where you began with the left, and, with another good sweep, come round to where you last left off; then from the top of the solder bring the point part of the cloth to the same line as the other part of the joint and off. Or, if you can, get at your joint with one hand, wipe all round at once without lifting your cloth, and finish as above. Part your surplus solder, and pick it up ready for another joint.

PUTTY JOINTS.

Fig. 37. Our work on joint-making will not be complete unless we speak of making putty joints. I have particularly noticed that many plumbers are in the habit of making these joints without sufficient care. They think that because it is only a putty joint, anything is good enough.



I contend that this joint requires quite as much care as other parts of the trade; for what is worse than a leaky joint to the arm of a closet-basin, and is there any leaky joint so numerous as the putty joint.

To make a good putty joint, let the pipe enter the arm of the basin about 1 in. or so. After this, see that it is perfectly dry and free from water; then take some kind of paint, and paint it well inside and out, after which take some stiff red and white-lead putty (many plumbers use ordinary putty, but it will not last the time or stand quarter the pressure), and with this make your joint to the shape of Fig. 37. Next take a piece of calico or canvas, about 3 ft. long and about $2\frac{1}{2}$ in. to 3 in. wide, and rub the paint tool over same; then wrap up the joint from A to B by winding your wrapper carefully round and round, true and tight; then take about three yards of middling thick twine, and make same good to A E, and then wind it tightly round your wrapper, as shown, until you come to B F, after which make it fast as best you can—a good plan is to tuck the end under, as shown at J. After this, rub the paint tool over same, to protect the twine from dampness. Care should be taken not to disturb this joint after it is made.

(To be continued.)

RESTORATION AT ST. ALBAN'S SINCE 1877.

(Concluded from p. 69.)

NOW that "the hurly-burly's done," which I arose about that matter (the high-pitched roof), I may mention some important discoveries which that work disclosed. First, it was found that there had been two high roofs over the nave of St. Alban's, one oversailing, erected by Paul of Caen, the Norman builder, and another with parapets, most probably constructed in the Decorated period, presumably in the time of Abbot Montmore, when the fall of some Norman compartments led to large reconstructions in the nave. The marks of both these roofs had been discerned, by the careful eye of Mr.

Chapple, on the western face of the tower, when its reparation was under his hands, and as we could not, and would not, destroy the later parapets, though such a course had been suggested by no less an authority than Mr. Street, the new roof was laid within them, on the Decorated lines. I may mention as a parallel instance of a second high-pitched roof, during the Medieval period, a fact, which our discovery at St. Alban's led me to fully investigate at Peterborough; that noble church had once a lofty central tower, the work of Abbot William de Waterville between the years 1155, and 1175; it was three stories high, and of very rich Late Norman work. The tower of Castor Church, four miles west of Peterborough, a parish closely connected with the Abbey and Cathedral (my father was its last rector in right of the Bishopric), has been thought to have been a copy of the great tower of the neighbouring Abbey Church, which, in that case, must have been splendid in the extreme, Castor being perhaps the most beautifully rich Norman tower in the kingdom. This great tower at Peterborough became so insecure that it either fell, or was removed—most probably the latter, or there would have been a greater crushing of the work below than now appears, and a Decorated tower, some few years later perhaps than the St. Alban's Decorated parapets, was built in its stead. At that time parapets were added to the nave at Peterborough, and precisely the same kind of roof was erected which we now see at St. Alban's, the line of the original higher, and oversailing roof being still to be distinguished on the back of the central gable of the Early English west front, which was arranged to accord with the older form of the roof which it terminated. A second discovery at St. Alban's was that the ceiling, which looked so well at a distance, was a very inferior imitation of a panelled roof discovered beneath it, sufficient of which was left to give authority for the ceiling, with its singular oblong rectangular panels, which has now been restored in oak, and only awaits the skill of a L'Estrange, or a Gambier Parry, to reproduce effectively its ancient colouring. A third discovery was that on a corbel, which formed an integral portion of the low roof, the probable date of which had been so much discussed, were found the initials "I.W.," marking it as the work of Abbot John of Wheathampstead; so it is now clear that when he lowered the aisle roofs, in order to fill the Norman Triforium arches with tracery and stained glass, he also lowered the great roof correspondingly. At the earnest desire of Mr. John Scott, and some others, a part of the roof, so lowered, has been preserved over that portion of the constructive nave which forms the choir, and it can now be conveniently seen by those who wish to examine it. During the last four years, then, the great work of raising the dangerous portion of the nave to the perpendicular, which will always have a deep interest as the last great mechanical work of Sir Gilbert Scott, and restoring all around it, has been accomplished; the nave-roof has been restored; the Lady-chapel has greatly progressed towards completion, the horrible pathway through its neighbouring chapels has been abolished, and a vast improvement effected by the acquisition of the property at its east end; now, through the munificence of one of our great benefactors, some beautiful areading destroyed, and cut away, is being restored, and replaced, while the Corporation of London are restoring, and will, I understand, fill with stained glass, the wonderful window at extreme east, the side windows having been already restored by the kind exertions of Lady Salisbury and some "ladies of Hertfordshire." The Freemasons of England offered to provide a recessed below the great east window, but there were difficulties in the way of accepting the gift, which will now, I believe, take the form of a cathedral pulpit. All we can hope is that the Lady-chapel will soon be so far completed as to serve the purpose of a Morning Chapel, an adjunct which no Cathedral Church can well dispense with, and that it may soon be opened to the rest of the building, and befloored with suitable paving. I have but little time left; already I have found that I have had more to say than most audiences would have the patience to hear, but I must refer for a moment to a very important work now in hand—the preparation of the stalls for the cathedral choir. These are being worked from a very beautiful design by Mr. John Scott in oak, the material

which Edward II. granted from the royal forest for the construction of their predecessors. When the return stalls are completed, one side will form a memorial to the late Archdeacon Mildmay, and the entrance doorway, and its surroundings, will be provided as a memorial to Captain Campbell, our good Bishop's lamented son-in-law, while the other stalls will be the liberal and valued gifts of some generous benefactors. Let us hope that the side stalls, and all that is needful to get the choir into cathedral working order, may shortly be provided. I need hardly say now, after all that I have spoken, written, and published on choral arrangements generally and those of St. Alban's particularly, that I am not the architect of the plan just undertaken for placing and working the large organ. It has been put, I believe, where we shall see it, from the pressure of that necessity which knows no law: I regret that an opportunity has been let slip for making some satisfactory permanent arrangement of this organ, such as I have often recommended, but I am assured that we shall have before us, or rather behind us, only a temporary arrangement to preserve, and restore to its use in the choir, our very fine instrument. I can hardly call the opportunity which has been lost, a golden opportunity, however, for that has not been of late a very appropriate epithet in describing our opportunities at St. Alban's, in fact, so serious has been the unlooked-for pecuniary embarrassment of that committee of which I have the honour and pride of being a member, that had it not been for the timely assistance of some generous subscribers, who have been friends to us in our need, I could only have hoped to have addressed you to-day by an application to appear through a writ of Habeas Corpus. I was able to assert, without I trust vain boasting, when I last addressed you, that up to that date, no mistakes had been made in our works of reparation, and I think I may say that the same sound and careful principles of restoration have guided our committee in their deliberations, and their orders, during the past four years. We are, however, now witnessing, for good or for evil, a new departure. I am myself very sanguine that the balance will be largely in favour of the good, but two archaeological proverbs may here be quoted—viz., "that you must not look a gift-horse in the mouth," and that the "proof of the pudding must be in the eating." A large share of responsibility will now be shifted, so far as the restoration of the west front, and its surroundings, are concerned, from the shoulders of that "multitude of councillors" in which a still older proverb tells us "is safety," on to the shoulders of one of our number, one, however, whose generosity we must all admire; one, who, among the army of amateur architects, stands in the foremost rank; one, who, through evil report and good report, will do the great duty he has so nobly undertaken for the Church of England, and for this county and diocese, with all the patience, skill, and care that is possible in man. Already we have an earnest that the noble design of John de Cella will once more be partially seen in the exact restoration of those three grand porches, which were its most glorious and unique feature. If our faculty committee are to be blamed then for allowing so great a work, and the opportunity of so great fame, to pass from their care generally; if the noble president of this Architectural Society and myself are reproved for severely proposing and seconding, in that committee, the resolution which handed over this work to the purse and to the care of Sir Edmund Beckett, our apology, if one is needed, must be that other benefactors failed us in the day of necessity, and that, if mischief befall, our committee must plead their poverty, and not their will, consented. I might, perhaps, conclude with a funeral oration over John of Wheathampstead's Perpendicular west window; but it is better to hope for its resurrection, if the means, that great difficulty at St. Alban's, can be found. It might now well form the eastern window of a building to be used as a library, Chapter House, and vestries, to be hereafter erected in the place of the ancient sacristies, on the south of the presbytery. This would look much like the arrangement of the chapter house at Exeter, and would be a most valuable and necessary adjunct to our cathedral. If, then, the defenders of the fallen window would lay down their arms, and lay down the dust besides, we might see our

deeply interesting and historical window restored to its dignity, and to us once more.

CALCULATOR OF MEASUREMENT OF PACKAGES AND TIMBER.*

TWO bulky volumes, by Mr. Manekji Kavajji Todivala, of the British India Steam Navigation Co., are certainly evidence of the growing magnitude of Anglo-Indian commerce. The large number of packages shipped make it necessary that their solid contents should be accurately ascertained in fractions of an inch, and the Chamber of Commerce now requires all packages, bales, &c., so to be calculated that all fractions are to be taken into calculation. Merchants and shipowners have adopted this system of exact measurement in their own interests; but it appears that shippers are in the habit of avoiding the fractional computations as too tedious, and in order to arrive at quick results, they adopt a rough and ready method, by which all fractions are either shifted and interchanged, or taken as whole numbers. It will at once be seen that this custom favours the shipping-owner at the cost of the shipper and the owners of packages. When, say, there are 100 cases, a difference of a fraction of an inch, say 33ft. 9in., makes, at £3 per ton, no less than £2 10s. 7½d., which the shipper has to pay in excess of one shipment. Of course such a loss on the part of the shipper tells in favour of the shipowner. The examples given show how these differences work out in the case of shifting the fractions, or taking the whole for the fraction. The greatest loss is experienced in the latter case, and when a shipper sends from 1,000 to 10,000 packages, the loss is very heavy. Mr. Todivala's "Calculator" is the result of an endeavour to obviate this great disadvantage which the shipper of goods experiences, and we are sure his two years' labour in compiling these tables entitle him to the best thanks of the mercantile world. The tables have been examined and certified to by Professor Hathornthwaite, of Elphinstone College, Bombay, who says that out of many tests he discovered only one error in the second place of decimals. The payers of freight are at present heavy losers by the tolls and expenses levied on packages by commission agents, and as the author says, "this custom must in the aggregate, and on hundreds of thousands of packages, tell heavily against the profits of shippers to and from India, and be adverse to the just interests of Anglo-Indian commerce." The tables given, which fully occupy the nearly 800 pages of each volume, are equally serviceable to the merchant or shipper having business with England, wherever, in fact, English measurements are used. To the shippers of this country we are sure accurate calculations will be sooner or later demanded, and in the interests of trade everything which facilitates correctness of charge must be welcomed. The tables proceed by increments of a quarter of an inch, so that packages whose dimensions vary from 6in. to 8ft. in length may be calculated at a glance of the table. Thus if it is required to find the solid contents of any package, say 3ft. 4in. by 2ft. 1½in., and 1ft. 1½in., the reference is first made to the top of the page, where the least dimension is found; the next dimension of 2ft. 1½in., is found at the top of one of the columns, and the length of 3ft. 4in. will be found in the centre column. Opposite the latter figure, and under the breadth, the required solid contents is found, or 7ft. 11in. .02dec. Several examples are given to show how the references are to be made, which are extremely easy. The tables increase by quarter inches, so that a package measuring 6ft. 6in. long by 3ft. 11½in., and 2ft. 6in. deep, may be directly taken from them, but when all the dimensions exceed 2ft. 6in., the solidity may be obtained by a very trifling calculation.

Not the least useful feature of the book is the service it may be made of in calculating timber, scantlings, and the solid contents of casks, thus saving an immense amount of tedious labour. The greatest advantage of properly-computed tables is, however, that accuracy is insured as well as time saved, and every attempt made to lessen arithmetical

* Calculator of Measurement of Packages, Timber, Casks, &c. In Two Volumes. By MANEKJI KAVAJJI TODIVALA, Shroff, British India Steam Navigation Co., Bombay.

labour, and, at the same time, to give correct results, is worthy of all praise, and with this assurance we heartily recommend Mr. Todivala's comprehensive volumes to the attention of all readers concerned in mercantile transactions.

SUGGESTIONS IN DESIGN.*

BOOKS on ornament have been so abundant of late years, owing chiefly to the impetus given to artistic manufactures that any new work on the subject ought to be particularly good. To be of any real use to the designer or art workman, the ornament should be applied to the purpose for which it is designed, and ought to be the work of men who have thought out the requirements of manufacture and the adaptation of material. A scattered collection of fragmentary ideas and fancies can have but little value to the designer in ceramics, metal, or woven fabrics, and it is to be deplored so many undertake works, the practical use of which is very doubtful. We have on our table a bulky folio volume by Mr. John Leighton, F.S.A., the letterpress of which has been contributed by Mr. James R. Colling, F.R.I.B.A. The work has the modest title of "Suggestions in Design," and, according to the preface, the nucleus of the work was prepared so long ago as 1852. However this may be, the book certainly rather indicates the state of art design at the period mentioned, and serves to show the great advances we have made, than to be depended upon as an index of the present state of design. We speak more in reference to the illustrations than the letterpress. It seems rather a pity the authors should have been induced by the success of the first work to redraw the original plates, and add to their number, for every one knows how great a change has passed over ornamental design since the time of the first International Exhibition. Its very principles have undergone a change, for, as the publishers themselves say, the original work was begun when Gothic art, under the influence of Pugin, was paramount—when Owen Jones's "Grammar of Ornament" had not even been thought of.

With these preliminary observations, we are better prepared to examine the work before us, which is handsomely bound and well printed. We may at once say the most reliable and useful part of the book is the introduction and historical account of the styles of ornament. No fewer than 176 pages are devoted to this portion of the work, and every style of ornamentation, from that of primitive races to French Renaissance, is described. The usefulness of these chapters is increased by wood engravings, generally well chosen, illustrating typical examples of ornament of the several periods. In alluding to Egyptian ornamentation, the papyrus, lotus, and palm, and the surface decoration in colour and sculpture, are dwelt upon. In the same manner the types of Greek ornament are introduced by reference to the elements of the architecture, while the author does not omit to mention Dr. Schliemann's discoveries at Mycenae and Troy, as bearing upon the origin of Greek ornament, such as the spiral lines known as the Vitruvian scroll, the fret, &c. The plates illustrating this portion are not so well chosen as might have been expected. The free adaptation of the anthemion ornament, for instance, is not a graceful example in Figs. 1 and 2; the Atlantes are of rather a sturdy type, and the suggestions given for band-enrichments (3 to 10), and the figure for colour decorations (11) are, to our minds, instances of an indefinite kind of ornament that one could not call good Greek. On Plate 9, Figs. 5, 8 scarcely suggest the spirit of the style, and the border enrichments 14, 15, with the leaf and ivy patterns on the same plate, are vague and meaningless in motif. What can we call such a singular conglomeration of scrolls and honeysuckles as that figured on Plate 12, Figs. 1 and 3? In these there is a painful sense of confusion and a want of unity. Some of the scrolls in Fig. 3 are positively contrary to the true principle of joining curved lines; but we pass on. We might take exception to the examples of Roman ornament given on Plate 15, and much better forms are given in the letter-press describing this period. Chinese and Japanese ornamentation

are illustrated by several suggestions, some of them passable instances, but others having little common to those styles. The best specimens are Plate 21, Figs. 2 and 3; Plate 22, Figs. 4, 8, and 10; Plate 23, Fig. 7; and Plate 24, Fig. 4. There are few of the Japanese emblems, the fabulous creatures, as the dragon and the *kirin*; we do not see any representation of those favourite birds of the Japanese artist, the *ho-ho* and the crane, nor is there any good examples of foliage and diaper-work in which he so excels. In the letterpress, we find several outline examples of diapers, which will give the student a better notion of the peculiar beauty of the style. The Indian ornament appears to be chiefly derived from woven fabrics, after which follow a series of examples of Moorish. But Oriental ornament was little understood when these designs were made. The peculiar semi-Greek character of Byzantine is scarcely suggested in some of the designs; Gothic ornament follows, and no less than six plates are given to this period. Some of the designs on Plate 36, Plate 37, and some of the panels on Plate 38 are very feeble. The design for the book-cover, on Plate 37, is much too naturalistic in treatment, and this spirit seems to prevail in other designs. The plate of surface decoration is not up to the mark, and the metal-work is behind the age, and is lumpy and coarse, or too closely natural in rendering. Renaissance ornamentation is the subject of a distinct chapter; the illustrative examples are numerous, though we are disappointed in the selection, and some of the forms would be more strictly called Gothickesque or nondescript. Several plates of inlays and diapers, of what is called blazonry, and a variety of suggestions for floral design, figure composition, and chimerical subjects, make up the book. We are afraid many of these will not bear a critical study. There is an objectionable naturalism in many of them, as in Fig. 3, Plate 39, and Fig. 3 on Plate 90. What is the meaning intended to be conveyed by girls' heads growing out of flowers, or human hands in the form of branches. These and other chimerical ideas and vagaries would have been better omitted altogether. There is much to commend in the descriptive part of the book, and the chapter on floral ornamentation has much to redeem the character of some of the designs. These chapters take into account the architecture of the several periods, and so lead the student from ornamentation, based on structural principles and utility, to other kinds in which the laws of composition are less rigidly enforced. Altogether, the work may be studied as a useful, historical introduction to the subject of ornament.

ROYAL ARCHEOLOGICAL INSTITUTE.

THE annual meeting of the Archaeological Institute was opened on Tuesday, at Bedford, under the presidency of Lord Talbot de Malahide and Mr. Charles Magniac, M.P.; Lord Cowper, the Lord-Lieutenant of the county; Mr. J. Shuttleworth, the High Sheriff; the Duke of Bedford, Lord Tavistock, M.P., the Bishop of Ely, and Mr. J. Howard, M.P., were among the patrons of the meeting. At 12 o'clock the Mayor and Corporation publicly received the members on their arrival at Bedford, the town clerk reading an address which welcomed them to the town and pledged the inhabitants to place every facility at their disposal. The reading of this address was followed by the reading of others to the same effect from the local Ecclesiastical and Antiquarian Society, and also from the Bedford Literary Institute. These Lord Talbot acknowledged briefly, and then resigned the chair—for the present congress—to Mr. Magniac, who delivered the inaugural address. Mr. Magniac urged the claims of archaeological and antiquarian studies to be regarded as a science, and deprecated all idea of treating the congress as a mere pleasant local gathering. He advocated the consolidation of local researches, so as to form the basis of a county history of Bedfordshire, which was still a desideratum, and which could only be accomplished by a concentration and subdivision of labour. He pointed to the results of archaeological inquiry in Greece, Italy, Asia Minor, and Egypt, and to the achievements of Layard and Schliemann in disentombing, not merely long-buried cities, but their inhabitants, their manners and customs; and concluded by expressing his conviction that, by our present researches, we are only paving the way for the scientific reconstruction of past ages. At the conclusion of Mr. Magniac's speech, the members of the institute, and a large number of visitors, sat down to luncheon in the new Corn Exchange. The afternoon was spent in reconnoitring the site of the ancient Castle of Bedford, its keep, outworks, &c., and in an inspection of St. Mary's and St. Peter's Churches, the old Grey Friars, and the other leading features of that ancient town. In the evening there were meetings of the various sections of the congress, when several papers were read.

NEWCASTLE-ON-TYNE.

THE engineering and architectural world have lately had their attention called to this town by the Stephenson's Centenary, the important litigation case of *Angus versus The Commissioner of Works*, and the building of the Chinese gunboats, armed by Sir William Armstrong; Swan's electric light, and other great undertakings, so I trust a few notes on the old and new parts of Newcastle-on-Tyne will not be out of place in your columns; but as they are penned by a visitor, they will be but short.

The hoarding has been removed in front of the Burden Buildings, which has been standing for upwards of six years. The building, which was designed and carried out by Mr. John Johnstone, is one of the finest specimens of street architecture in England or the Continent, owing to its originality and beauty of design. It will consist of about twenty very large shops on the ground-floor, and about 200 rooms above, to be used for hotel purposes, in connection with the old Neville Hotel, which will eventually be pulled down and rebuilt in the same style, including many other old buildings facing the central. Looking down Grainger-street, one sees ranges of buildings worthy of the metropolis. One of these is the office for the Newcastle and Gateshead Gas Company. In Collingwood-street are the new insurance offices by Austin, Johnson, and Hicks, a very handsome front in the Queen Anne style; a little further on is the Town Hall, built about twenty years since, a wretched confusion of old Classic, badly adapted from various works by Inigo Jones, Sir Christopher Wren, and other Classical architects. Looking towards the High-level bridge is to be seen the celebrated old church of St. Nicholas (which is to be the cathedral), and close to which, apparently to insure its early destruction, the corporation are allowing a number of very lofty buildings to be built, the basements of which are principally let to oil and butter merchants. Many of these buildings are very fine, especially the block by Mr. Parnell in the Italian style, and the offices for Mr. Armstrong in red brick and free-stone, finished at corners with corbelled turrets, and small spiral roofs, a clever mixture of Queen Anne and Scotch Baronial. Going towards the Manor Station we notice a wholesale demolition of old property for the new road, which is to open out the new estates at the east end of the town. There is much useless old property occupying valuable sites in Newcastle that should be destroyed (and, if possible, some of the tenants with it).

Making a short cut across these slums, towards the Blythe and Tyne station, one comes upon the New Library, a Classical building designed by the borough engineer, but which should have been put up to competition. From thence one strolls down Northumberland-street, among the cabinet-makers of the North, one of whom, Messrs. Chapman, fitted up the Scotch Arms Restaurant, from the designs of the architect—a building which it is said surpasses the Criterion of London, although much smaller. The next building worthy of notice is the New Museum, on the high road to Edinburgh; a munificent gift to the town and worthy of further comment. Leaving this, one makes way through Jesmond, down roads lined with jerry-built houses, in a bastard Queen Anne style, with everything studied but good design, good construction, and proper sanitary arrangements. Between each main road is a narrow back lane, with a doorway and two loopholes to each house. The loopholes are, one for coals and the other for the clearance of the middens, the middens being a sanitary arrangement allowed by the corporation, consisting of a privy and a dust-bin. Although they are in juxtaposition, no

* Suggestions in Design. By JOHN LEIGHTON, F.S.A., with descriptive and historical letterpress. By JAMES R. COLLING, F.R.I.B.A. London: Blackie and Son.

arrangement is made for the ashes falling on or near the excreta, which is apparently allowed to remain for many months decomposing; and the ash-pits, which are about 6ft. by 6ft. by 5ft., with loopholes or doors near the top, are generally filled with decomposing matter.

Getting tired of Newcastle when the atmosphere is impregnated with chemicals, one naturally makes for the sea-side, and arriving at Tynemouth, one is much interested by watching the steam navies which are working on the new line from Tynemouth to Whitley: the latter place being expected to out rival Tynemouth, on the strength of which houses are springing up like mushrooms, but all on the jerry building system: in many cases one finds 7in. by 2½in. joists to a 15ft. span, and 15in. apart in the clear.

One is also very much disgusted to find how defective the sanitary arrangements are in some of the coast villages; and the inhabitants tell me it cannot be remedied, as most of the owners are on the sanitary boards, and any complaint is simply pooh-poohed by them.

Not being particularly fascinated with Northern sea-side residential architecture, one pays a visit to the Tynemouth Crystal Palace, a very fine building, designed by Masey, of London. It consists of the large winter-garden (without a vestige of winter plants in it, or anything else, excepting the organ, which is a grand instrument, and is well played); and the aquarium, wherein I saw two small dabs and one crab; the hotel, which is not patronised, and the concert-hall, which is not completed. Judging from what one saw, the speculation must be a failure, as the journey to it would be impossible, excepting in very fine weather, the approaches being very incomplete owing to a dispute between the Duke of Northumberland and the Tynemouth Corporation.

There are many very interesting relics of old Newcastle; but they are so fully detailed in the "Guides" to Newcastle that any account would not be worth space. A. V.

GLOUCESTERSHIRE NOTES AND QUERIES.*

THE present number of this welcome serial contains a few notes of interest. The custom of wearing hats in church is made the subject of a note, from which we gather the Puritans persisted in the habit till as late as 1639. A very interesting account of a great flood in the Severn, which occurred in 1696, is taken from the *Gloucester Magazine*, from which it will be seen that that river has been the source of greater floods than any of late years. All the country from Bristol to Gloucester, for some miles on each side, was overflowed, and many villages and bridges destroyed. The loss is estimated at 500 persons. A church at Cardifl was partly carried away, and South Wales suffered much. The account is graphically written in the quaint semi-superstitious style of the period. Another writer has a query in reference to the locality of Kingswood Abbey, and asks whether any remains of it are to be found. The tomb of Edward II., in Gloucester Cathedral, is the subject of an interesting note, and we find an account given of the examination of King Edward's tomb, for the purpose of discovering whether his body was actually interred beneath the tomb. This doubt was set at rest by the discovery of a wooden coffin quite sound, enclosing a leaden one of arched form. Reference is made to Mr. F. S. Waller's edition of the Rev. H. Haine's "Guide to the Cathedral," and the account of the examination of tomb is quoted from the late Mr. Allen's not-book. The note on Richard Furny, Archbishop of Surrey, and a learned antiquary and writer on local antiquities, is interesting; and another, headed "Sepulchral Crosses," furnishes the reader with some information respecting two Gloucestershire crosses, one a grave-stone cross in Brookthorpe churchyard, of the 13th century, and another on a raised tomb in Quenigley churchyard. The writer quotes from Mr. Charles Bailey's paper in the *Journal of the British Archaeological Association*, and, as he states, these crosses afford much collateral evidence of age, manners, and customs, though many fine examples are

scattered in remote churchyards. One of the most interesting scraps refers to the old organ of Uley Church, mentioned in Fosbrooke's "Encyclopedia of Antiquities," and cited there as the model of the old form of instrument. It seems, from a correspondent in *Notes and Queries*, this old organ was removed about 70 years ago, and there are said to be no remains of it. It is said to have lasted from the time of Charles II., and is described by an old inhabitant as a "box of whistles." It was turned with a handle, like a grinding-organ, and was painted blue and buff. Uley Church is an entirely modern structure, and replaced the old one, which had a very ancient tower.

The next note, CCCCVI., upon an old stone pulpit in Pitecombe Church, informs a querist that the only extant portion of this old pulpit has been inserted in the south wall of the chancel. Specimens of Local Dialect, and some remarks on the old south gate of Gloucester, destroyed in the siege of that city in 1643, but afterwards rebuilt, also the note on Fairford Manor and Church, will be read with much interest by local antiquaries. This number contains a steel engraving of "Over Bridge, Gloucester," a structure of one span, the arch having a very flat elliptical curvature. The map of Gloucestershire is a valuable addition to the present part, and enhances the usefulness of the Rev. Mr. Blacker's publication.

"BUILDING NEWS" DESIGNING CLUB.

DESIGNS FOR A SMALL STABLE.

THE designs we have received for this subject are very numerous, and many of the plans show a knowledge of the requirements of buildings of this kind. With regard to external treatment, a few have conceived the kind of building in the right spirit, though among many a rather fussy picturesqueness has been obtained at the expense of simplicity and economy. (1) "Pupil J." has worked out a simple, unpretending plan in a quiet sensible manner, the materials being coarse-d stone, with dark red tiles for the roof, and a little timbering in the coach-house gable. The general disposition of plan is good. The stalls and loose-box form a cross wing open to the roof, which boldly projects, screening the washing-space; a small harness-room connects the stable to the coach-house, the latter has a coachman's room over, access to which is obtained by a stairs. Over the harness-room is a hay-loft. A shoot and ladder in the stable are shown in connection with the loft, and a stove is placed in a recess in the coach-house. The centre pier between the coach-house doors, which are hardly wide enough, is unnecessary, and another foot or two would have improved the stable. Effect is obtained by arching over the washing lobby below. The stairs entrance is in this lobby. (2) "Walter" has many good points in the plan; the stalls and loose-box are similarly placed to the last, and form a projecting gable open to roof, screening the washing-space in front of harness-room. There is a separate entrance to stable for the horses, and the loose-box and cob-stall are well placed at the inner end. A stairs to the hay-loft over ascends from the harness-room, and there is a hay-shoot in a good position. A stove is made to warm both the latter room and coach-house at the same time; coach-house measures 18ft. by 15ft. A Boyle's ventilator is shown fixed over stable, and the external treatment is stone and brick, with plain mullioned windows in a suitable style. The projecting roof over carriage-wash is finished abruptly; a deep corbelling at end would have taken away this appearance. (3) "Jack" sends a piquant ink sketch in a brick style, Queen Anne in spirit. The coach-house is rather narrow, only 15ft. wide. The author follows the same plan as the two first-described, with a small centre harness-room, and horse-washing lobby arched over. One objection is the awkward entrance to the stable; the projecting jamb of the hay-shoot would make it extremely awkward for a horse to turn. A useful stove is placed to heat both the harness-room and coach-house, and we find a loft over the stable, pierced by a ventilating shaft having a cupola on the roof, the coachman's sitting and bedroom being over the coachman's and harness-room. (4) "Walter H." This is a neat set of drawings; the stalls and cob-stall are placed on the reverse

side to those we have been describing, but we find no bin or hay-shoot provided, though there is a hay-loft over. The harness-room, with horse-wash space, covered over by a continuation of the roof, is convenient, and the coach-house has also a covered space for washing carriages. A coil heats the coach-house, and the man's room forms a corbelled gable arrangement above the roof of this part. The style is suitable for brickwork. (5) "Finem Respie" is another well-planned arrangement, with a neat brick exterior; the disposition of stables, harness-room, and coach-house is similar to the first of those mentioned, and the yard is shown inclosed by a wall with manure-pit, &c. A small hay-loft is got in the roof over coach-house, and the stables are ventilated by a louvered turret. (6) "Yarra Yarra" adopts also the typical plan, but has two loose-boxes and a centre stall. The coach-house is narrow, 14ft. by 18ft. deep, and no heating-stove is indicated. There is a loft over both, with a man's room over harness-room. The floor of coach-house is boarded, and Musgrave's fittings and ventilators are provided. The drainage is conveyed by a 6in. socket-drain, bedded in concrete, to a manure-pit. The treatment is unpretending, and the windows too small for light. The case-ments are made to fall inwards at top. (7) "Veritas Vincit" shows a half-timbered building. At one end two stalls are placed, entered from a covered way; at the other end is a loose-box and coach-house, these being separated by the harness-room. This plan is hardly compact enough to be desirable. The most objectionable point is the upper story of lofts, the coach-house being kept low. (8) "Black and White" has a three-stalled stable with covered washing-space, harness-room, and coach-house, between the two last being a wide stairs to coachman's rooms over. The stable has a loft over it. The planning is compact, and the coach-house is only 15ft. by 10ft. In elevation, brick of the simplest common-sense treatment has been adopted. (9) "En Avant" is simply and suitably treated; stable provides for two stalls, a loose-box, and a cob-stall. There is a washing-place, covered, in front of entrance, and the harness-room and coach-house are convenient. A ladder ascends from the stable to the hay-loft, which is larger than necessary. Boyle's ventilator is shown in a turret over. Brick and stone dressings, with Broseley tile roof, are specified, and Cottam's stable fittings are mentioned. (10) "Quiet and Simple." This is a 4-shaped arrangement. The stable shows a small stall for cob, besides the loose-box, and two stalls, and loft over; the coach-house and harness-room form the cross block, a living-room and bedroom being got above, approached by an independent entrance and stairs. Ventilation by a centre shaft is shown above the stable, and the fittings are pretty complete. Old English, with brick and tile-hung parts, and timbered gable, is chosen. (11) "Iota" is a Gothic design in brick and stone, but rather too school-like. The gabled dormers over stable, and the high-pitched gable of coach-house, look out of place. The plan shows an independent entrance to stable, besides one from a covered lobby. The corn-bin and hay-shoot are placed at the end, which arrangement makes the stable longer than need be. (12) "Bonus Hominus" has several good points; the elevation is plain, but characteristic, executed in brick and tile, and the plan is convenient. We take exception, however, to the stable arrangement, in which two loose-boxes—one in the angle—is obtained, besides a stall. The hay-shoot, ladders, mangers, and the stove for heating the coach-house and harness-room are well planned, and ventilation is provided by air-bricks, 18in. from floor, and the upper portions of window are intended to open. "Merit" has a sensible general plan, but the independent loose-box at the end and the passage at the end of stalls are not required. The elevation is generally appropriate. "Nitor" makes his stable the prominent feature, flanking it by a coach-house and harness-room, which appear as low wings. The requirements are fairly provided for. "Tom Finch" sends a characteristic treatment. The harness-room is carried up over an arched washing-lobby, and the upper story is appropriated for hay. It slightly projects on corbels, and is timbered. Two stalls and a loose-box for cob are shown on one side and a coach-house on the other. The roof of the latter comes forward and forms a covered shed for carriage-washing. "Per"

* Gloucestershire Notes and Queries. London: W. Kent and Co., Paternoster-row, E.C.

shows an economical plan, but the details are imperfect. An arched washing-lobby in front of harness-room is made the central feature, and is gabled. There is a loft over the whole, the roof having a ventilating turret. "Alpha" makes also a feature of the grooming-space, which is arched over and made a hay-loft above, the harness-room and coach-house, form two low wings. Two stalls and a loose-box are obtained in the rear, but the roofing of this part is not quite apparent. Details also are wanting.

It would be impossible to comment on all the designs. Many of the plans show fairly-arranged stables, but fail in the details. "Hamlet," for instance, sends a plain inexpensive design with timber and plaster in the upper story, but there is no distinct entrance to harness-room; "June's" design is too expensive, and the separate space for washing horses and the large harness-room are unnecessary; "Vignette" has a simple and compact plan, and one could have wished the details of elevation had been better; "Romeo" has too long a range; "Rex" shows a neat elevation, but is imperfect in details of plan; "Joek" has a convenient plan, but the elevation is crudely drawn; "R. E. S. W." has a plan capable of improvement; the entrance to stable is contracted and awkward, and we cannot admire the elaborate ornamental treatment to gable. "H." has a compact plan, but puts us too much in mind of a town building; the coach-house is narrow. "That's my idea" partakes largely of a gentleman's lodge; the coach-house is much too narrow, and the plan is not compact. "Cede Deo" is a singular plan, with a projecting loose-box, a room for food, and a coach-house 25ft. long. The doorways are not happily placed, and the large covered cleaning-shed in front is excessive. "Gig-lamps" also goes in for a large washing-shed, and details of a rather costly kind in elevation. "Utile Dulci" is fairly planned, but meagre in elevation; "Lancaster" is simple, though hardly well studied in the fittings; and "Good Luck to Your Fishing" has a well-considered plan spoilt by a coarse elevation; "X. L." is rather wasteful in arrangement of feeding passage, and "T. F." in circle is compact if not convenient. We may also name "Fiat," "Bon Ton," "Desire," "Parans," "Will," "Trial," "Ambition," and "Montigue," as arrangements which show a more or less imperfect knowledge of the requirements of stable-planning.

A SMALL CONSERVATORY.

Few of these meet our expectations. "Jack" is the first in both plan and design. The plan shows an oblong conservatory, projecting from drawing-room, 18ft. 6in. by 11ft. 6in., with gabled projections at the end; the main roof being hipped back on the same plane. One projection contains the entrance, and the other is intended for an aviary and fountain. The style is Late English, with mullions and transoms, the upper lights being filled with small panes and lead quarries. No details are shown. "Walter" is a sensibly-designed elevation; the long side is broken by a pedimented projection, with entrance in centre, and the details are carried out in the spirit of Queen Anne. A flower border surrounds the interior. "Bonus Hominus" is another suitable design, and is made to project about half the width, the other half being recessed. There is a tiled centre space with side borders. The entrance projects, and is hipped; and the lights over the transom are filled with small panes, ornamentally arranged. "En Avant" is appropriate; the lights are designed to open by lever apparatus, and the top lights are lead-glazed in colours. The rafters are trussed; diaper panels are shown below the sills. "Quiet and Simple" is a Queen Anne elevation, with three gables intersecting the main lean-to roof. "Pupil J." sends a rather *outré* design, having a span roof with lean-to projection all round, and a clerestory arrangement of lights to open. The entrance forms a transept. We do not admire the arched lights; no section is shown of the construction. "Vignette" shows a top lantern, "Spes" a gabled side, "Con" in circle has taken particular pains to show a curvilinear-shaped bed of flowers and borders, and "Desire" is remarkable for a flat roof curved at the springing, and the whole filled in with narrow lights. A few of the designs are copies.

PROPOSED IMPROVEMENTS AT BILLINGSGATE MARKET.

WE have before us a pamphlet, written by Captain W. E. Heath, which sets forth a novel and ingenious scheme for the retention and enlargement of the present Billingsgate Market. As a commission is now employed inquiring into the best means of making the market adequate to the wants of the Metropolis and to take evidence thereon, Captain Heath's suggestions will be read with the attention the subject deserves. The author shows conclusively, we think, that there is no other better locality than the present site of the market available for a new one. Neither on the Middlesex nor on the Surrey side is there a position that can compare with it. The Surrey shore is cut off by bridges from the termini of the chief fish-bearing railways. To shift the site eastwards or westwards, equal difficulty would be experienced, Upper Thames-street to the west is narrow and crowded, and the steep gradients of the narrow side streets would be objectionable, while beyond Blackfriars the Embankment forbids the utilisation of any site. Eastwards, there is no space, as the Custom House Quay, the Tower of London, and the succession of wharves and docks prevent the acquirement of a site; and the author points to the difficulties that would beset the attempt to convert St. Katherine Docks into an area suitable for the purpose, surrounded as it is by little narrow streets and distant from the principal railway-stations. It is much easier to build a market than to establish one, as Captain Heath observes, and he cites with much force the Columbia Market as an instance of the folly of building one anywhere. A market, moreover, is the growth of years and circumstances, as fishermen, salesmen, and fishmonger connect themselves to the old site, and many interests would be completely destroyed by an attempt to remove Billingsgate Market from the site it has so long enjoyed.

Let us see how the author proposes to carry out his scheme, which is illustrated by two plans. He proposes to "remove the whole of the upper part of the present market as low down as the top of the entablature that rests on the internal columns, and construct on iron girders a flooring or watertight roadway of wood or asphalt over the whole area pierced at proper intervals with staircases and wells for hydraulic lifts for porters carrying fish or for passengers, while lifts should travel up and down at stated intervals of a few minutes, while the business lasted." The present roof would be thus taken off and the side walls pulled down to the necessary level, a new asphalted floor made over the entire area with openings for lifts and hoists, and the roof would then be replaced on columns or piers leaving the sides open to the air. From this platform or floor-level a viaduct would be thrown across Lower Thames-street at the western end of the market giving a headway of 30ft. and a roadway 45ft. wide; the roadway thence it is proposed to carry by an easy gradient of about 2 in 100 to near the top of Love-lane on columns or arches. The roadway thus formed would connect the market with Eastcheap at its west part, at which point are three channels for relief, north, west and east. The line of road shown on plan is not quite straight, but has a slight turn in the direction, and the positions of St. Mary's Church and the ward school in Love-lane will necessitate a rather unpleasant curvature in the centre to clear them. The removal of the school would enable a straight or pleasingly curved line to be formed at probably little increased cost, which would obviate the crippled appearance at this point. We make this remark only as an esthetic suggestion. In its main features the roadway would be a decided relief to the market. The author proposes that the purchase of property required to construct this high-level road may be met by a toll on vehicles using it, though the new frontages made would largely recon the cost of the roadway. Lower Thames-street would still be available for traffic, and the new approach would vastly relieve that now very much congested thoroughfare. The plan shows width of new roadway for four lines of traffic, two stationary and two moving, besides footways for porters and others. The standings on the stationary lines may, it is suggested, be numbered so as to be readily found by the porters when carrying their loads to the fishmongers' carts below. The new platform or floor of market, sheltered as it

would be by the roof, could then be used for the railway vans, and by a gallery constructed over the jetty on the river front, fish could be hoisted direct from the boats. The plan given of this platform shows standing room for 50 railway vans with two horses round the area, while two stairs, two load lifts, and a passenger and porter lift are indicated in the centre.

On the whole, Captain Heath's proposal is worth the attention of the special committee of the Corporation which is now sitting; the advantages pointed out by the author are not exaggerated, as any scheme which retains the present market where it is cannot fail to be the most economical one, and to meet the requirements of the fish trade. Lower Thames-street would be greatly relieved, and be left for the other traffic, and the time saved in loading and unloading would ultimately tell in favour of the consumer.

THE IMPROVEMENT OF ARTISANS' DWELLINGS.

LAST week a conference of gentlemen interested in the improvement of artisans' dwellings was held in the Guildhall at York. There was an influential attendance. In opening the meeting the Chairman (the Lord Mayor) said one of the more definite objects of the meeting was to arrive at a conclusion as to whether it was necessary, in order to improve artisans' dwellings, that anything should be done in the way of the formation of a company or otherwise. Mr. W. H. Empson said the only way to provide proper buildings would be by building in the block system, or that which Sir Sidney Waterlow had adopted in London. He (Mr. Empson) thought there could be no difficulty in building on either of these plans at York, and making it a success. Having given information on Sir Sidney Waterlow's system, which, he said, was a paying concern, Mr. Empson gave statistics as to cost.—Mr. Demaine also described the buildings in London, and gave estimates of the cost of erection, and the rent required.—Mr. Ernest thought that increased accommodation was required in York, and had no doubt speculation would be successful.—Dr. North referred to the question of public health, which, he said, was the main question. He said that beyond certain limits, exactly in proportion as the population per square mile was increased, so the rate of mortality increased. With regard to the building of blocks, though it might have to be submitted to of necessity, if they piled up houses one upon another, those persons living in the top rooms would have the disadvantage of living and breathing the atmosphere of those below. Having referred to the necessity of adequate ventilation behind and in front of houses, the speaker said that another great question was that of morality, that was as to whether it was for the good of morals whether people should live in huge barracks in which persons of all sexes should be congregated as though in common lodging-houses. In his opinion these sort of houses were an unmitigated nuisance, centres of social injury, and tended greatly to deteriorate public morals. At the present moment he did not think there was any stern necessity for blocks in York.—The Rev. T. D. T. Speck agreed with the previous speaker as to the disadvantage experienced by persons living in top stories of high buildings.—Mr. Butler agreed with the opinions of Dr. North, relating his experience with reference to the system of blocks. He thought that they tended more to deteriorate the physical and moral condition of the people occupying them than otherwise.—The discussion was continued by Mr. Rymer and the Rev. G. M. Argles, the latter of whom considered that more small cottages at about the rent of £10 were required. The sheriff (Mr. R. Thompson) said that the moral and physical question was of considerable importance, and wanted well discussing first. After further discussion, the meeting was adjourned *sine die*.

A new Welsh Calvinistic Methodist Chapel has been erected at Newborough, Anglesey. The chapel, which will seat 650 people, has been built on the foundations of the old structure, with the addition of a porch, at a cost of about £1,400. Mr. Elias Jones, Dwyran, was the contractor, and Mr. Richard Davies, Bangor, the architect.

CONTENTS.

Towers and their Treatment	125
The Smoke-Abatement Exhibition at South Kensington	125
The International Medical and Sanitary Exhibition.—II.	127
The Water Question.—XII.	129
Bristol and Gloucestershire Archaeological Society	131
Practical Notes on Plumbing.—VII.	131
Restoration at St. Albans since 1877	131
Calculator of Measurement of Pa. Rates and Timber	132
Suggestions in Design	133
Royal Archaeological Institute	133
Newsletters on Tyne	133
Gloucestershire Notes and Queries	134
"Building News" Designing Club	134
Proposed Improvements at Billingsgate Market	135
The Improvement of Artists' Dwellings	135
Our Lithographic Illustrations	136
Archæological	136
Archæological and Archaeological Societies	136
Ancient Wood and Ironwork in Cambridge	139
The Right to Lateral Support	139
Building a House on a Sand-hill	139
Timber from Straw	139
Art on the Stage	151
Water Supply and Sanitary Matters	151
Statues, Memorials, &c.	151
Building Intelligence	151
Competitions	152
Chips	152
To Correspondents	153
Correspondence	153
Intercommunication	154
Legal Intelligence	155
Our Office Table	156
Tenders	155

ILLUSTRATIONS.

NORTH TRANSEPT CHURCH, BEVERLEY MINSTER.—SHREWSBURY SCHOOL NEW CHAPEL.—PROPOSED CHURCH NEAR ROTHERHAM.—NEW TOWN HALL, GRAHAMSTOWN, CAPE OF GOOD HOPE.—BODNANT, NORTH WALES.—COTTAGE AT WEST STRATTON.

OUR LITHOGRAPHIC ILLUSTRATIONS.

BEVERLEY MINSTER.

BEVERLEY Minster, originally a monastery, was founded by St. John, of Beverley, about the year 700, and destroyed by the Danes in 866. It appears to have been re-founded and made collegiate, about the year 928, by King Athelstan, who endowed it with large privileges. By the favour and bounty of succeeding kings, and of the Archbishops of York, who claimed the immediate patronage, it continued to flourish for many years. There are four transepts, the two choir-transepts built in the year 1188, belonging to the earliest part of the church, and resembling that of Salisbury. At the time of dissolution, 1st Edward VI., it consisted of a provost, eight prebendaries, a chancellor, precentor, seven rectors choral, nine vicars choral, with many chantry priests, clerks, choristers, officers, and servants; the first provost being Thomas, of Dyeaux, afterwards Archbishop of York in 1592, and Thomas à Beckett in 1150. The west end of the minster is adorned with two lofty towers 160ft. in height. The total length from east to west is 34ft.; breadth, 61ft.; length of great transepts, 167ft.; height of vaulting, 67ft. In the choir stands the Mid-stel, a chair of one entire stone, said to have been removed from Scotland, in which those who sought sanctuary in their minster were seated at their admission. St. John, of Beverley, was born at Herpham-on-the-Wolds, and was the first M.A., Oxon. His bones are stated to have been found, in digging in Beverley Minster, Sept. 13th, 1661.

SHREWSBURY SCHOOL—NEW CHAPEL.

THE grammar-school at Shrewsbury will shortly be removed from its present quarters to a new site on the other side of the town, overlooking the Severn, opposite the quarry. Here it will occupy an old building, which was originally designed in the last century for a foundling hospital, but is now being altered and adapted to its new purpose. A head-master's house, and two under-masters' houses, the latter by Mr. William White, F.R.S.A., are also in process of erection on the same site, which affords ample space besides for play-ground, cricket-field, and other necessary adjuncts of a large school. The buildings are all of red brick, but the governing body have decided that the chapel, which is not yet begun, shall be of stone, the cost being limited to £7,000. Of this sum, £3,000 has been raised for a memorial to Dr. Kennedy, the late distinguished head-master. It was stipulated that the memorial should form some distinct and definite portion of the building, a proviso with

which it would have been difficult in a college chapel to comply. It was decided, however, to seat the building as a church, and a chancel, which thus became a necessary feature, naturally met the requirement. The building has been designed to bring each portion within the stipulated limits of cost, and will, when complete, accommodate 500 boys besides the masters, their families, and a limited number of visitors. The old screen and pulpit, and such other fittings as can be re-used, will be retained in the new chapel. The chapel will stand on the west side of the school-building.

NEW CHURCH, ROTHERHAM.

PROPOSED to be built at Moorgate, of local red brick and red stone. E. Francis Clarke, architect, 7, Westminster-chambers, London, S.W.

NEW TOWN HALL, GRAHAMSTOWN (CAPE COLONY).

THE New Town Hall at Grahamstown, Cape Colony, which we illustrate in our present number, has nearly reached completion, the contract time—two-and-a-half years—expiring in September next. It is one of the most extensive buildings in the country, and, being of stone, is an improvement on the brick and plaster which till of late was too generally adopted throughout the colony for buildings of all descriptions. As our illustration gives a ground-plan of the building, its extensive accommodation will be seen, and a second story extending over the front portion affords, in addition to this, four large museum and two committee-rooms, and at the back, under the anterooms of assembly-hall, there is a roomy basement for taxidermist, store, and other purposes. The design is by Mr. Sydney Stent, F.R.I.B.A., Assoc.M.Inst.C.E., of the Cape Public Works Department, and was the successful one in a general competition advertised by the municipality some four years since. A general ground-plan formed one of the conditions of the competition, and another was that tenders should be obtained within the limit of cost given. The conditions were (which is not usual on the part of municipal authorities) adhered to: it was also a *sine qua non* that the tower, which is a jubilee memorial, should stand out as a distinct part of the building, so that architectural treatment became somewhat restricted. The foundation-stone was laid by Sir Bartle Frere, Bart., on the occasion of his first visit to Grahamstown as governor of the colony. A special feature in the carrying out of the design is the use of moulded cement concrete for all dressed work except the plinth-course, which is cut stone. The mixture for this is 4 of broken stone, 2 of sand, and 1 of cement: it is cast in blocks the sizes that would have been used had cut stone been adopted, and was allowed to stand under cover not less than a month before use. The blocks are built and bedded in the work, and afterwards pointed, just as stone would be, in cement mortar. Had this been done in coal-ash mortar, a more distinct joint would have been obtained, and the work would have looked better, perhaps. The cost of cut stone in Grahamstown precluded its use, and but for this successful substitute, no dressed or ornamental work could have been introduced into the design. As it is, the effect of stone has been obtained at a small cost, and casual observers do not detect the difference. A little ingenuity and skill is required in constructing the moulds for some of the more intricate castings, but the actual moulding of the blocks themselves is readily acquired by any careful and good workman in a week or so. The durability of this concrete is no doubt greater than that of stone, and its only drawback is the coldness and monotony of its colour or tint; but this, where it is used only partially in a building, as in the case before us, and where it thus has the relief of the stonework, is hardly noticeable. In using concrete for the same purpose again, the architect would adopt different proportions, and would admit as much as $\frac{3}{4}$ of sand, instead of 2, to the 1 of stone and 1 of cement. The ventilation of the building will be very complete, being accomplished by vertical tubes, a special contrivance of window-sashes, and cornice outlet spaces in all the rooms. The assembly-hall, which is 82ft. by 50ft., will seat about 600 persons. A local builder, Mr. J. W. Abbott, is the contractor, and he has carried out his work, under most adverse circumstances, most satisfactorily. The contract price of the whole was £14,800.

BODNANT, NORTH WALES.

THIS building, which has been erected for H. D. Pochin, Esq., is situated in a most picturesque part of the Conway Valley, at an elevation of about 200ft. above the river, and commanding magnificent views of the Snowdon range. It is built on the site of an old house, which, however, possessed nothing of interest, and of which some minor portions have been worked into the interior of the new house. The walls are hollow throughout, and are constructed of a grey Chert stone quarried on the estate, and the whole of the moulded and dressed stonework is executed in Talaere stone. The roofs are covered with Welsh slates, and a certain relief of colour is obtained by the use of the half-timbered work in the upper portion. The surrounding country being very much broken up and richly wooded necessitated considerable play of outline in the general design, and especially in the roofs, to make the building harmonise with its surroundings. The work was executed by Messrs. Lucas Brothers, the architect being Mr. W. J. Green, of 8, Delahay-street, Westminster.

COTTAGE AT WEST STRATTON.

THIS is the first of a group of cottages to be built in the village of West Stratton, the seat of the Earl of Northbrook. The external walls are of unsquared flints, with the mortar-joints brushed over to give a good texture; the quoins and jambs and heads of windows are in red brick, pointed in mortar. The half-timber work is all of English oak. The roof is covered with red Broseley tiling. The work has been faithfully and ably done by Mr. Mussellwhite, of Basingstoke, from the designs of Mr. Ernest Newton, of 14, Hart-street, Bloomsbury-square.

ARCHÆOLOGICAL.

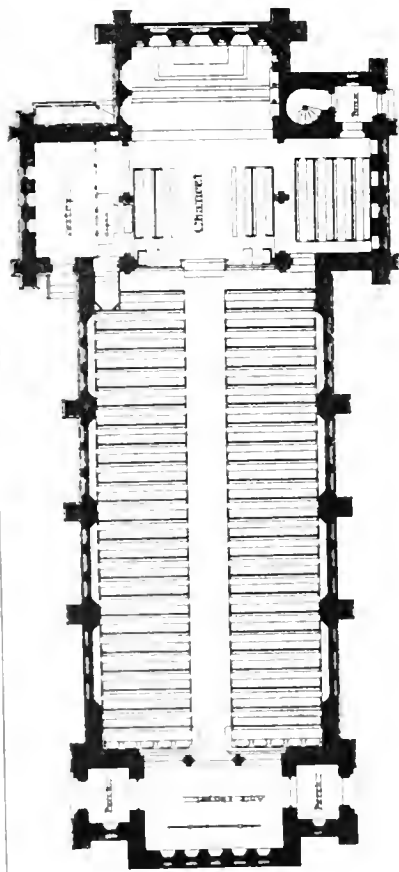
SUPPOSED TWELFTH-CENTURY REMAINS AT TANKERSLEY.—Last week the workmen engaged in carrying out the scheme for enlarging Tankersley parish-church made several interesting discoveries. The scheme of enlargement embraces the erection of a new porch in place of the old one, which, according to an inscription in the wall, was built in 1726. In pulling down the walls of the old porch the workmen have found about a score of different sized stones, and of various shapes, on which some ancient emblems appear, consisting chiefly of the sign of the cross. On one stone, 1ft. long, are a cross and a sword side by side. Several stones have round heads, and the figures on them are circles within which Greek and Latin crosses are inscribed. The cross and the sword are also on other smaller stones. In addition to the cross one stone has a rude outline of a number of steps, and on another stone is a cross and a very good sketch of a pair of shears, which no doubt were inscribed to indicate the trade of the person interred beneath the stone. The whole of the stones have been examined by Mr. Hadfield, architect, of Sheffield, who considers that they relate to the twelfth century. The sign of the shears would indicate that the iron trade was carried on in the locality of Tankersley 600 years ago. In clearing away the earth near the porch on the east side, a large stone coffin, six feet long, containing human bones, was found. The coffin has a place at the top for the head, and then widens to admit the shoulders. It gradually diminishes in width to the feet. On the top of the porch was found a large flat stone, on which were sketches of the cross and a scimitar.—*Sheffield Independent*.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

ESSEX ARCHÆOLOGICAL SOCIETY.—The annual general meeting of this society was held at Chipping Ongar yesterday. The chair was taken at the Trust School at 12 o'clock. At two o'clock the meeting visited Ongar Church and Castle, and proceeded from thence, at a quarter to three, to the ancient and interesting timber church at Greenstead. Afterwards, by the invitation of Captain Budworth, the reservoir of a holy well at Greenstead Hall was inspected.

At a special meeting of the Dover Town-council held last week, the tender of Mr. H. Stiff, amounting to £15,982, for the new municipal buildings, was accepted.

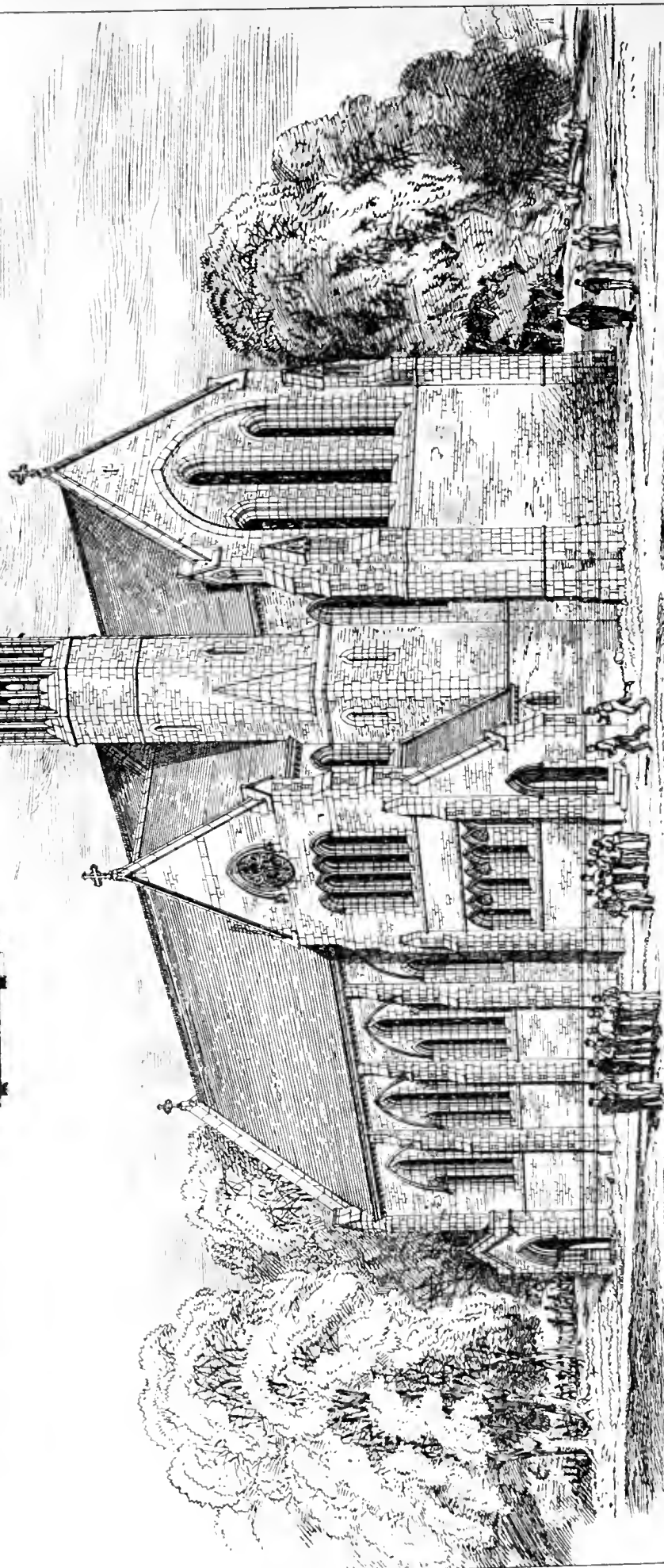


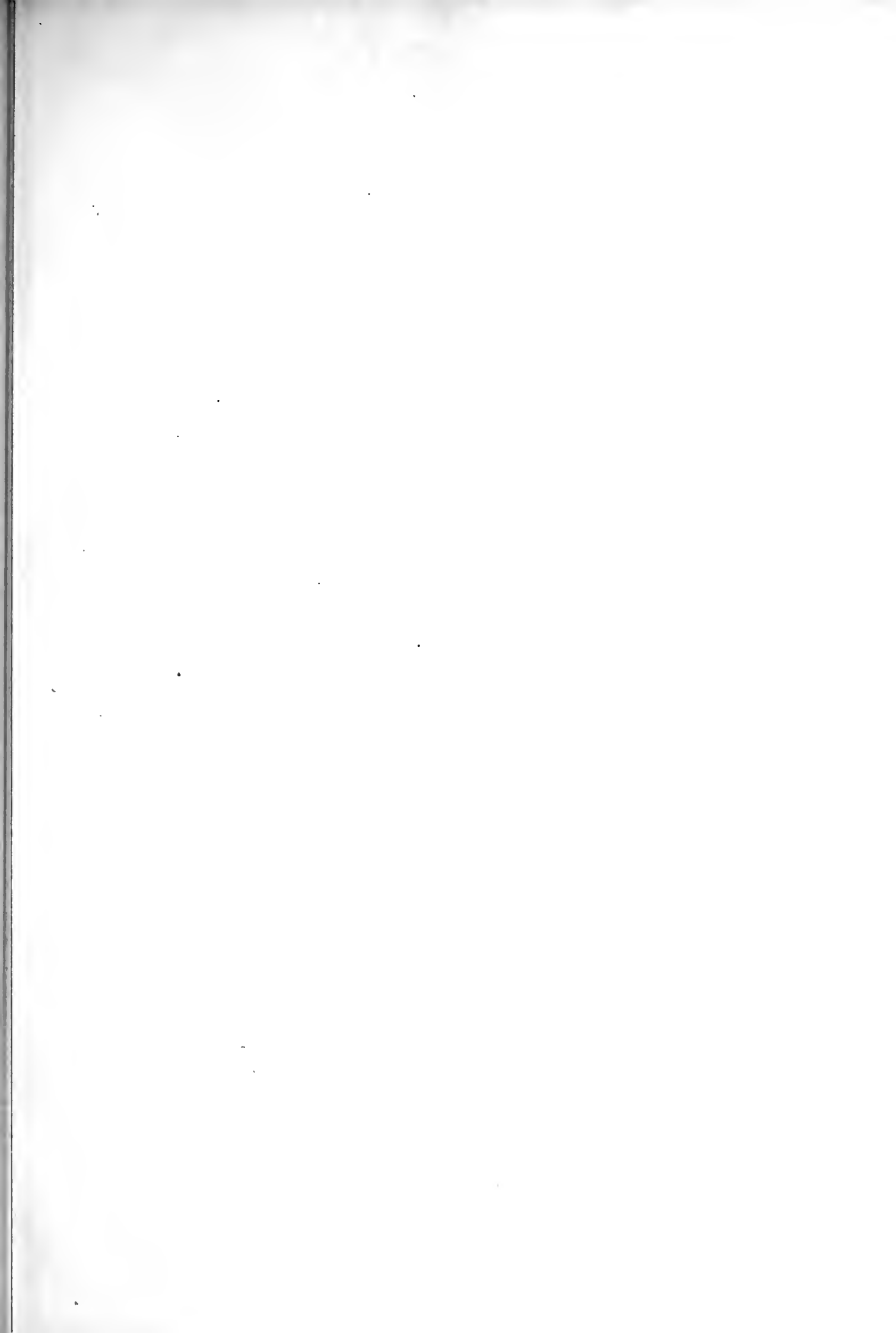


Shrewsbury School

New Chapel

ARTHUR BLOMFIELD M.A. ARCHITECT





BODNANT THE SEAT OF H. BODNANT ESQ
NORTH WALES
W. J. GREEN ARCHT. RCHT.

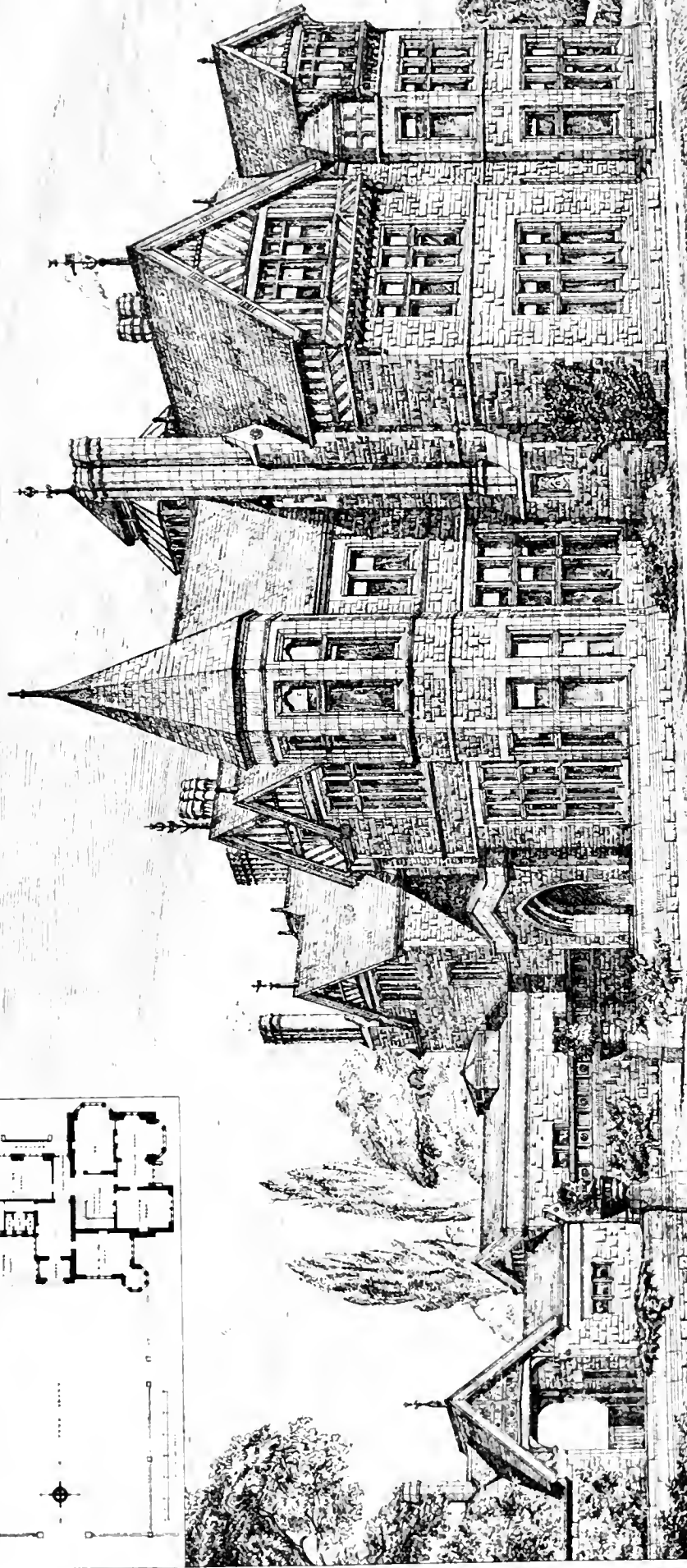
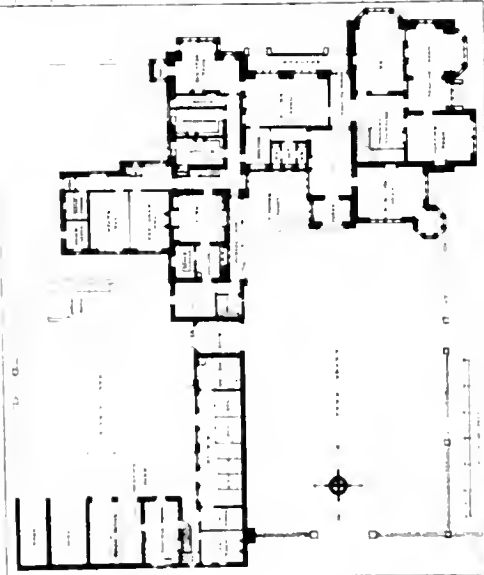
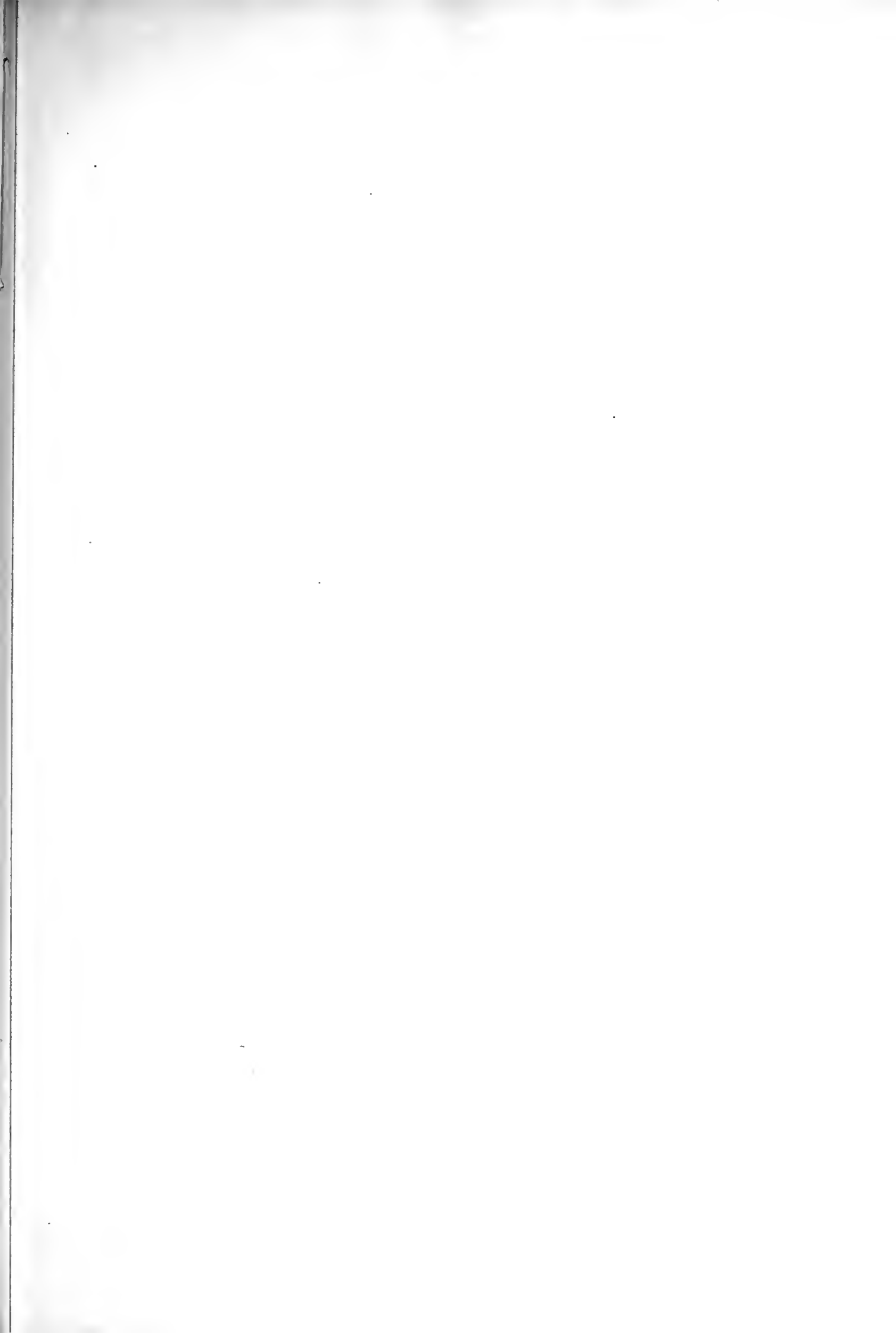


Photo-Lithographed & Printed by James Abernethy, 6, Queen's Square, W.C.



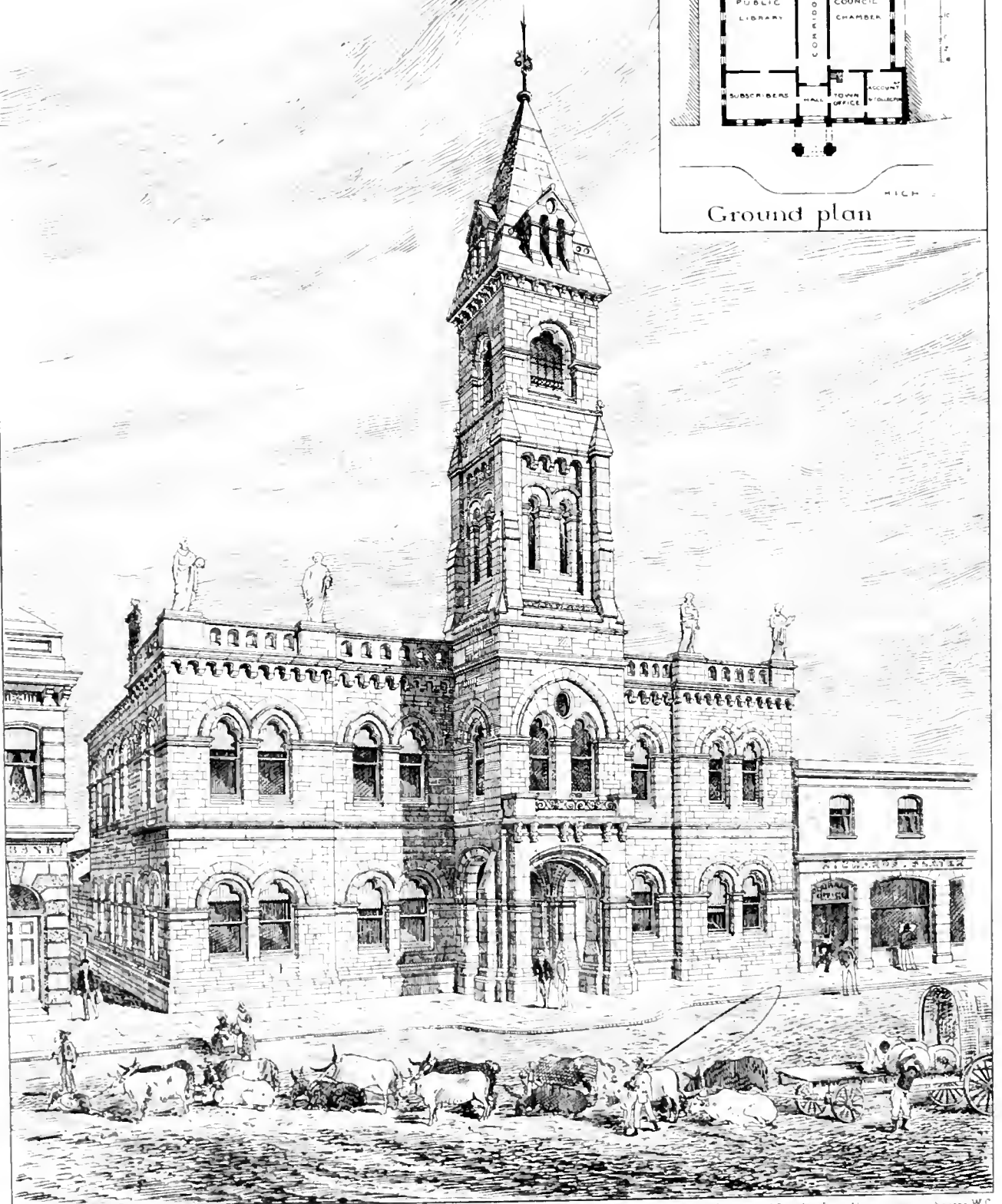
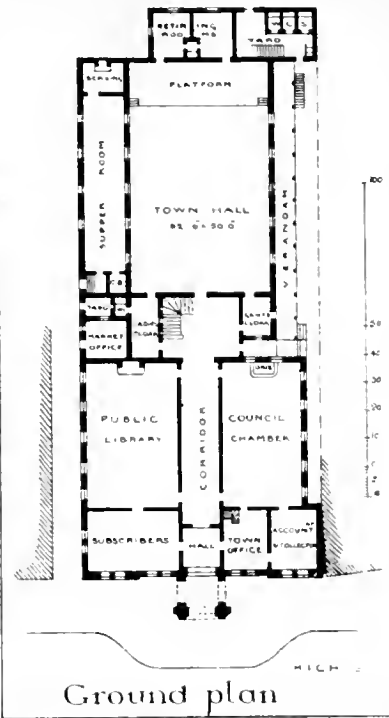
GRAHAMSTOWN CAPE OF GOOD HOPE

NEW TOWN HALL

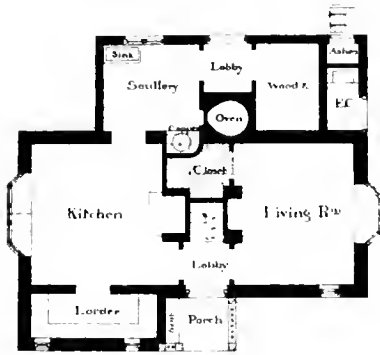
WITH JUBILEE MEMORIAL TOWER

SYDNEY STENT

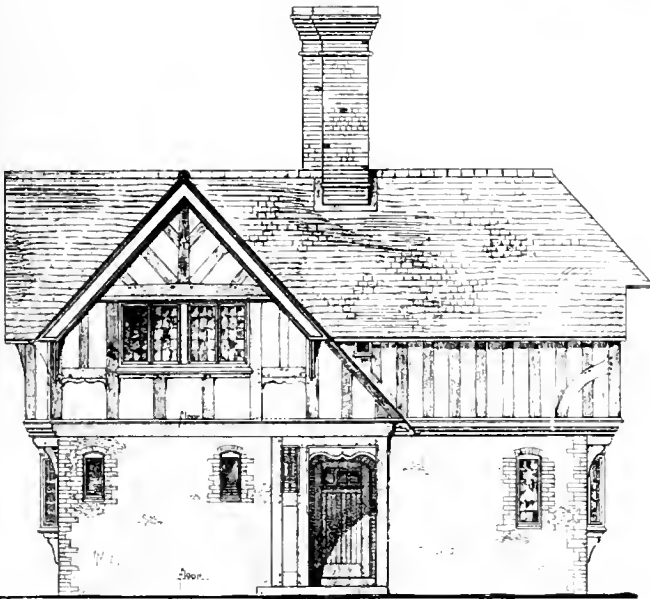
ARCHITECT



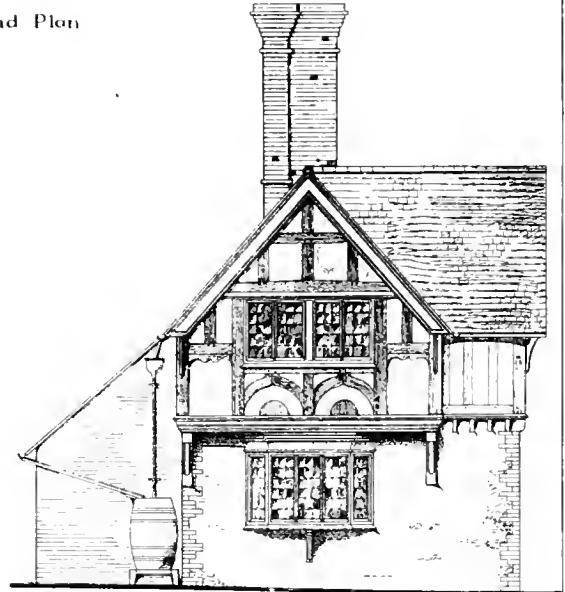
Cottage at West Stratton
for the Earl of Northbrook



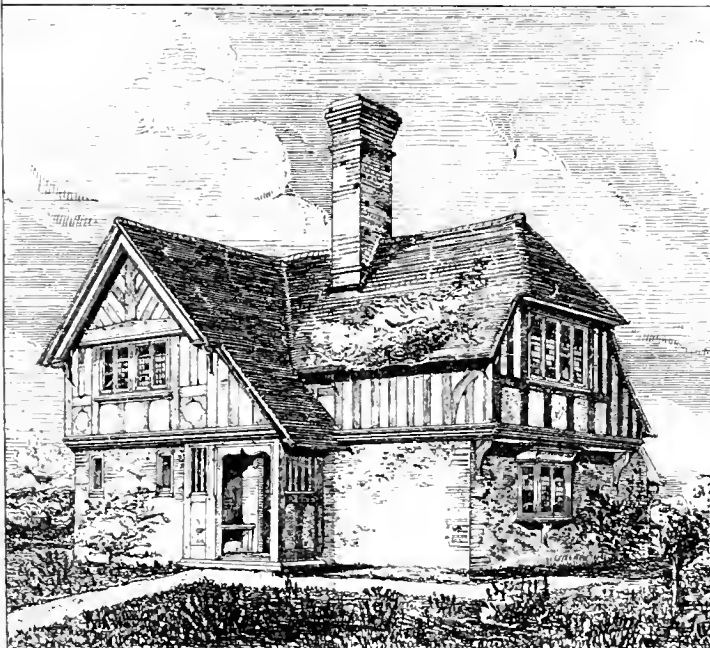
Ground Plan



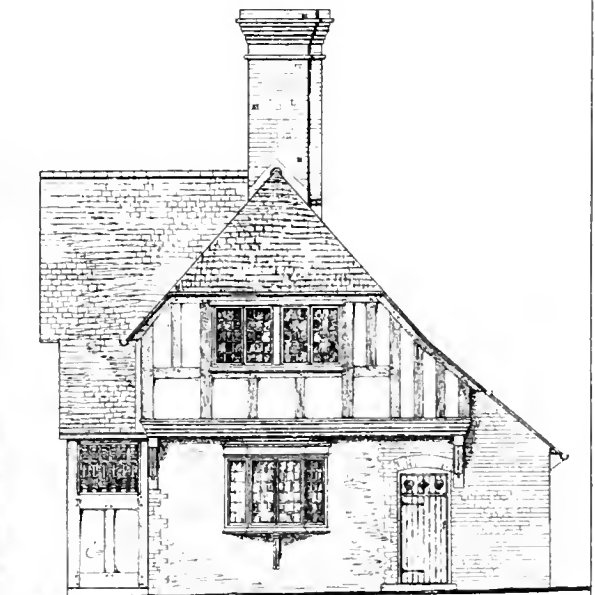
East Elevation



South Elevation



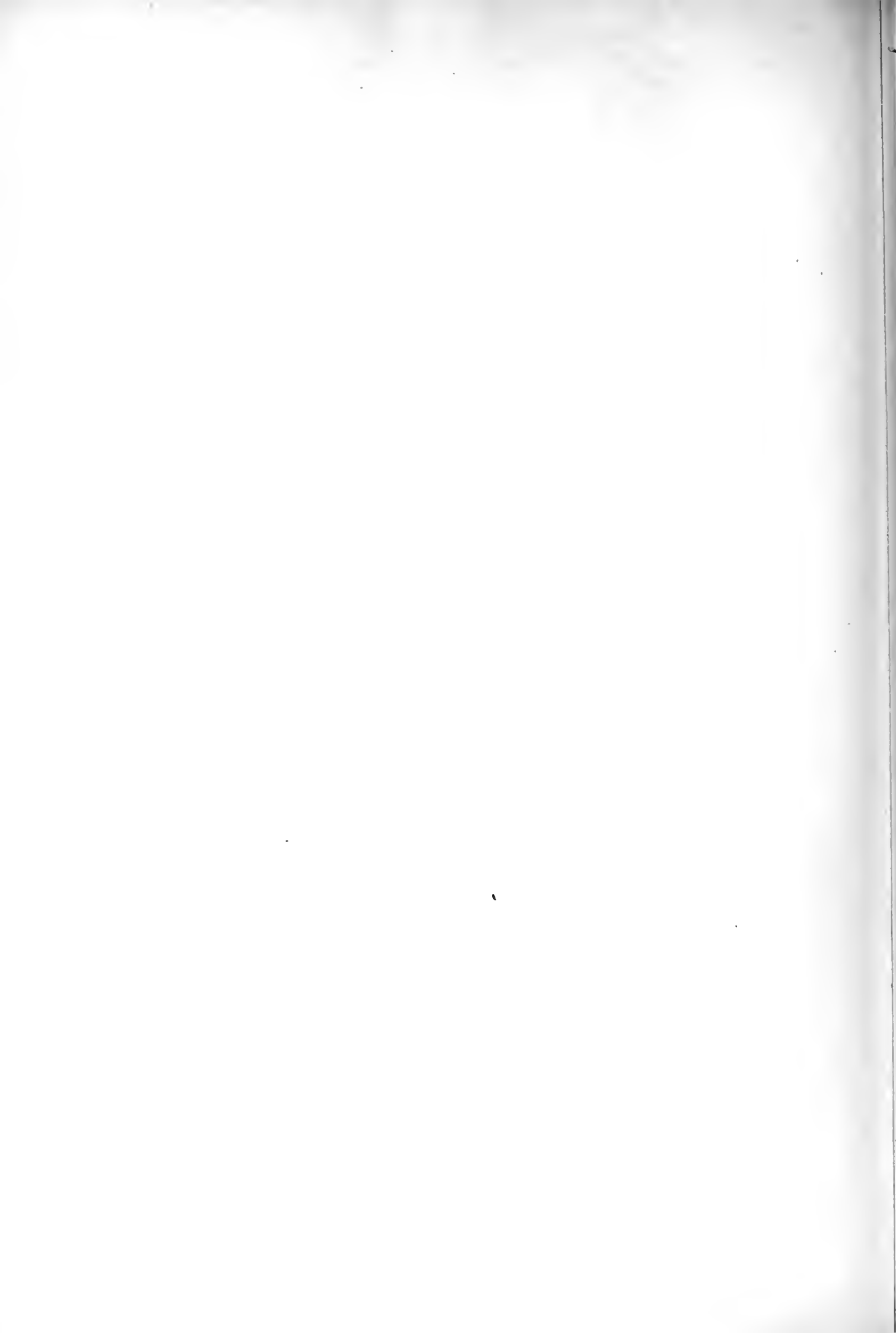
View of Bailiffs Cottage from the North

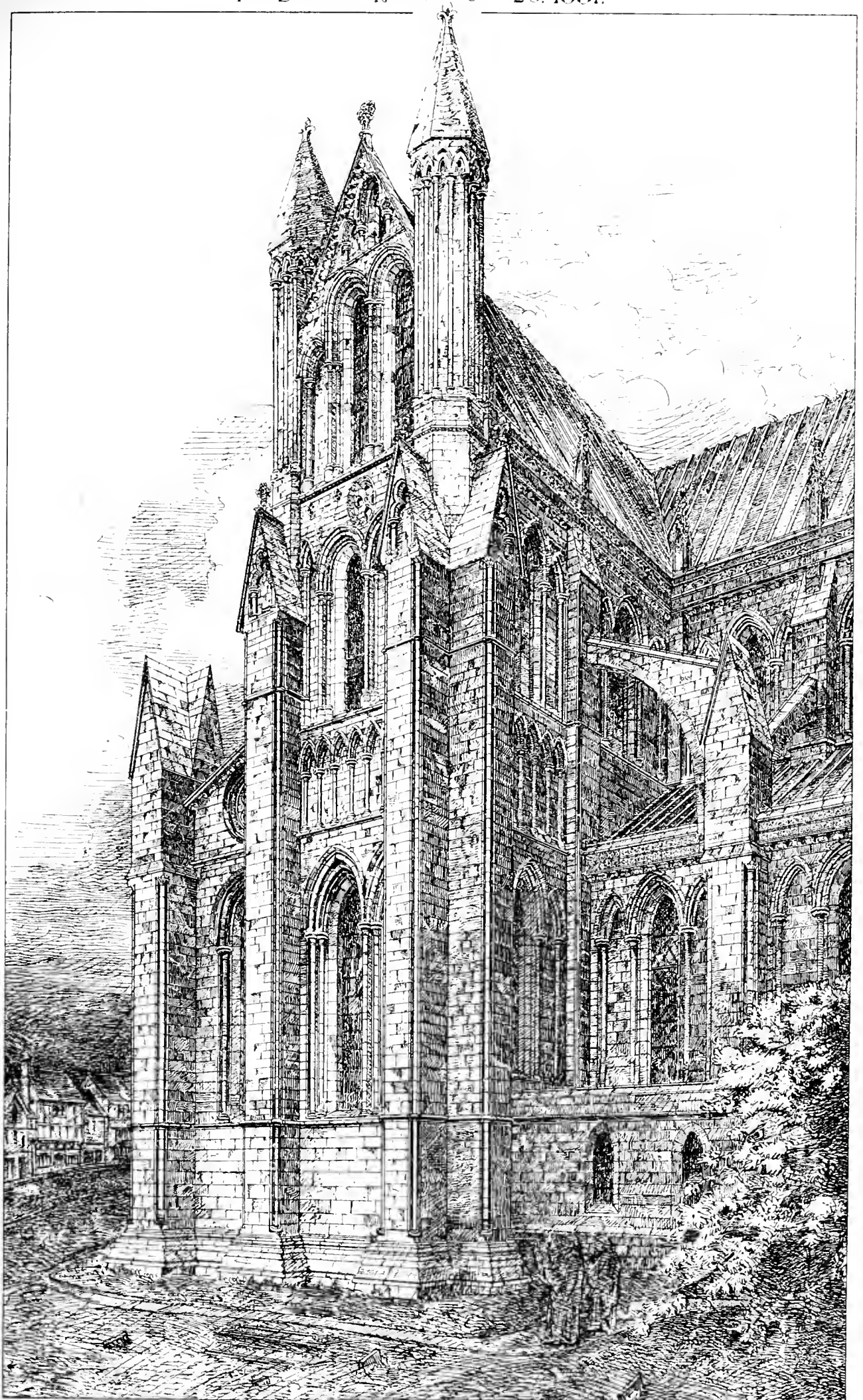


North Elevation

Scale of 0 1 2 3 4 5 6 Feet

*Architectural Agent
14 West 21st Street
New York*

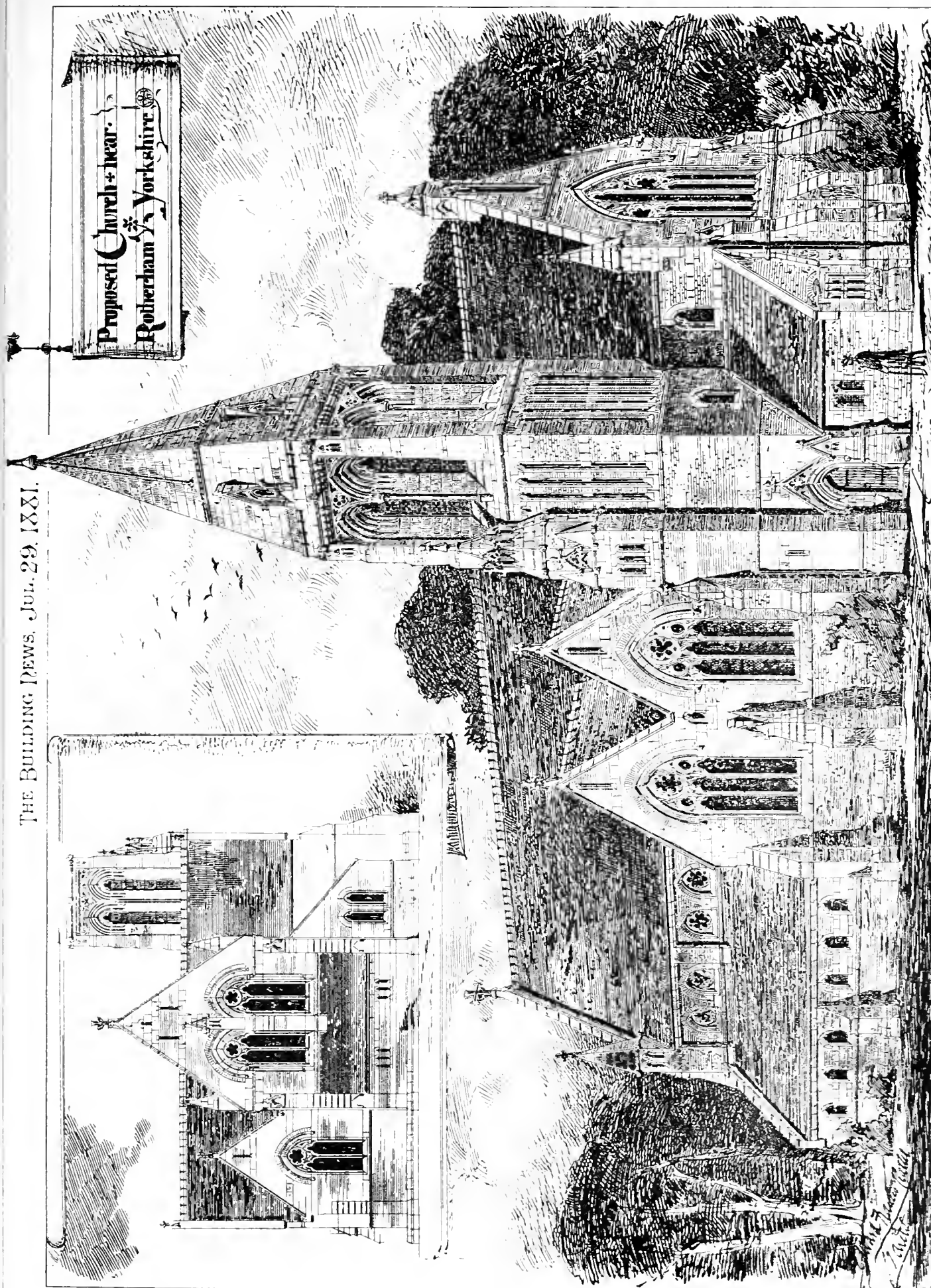




C. H. Lohr del.

Photo Lithographed & Printed by Isaac Aspinwall, Queen Square W.C.

North Transept, Choir & Beverley Minster.



ANCIENT WOOD AND IRONWORK IN CAMBRIDGE.*

WE have received Part II. of a work under the above title, by Mr. W. B. Redfern, Member of the Cambridge Antiquarian Society, assisted by the Rev. D. J. Stewart, M.A., and John Willis Clark, M.A., who have aided the author in writing the letterpress. As the latter gentlemen are authors of archaeological works, we may take it for granted that accuracy of drawing and description will be maintained. The present part contains three lithographic plates. The first of these represents a beautiful wood carved chimney-piece of the 16th century in a small house, No. 3, Sussums-yard, Bridge-street, belonging to St. John's College. It has the date of its construction on a small shield in the centre of mantelshelf. Only two compartments are shown, in order to give the detail large. Four groups of coupled Corinthian columns, raised on pedestals, divide the space into three panels. These panels are inlaid with coloured woods, and are all three alike. The subject represented is an Oriental temple, with a lake in front, having swans swimming. We are sorry the details of the mouldings are not given. The whole is surmounted by a deep entablature with lions' heads in the frieze over the coupled columns, and with a fluted enrichment in the longer portions of the frieze. Round each of the chief panels is an enriched echinus. The next plate is even more interesting. It shows the ancient bookcases in Trinity Hall Library, which, together with that at Merton College, Oxford, are the only two libraries in England in which the ancient arrangements are preserved. The Trinity Hall Library is a long and narrow room, 65ft. long by 20ft. wide. It has eight windows in each wall (two-lighted), and a high waggon-shaped roof. The bookcases or "stalls" are placed at right angles to the walls, between each pair of windows, with the seats directly in front of the windows, and at a certain distance from the cases. These bookcases have sloped tops or desks, below which is a shelf for books. Under this a desk, which could be pulled out if required, was placed. The details are particularly interesting, as they show the manner in which the books were chained to the desk. One end of the chain was fixed to the left-hand cover of the book, and the other end had a ring which passed over a long iron bar beneath the sloping desk, which was secured at the end by an ornamental iron lock at the end of the case. The bar shows a long clasp, which is fastened to the lock front by two keys. Plate VI. illustrates a carved oak arm-chair, date about 1630, now in the possession of Mr. A. J. Gray, Hills-road. A front and side view of the chair with plan are given. The seat is square-ended, slightly tapered behind, and the side framed rails are enriched by large half-circles with a bold leaf-pattern. The back has a square top rail which crosses the upright framing. These are richly carved with scroll-work and guilloche ornaments, while the back has a circular guilloche border surrounding a panel inlaid with a geometrical pattern in black and yellow wood, the design of which is essentially Oriental in character. The front legs are boldly carved and the framing is massive. These illustrations are drawn to a scale of 2in. to 1ft. The drawings are produced by the Anastatic process, the merit of which is that the touch of the original is retained. If the succeeding parts equal this one, the subscribers will have no cause to complain.

THE RIGHT TO LATERAL SUPPORT.

COMMENTING on the recent case of *Angus v. Dalton*, which we reviewed at length on page 727, last vol., *Engineering* remarks that "It is somewhat surprising, considering the subtle and highly technical grounds on which the arguments and judgment proceeded, that the defendants did not raise what seems to us to be the true nature of the right claimed. It was admitted that the pillar of clay which was left by the excavators was, in the state in which it was left, amply sufficient for the support of the stack, and that the accident arose from the drying action of the air upon the clay when ex-

posed. The right claimed, therefore, in this case resolved itself into a right to have the supporting clay covered up by the defendant's soil, so that its moisture, and consequently its supporting qualities, might be preserved. We do not think that plaintiffs could have claimed a right to have the protection of defendants' soil to keep their clay wet, any more than they could have claimed a right to have the protection of the defendants' wall to keep their building dry. The point, however, was not raised, and the decision proceeded as if the right to support alone were in question. According to the law as it now stands declared, a building erected upon the edge of the proprietor's land has, after twenty years, a right to the support of the adjoining soil, and this, however shallow, may be the foundations. Thus, though the foundations be merely 'scratched in,' as is the practice with speculative builders of the present day, after the building has stood twenty years the proprietor of the adjoining land will be debarred from excavating it, even to a small extent, except at his own risk. The only way in which he can effectually prevent the acquisition of the right is by digging a hole in his land during the twenty years, and actually letting down his neighbour's building. On the other hand, the building may have its foundations laid deep and solid, yet, until the lapse of twenty years, the proprietor has no security that it may not be brought about his ears, except in the forbearance of his neighbour. If his neighbour, as sometimes happens, put up next to him a heavy building, which by its weight disturbs his foundations and cracks his house or lets it down, he has a right to compensation; but if, within twenty years, his neighbour maliciously excavates and produces the same effect, he has no such right. But for the forbearance of which we have spoken, a state of things such as this would have long ago become intolerable in the metropolis and other large towns. As it is, this forbearance cannot always be relied on, and now that the present state of the law is definitely determined, the question arises whether or not it should not be amended by the action of the Legislature. The course which may be proposed is that by laying the foundations at a certain depth, varying perhaps according to the neighbourhood and the weight of the building, an immediate right to the support of the adjoining land should be gained. Another plan which suggests itself is that a person proposing to build along the edge of his land should give the adjoining proprietor notice of the nature of the proposed building, and the proposed depth of foundations. If no objection be made the work could proceed, and the right be immediately acquired. If objection be taken and the parties fail to come to terms, the matter should then be submitted to the district surveyor or to an arbitrator agreed on by the parties, who should award upon the matter and state how much, if any, compensation should be paid to the adjoining proprietor in respect of the diminished value of his land by reason of the depth to which he may excavate upon it being limited. The compensation being paid by the building erected in accordance with the award, the right would then be acquired as before. The rights of the parties would thus be at once finally ascertained and determined, without the lapse of twenty years and the intermediate uncertainty. Some such solution of the difficulty seems to be called for, whenever an overworked Legislature can find time to turn its attention to the subject."

BUILDING A HOUSE ON A SAND-HILL.*

AS I am not aware that it has ever before been attempted in the United States to build a house on the very top of a lofty sand-hill, exposed to all winds and weather, while simply depending upon, or rather by simply making the loose sand the agent to keep it firmly secured in its seat, I think a few words upon the construction of a single station, which I have just finished for the Maritime Exchange of this city, on top of the highest sand-hill at Cape Henlopen, may be of interest to some.

The signal station mentioned will serve to report the arrival at and departure from the Breakwater of all passing vessels, to the

Philadelphia Maritime Exchange, by means of the Western Union Telegraph lines which connect it with this city.

In the first place, it was necessary that the observer stationed in the building should have a clear and unobstructed view of the seaward horizon from south to north, that is seaward of the coast line. To obtain this it was necessary to erect the building on top of a hill, which rises some 80 feet above the level of the sea. But the building thus necessarily becomes exposed to every gale that sweeps that part of our coast, while it is absolutely required that it shall stand firmly planted in such a way that even a hurricane shall not shake it or make it tremble, as that would affect the sight of the telescope in the observatory.

The usual mode of securing is by building a foundation of screw piles or of heavy timbers sunk into the sand; the latter mode, however, has this disadvantage, that if the wind shifts the sand away from around the foundation, it becomes undermined and its effect is thus destroyed.

In order to be independent of all this, I designed what I consider a cheap and, at the same time, an effective anchorage for the building in the following manner. The building is of wood entirely; it has a cellar, above which are two rooms, one above the other, and the whole surmounted by the observatory proper. First, the ground-sill is a square of 20 feet, made of yellow-pine sticks, mortised together and pinned with stout trunnels. The sill of the observatory is made likewise of heavy timbers, 12 feet long. The two sills are joined together by four stout yellow-pine corner-posts, which in turn are mortised into both sills. The posts are 26 feet in length. Five feet above the lower sill is the sill which supports the floor of the first room, ten feet above this is the sill which supports the upper room. Both these sills again are mortised into the corner-posts. This structure is sheathed outside with German siding, inside with rough boards covered with felt, and again by tongued and grooved yellow-pine boards. The observatory proper, octagonal in shape, is securely mortised into the top sill and is covered with a corrugated-iron roof, conical in shape. The cellar is floored with 3-inch wood, and boarded all around on the inside of the posts.

I first dug a pit in the sand, about 6 feet deep and fully 20 feet wide on the bottom. I then laid the ground or cellar sill on this bottom, and built the structure: thus the whole depth of the cellar is sunk below the top of the hill, or the level of the sand. I then filled the cellar up solid with sand, and packed it solid all around the outside also; consequently the building is anchored in its place by the load in the cellar, some 100 tons in weight.

I carried three heavy joists (part of the joists which carry the first floor) through on one side of the building, and on these the kitchen was built, so that this is also independent of the position of the sand under it. Since the construction of the station we have had some very severe blows, yet there is no more tremble in the building than if built of stone on a rock.

A few feet from the building stands a signal post or mast 100 feet high, which carries a 5-foot ball of rattan covered with canvas; the ball is made to slide on the mast, and is used to answer signals from vessels by raising and dropping it. As it would, in my opinion, be a rather dangerous thing to simply place the mast in the sand,—no matter how deep,—I sank a well into the sand-hill.

This well is made of pine, 20 feet deep and 8 feet square. The mast is placed in the centre of the well and is braced, from the corners of the pine box, by some 20 stout braces, and the well afterwards filled and tightly packed with sand inside and outside, so that, like the house, to blow it over would necessitate moving of a tremendous weight of sand with it.

TIMBER FROM STRAW.

WE referred some months ago to the invention of a process for producing solid masses or blocks of any form and size from straw, which had been patented by a Western inventor. The *Northwestern Lumberman*, of recent date, reports the receipt of a sample of such lumber, made from straw, from the inventor, Mr. S. W. Hamilton, of Lawrence, Kansas, U.S.A. The inventor of this product claims that he can manufacture timber in any desired length, from

* Ancient Wood and Ironwork in Cambridge. By W. B. REDFERN, assisted by Rev. D. J. STEWART, M.A., and JOHN WILLIS CLARK, M.A. Published by W. R. Spalding, Cambridge. London: W. Kent and Co.

*A paper by Mr. J. J. DE KINDE read before the Engineers' Club of Philadelphia.

12ft. upward, and to 32in. wide, at a cost competing with the better or finishing grades of pine. Our contemporary says of the sample sent to it, that it will hold a nail as well as wood, that it is equally susceptible to a high painting finish, and can be polished to as high a degree as is desirable. It is made waterproof, and there seems no reason why it should not be so durable, or more so, than pine, or even oak, while its adaptability is evidently as great for roofing purposes as for the fine work of a dwelling.

The new material appears to be capable of being worked under the plane and other tools of the carpenter, and has the special advantage of being free from knots and not liable to shrinking, swelling, warping, and splitting. The material, judged from the sample, is reported to resemble hard wood in appearance, being about as dark as oak, but more dense in texture, and with a specific gravity one-fifth greater than thoroughly seasoned black walnut. Its tensile strength is reported to be about double that of wood of the same thickness.

ART ON THE STAGE.

SCENE-PAINTING is an art by itself. There is no other branch of painting just like it, either in the variety of subjects embraced or in the methods employed. The thorough scenic artist must be equally at home in landscape or marine work, architectural or fresco. He is not permitted to cultivate any particular branch of his art, nor any favourite style. He must be able to produce, at any time, the wild mountainous passes of Switzerland or the flat meadows of Holland; the green lanes of home-like England, or the winding valleys of romantic Spain. In his architectural work he cannot devote himself to the Gothic or the Romanesque, but must be equally master of the Moorish, the Greek, and the Oriental. He may to-day be called upon to paint the Temple of Minerva, and to-morrow the Mosque of Omar; this week the Windsor Hotel, and next week the Palace of Versailles. His art knows no boundaries, and his scope is confined by no limits. The universe must be at his command, and things unseen must live in his imagination. The methods by which he works and many of the materials he employs are altogether different from those employed by the ordinary oil or water-colour painter. They approach more nearly to those of the latter, yet even here certain qualities of the colours used by the scene-painter constitute a sharp dividing line.

In the first place, the ordinary water-colour painter works upon paper. The scene-painter uses canvas. He first makes a pasteboard model of his scene and gives it to the stage-carpenter, who builds the frame-work and pastes the canvas upon it. It is then ready for the "paint frame." This is a huge wooden affair, hung upon ropes, with counter-weights attached. It is usually placed against the wall at the back or side of the stage, and has a windlass attached by which it may be hoisted and lowered. The artist works upon a bridge built in front of this frame and at its top when the bottom is touching the stage. By hoisting or lowering the paint frame he is enabled to reach any part of his scene. He is provided with plenty of brushes, ranging from a heavy 2lb. brush, such as is used by house-painters, to a small sharp one for drawing fine lines. In addition to these he has several whitewash brushes for laying in flat washes and skies.

His colours are kept in buckets, tin cans, and other ware vessels. His palette is a long table with partitioned compartments on the top to hold small quantities of colour. Give him now his palette-knife, his rule, plenty of twine and sticks of charcoal, and he is ready to go to work. His first duty is to "prime" his scene. This is done with a plain coat of white. These colours and all others used by him are mixed with "sizing," which is simply a weak solution of glue. Working with colours mixed in this way is called painting in distemper, and has certain advantages which will be spoken of further on. The priming coat is laid on with a heavy whitewash brush, care being taken to drive the colour well into the canvas. Sometimes heavy unbleached muslin is used; but the usual material is duck.

After the canvas is primed and dry, the artist is ready to draw. Most scenic painters do their

first drawing in a very sketchy manner. After the charcoal outline is finished, it is gone over carefully with an ink prepared especially for the purpose, and not used in any other branch of art. In architectural drawing this part of the work is necessarily done with the greatest care, as regularity of outline and accuracy of detail are absolutely necessary. A scene-painter's outline for a landscape, however, looks very much like the off-hand outline productions hastily done by an old hand at sketching from nature. The scene-painter must be a master of perspective; for street scenes and palace corridors are frequently produced by him. The method of drawing in perspective on a large scale is curious, though substantially the same as that usually employed. The artist selects his "vanishing point," usually outside of his scene, and attaches to it by a pin a long piece of twine. Beginning at the top of the scene he marks off, in the foreground, the distances between his lines. He then blackens the twine with charcoal, and, laying the loose end on his first mark, draws it tight and snaps it upon the scene, making a line in the same manner as a carpenter does upon a long board. These lines are afterward gone over with ink and ruler. In this way he is able to produce a perfect perspective. Exterior scenes, in which a castle or other large building appears, often have the perspective increased in effect by continuing a wall or rampart down the stage upon a separate piece set exactly in the line of perspective.

SECRETS OF THE SCENE-PAINTER.

The next step is the laying in of the ground-work. The sky is, of course, the first point. This is done with whitewash brushes, the painter being absolutely free from all restraint in his method of putting on the colour. The principal point is to get it on quickly. And here the great advantages of painting in distemper become thoroughly plain. These advantages are two in number: the first is, that the colour dries very quickly, thus affording the artist a high rate of speed in working; secondly, all the colours retain, when dry, precisely the same tint as they had before being mixed. The addition of the sizing makes each colour several shades darker than it is when simply in the powdered state. The knowledge of this fact and thorough understanding of the effect the tints will produce after drying is one of the great secrets of the art. Oil-painters of high standing have been known to try the distemper method with utterly disastrous results. Colours mixed with oil always darken several shades and remain dark. Colours mixed with sizing always dry out to their original shade.

Different painters have different methods, and there is as much variety in the school of scene-painting as in other branches of art. The German, French, and American artists use opaque washes, or, as it is usually expressed, work in "body colour." The English school, in which the greatest advances have been made, use thin glazes. This in scene painting is the quickest and most effective. Morgan, Munton, Fox, and Voegtlin are among the leading representatives of this school in America, and their method is gradually spreading among the artists of that country. Its rapidity may be judged from the fact that one of these artists lately painted a scene measuring twenty by thirty feet in less than four hours.

One of the greatest differences in scene-painting from ordinary water-colour painting is that, while the colours of the latter are transparent, those of the former are opaque. For instance, the water-colour painter can lay in a wash of yellow ochre, and, by covering it when dry, with a light coat of madder lake, can transform it to a bright orange. In distemper, however, the coat of madder lake would not allow the yellow to show but would completely hide it, and the tint presented would be pure pink. From this fact results a total difference in the painting of foliage. The water-colour painter lays in his light tints first and puts in his shades afterwards. The scene-painter may do this or not as he pleases. He may put his light tints over his dark ones and they will not lose any of their brilliancy. The advantage of this in regard to speed may be easily seen. If the water-colour painter wishes to put a high light in the middle of a shadow, he must first erase with a sharp knife a portion of his dark tint, or else put on a heavy spot of Chinese

white. Over the spot thus erased or whitened he puts the required tint. The distemper painter is relieved of this roundabout process, for he simply dots in his light colour wherever he needs it over the darker shade, and it shows with perfect brilliancy. Again, in painting skies the scene-painter works by a method of his own, not unlike that adopted by oil-painters. The water-colour painter must leave all the broad light of his sky when putting in the main colour, and is obliged to work with his tints wet. The scene-painter may lay in the entire sky with blue, and paint his light yellowish clouds over it afterward. If the ordinary water-colour painter were to do this, his clouds would be green. Some scene-painters, however, work their entire skies wet. The effect of a sky painted thus is always very fine, but only an artist thoroughly conversant with the values of his several pigments can do this. For the colours, it will be remembered, present a very different appearance when wet from that which they have when dry.

Scene-painting has become so important an art that one large firm in New York makes a great speciality of imported materials. There is a long list of colours and other things used exclusively in scenic art, and improvements are being constantly made. Formerly scene-painters were obliged to grind their own colours, but these are now prepared in "pulp"—that is, ground in water. Among the colours used almost exclusively by scenic artists are English Paris white, zinc white, silver white, drop black, Frankfort black, Turkey umbers, Italian sienas, Cologne earth, Dutch pink, Schweinfurter green, Newwider green, ultramarine green, Bremen blue, azure blue, Persian scarlet, Turkey red, Tuscan red, Solferino, Magenta, Munich lake, Florentine lake, Vienna lake, and blue lake. Some of these colours are also used by fresco painters.

Those which are never used except by scenic artists are celestial blue, golden ochres, green lakes, Milori greens, French green and yellow lakes. The colours specially imported for scene-painters are carnation, royal purples, green lakes, and the English chromes. Indigo is used in very large quantities by scenic artists, but it is used very moderately by water-colour artists. It adds considerably to the expense of getting up scenery.

OTHER MATERIALS USED.

The scene-painter, however, is not confined to colours in producing his effects. There is a number of other materials of great importance in scene-painting. The gorgeous dashes of blue, crimson, yellow, and purple that make the resplendent fairy grotto are not alone sufficient. The glitter that is seen on the many-coloured stalagmites and stalactites is produced by ordinary gold and silver leaf. Sometimes it becomes necessary to produce upon the scene a smooth, glittering surface which shall be coloured. This is produced by foil papers. They are made of paper with a polished metallic surface, and are very effective in fairy scenes. What are known as bronze powders are made of all shades. They are metallic powders of gold, silver, bronze, steel, blue, red, purple, and other shades. A brush full of glue is drawn across the required surface, and the bronze is spread over it. The consequent appearance is that of a rough metallic surface similar to that frosted silver.

In some scenes it is necessary to represent precious stones. The jewels in the walls of some Eastern despot's palace cannot be imitated by paint with a sufficient degree of realism to stand the glare of gas and calcium light. Hence, theatrical art resorts to what are called "logies." These are made of zinc, in the shape of a large jewel, and are set in the canvas. They are made in all colours; and thus, by a very cheap and easy process, the barbaric splendour of Persia or of Turkey may be reproduced in all its original opulence. Sometimes it becomes necessary to represent that changing sheen that is visible upon highly-polished metals when exposed to the rays of the sun. This is done by means of coloured lacquers. The surface of the metal is painted, and a wash of these lacquers, blending from one tint into another, is put over it. The light reflected from these different coloured washes produces the desired effect, and gives a highly realistic representation of a surface of metal.

An ice scene is never complete without some-

thing to produce glitter and sparkle. This effect is produced by "frostings" of crushed glass, which are made to adhere to the canvas in the same manner as the bronze powders. The elaborate ornamental work in interior scenes is always done by means of stencils cut in paste-board. There are books published on fresco painting which give large numbers of beautiful designs for panels, ceilings, mouldings, and other ornamental work. Every scene-painter has a collection of these works. The ingenious artist, however, is constantly combining the different designs, and often invents new ones. He is thus enabled to present to the public an ever-changing variety.

The last thing that the scene-painter does before the production of a new play is to have his scenes set upon the stage at night in order that he can arrange the lighting of them. The "gas-man" of a theatre is the artist's mainstay. It lies in his power to ruin the finest scene that was ever painted. Ground lights turned too high upon a moonlight scene, calciums with glass not properly tinted, or the shadow of a straight edged border-drop thrown across a delicate sky—all these things are ruin to the artist's most careful work. The proper lighting of a scene is, therefore, a matter that requires the most careful study. The artist sits in the centre of the auditorium and minutely observes every nook and corner of his scene under the glare of gas. Here a light is turned up and there one is lowered until the proper effect is secured. The gas-man takes careful note of his directions, and the stage-manager oversees everything. Long after the audience has left the theatre on the night before the production of a new play, the stage-hands, the artist, and the stage manager are at work, and the public sees only the charming result of their labours when the curtain rises on the next night. —*New York Tribune*.

WATER SUPPLY AND SANITARY MATTERS.

BURGESS-HILL, SUSSEX.—The local board of Burgess-hill have appointed Messrs. Bailey Denton and Son their engineers, to carry out a scheme of sewerage and sewage disposal for their district.

WATFORD, HERTS.—The urban authority of the above town have called in Messrs. Bailey Denton and Co. to modify the present arrangements on their sewage farm by the introduction of intermittent filtration in combination with wide irrigation. Several of the neighbouring sanitary authorities might follow the example with advantage. At Harrow, Willesden, and other places, the sewage difficulty is to the front just now, and must sooner or later be settled somehow.

EAST DEREHAM.—The local board of East Dereham, Norfolk, received last week a detailed report from the surveyor, Mr. W. H. Nankivell, as to the progress of the new scheme of water supply. He stated that the section of laying water mains from the works to the market place had been completed, and the remainder of the pipes were being laid by the contractor, Mr. Hubbard. The fittings had all been delivered by the Glendfield Company, Kilmarnock, and the water-works tower had been built. The tender of Mr. Alfred Dodman, of King's Lynn, was accepted for the supply of engine, boiler, and pump at £494 19s. A scheme of sewerage is also in progress from Mr. Nankivell's plans.

ANNAN.—New waterworks at Annan were opened last Friday. The waterworks were commenced nine months ago, the contractors being Messrs. Brehner and Fleming, contractors, Edinburgh. The reservoir is situated seven miles from Annan, on the Middlebie Burn, in the parish of Middlebie. It covers 16 acres, and is estimated to hold 27,000,000 gallons of water. The filter-bed and tank are situated five miles nearer the town, at a height of 215ft. above sea-level, and are calculated to pass from 100,000 to 150,000 gallons. A 3in. pipe conveys the water from the reservoir to the filter, and 7in. pipes from the tank to the town. The engineer of the scheme is Mr. W. Henderson, C.E., Dumfries, and the cost of it will be between £11,000 and £12,000.

STATUES, MEMORIALS, &c.

A PUBLIC drinking-fountain was opened at Glosop on Saturday week, the gift of Mrs. Wood, Whitfield House. Messrs. Mills and Murgatroyd, Manchester, are the architects, and Messrs. Williams and Hope, Dinting, are the contractors.

Building Intelligence.

BLACKBURN.—The first school erected by the School Board of Blackburn was opened on Monday last. The schools are arranged in four departments, for 75 babies, 235 infants, 225 girls and 225 boys, making a total accommodation for 750 scholars, with an allowance of 10 superficial feet of floor-space for each scholar, according to the requirements of the Board of Education. The style of architecture is Domestic or Tudor-Gothic. The walls are built of Yorkshire pier-points in broken courses, and the ashlar dressings have been procured from the Howorth quarries in Yorkshire. The slates are green in colour, and the ornamental ridging of a red brown tint. The floors of the schools are laid with pitch-pine blocks in pattern, upon a bed of concrete and cement, and the walls are cemented throughout. The design was selected in competition, and the work has been carried out by the author, William S. Varley, F.R.I.B.A., architect, Blackburn.

BRAMLEY.—A large swimming-bath, situated in Bramley, one of the suburbs of Leeds, has lately been opened. The floor, side, and foot-paths around the bath are made in concrete, the whole of which has proved perfectly watertight. The above concrete has been supplied by the "Eureka" Concrete Co., of 52, Queen Victoria-street, London.

BRISTOL.—A quaint structure, the chapel attached to Barstaple's alm-house, near Jacob-street, at the top of Old Market-street, has disappeared, having been taken down to make room for a new structure. The hospital founded by John Barstaple dates from 1402, when Henry of Lancaster, having put an end to the Plantagenet line by seizing the crown, had reigned three years, and Thomas, Lord Berkeley, was employed in mustering men in Bristol and the surrounding district to oppose the incursions of the Welsh into England. The original building in Old Market-street was in existence till nearly the middle of the 18th century, and was at first more restricted in its accommodation than subsequently. The founder, a merchant, was bailiff of Bristol in 1379, sheriff ten years afterwards, and Mayor in 1395, 1401, 1405. He dedicated his almshouse to the Holy and Undivided Trinity and St. George, and located here six poor men and an equal number of poor women, with a priest to officiate to them. This arrangement lasted during pre-Reformation times; but afterwards the number of inmates was increased. About 1738 the old hospital, having become dilapidated, was removed, and a building which stood for 120 years substituted. This structure was partially pulled down in 1853, to give place to a more finished almshouse. Messrs. Foster and Wood were instructed to prepare plans for the new chapel, and Mr. H. A. Forse, builder, of Charles-street, St. James's, was chosen to carry out the contract of removing one building and erecting another on the site. The contractor, in taking down the chapel, found the date 1679 on one of the stones. As the design of the place was remarkably plain, there were few of the details worthy preservation. Having completed the task of pulling down, Mr. Forse, on Saturday, commenced the wall of the new structure, the dimensions of which will be 40ft. long by 15ft. w.de. The style is Perpendicular, and the chapel will be substantially built of Pennant stone with Bath stone dressings. The whole of the woodwork will be of pitch-pine varnished; the seats will be open, and the roof of timber with curved ribs. The part of the chapel near the Communion-table is to be laid with encaustic tiles. The windows will be filled in with cathedral glass. A corridor will lead to the vestry attached to the chapel, and the entrance to the chapel will be by a porch. The total cost of the undertaking is about £1,000.

BRYNAMMAN.—The Bishop of St. David's attended at Brynamman on Friday, the 15th inst., to consecrate the new church which has been erected there. The building will accommodate 300 persons. It consists of nave 55ft. long by 25ft. wide, and chancel 26ft. long by 16ft. wide. The latter has a small aisle on the south side, and the former a baptistery against the west wall next to a double porch, while on the north side of the chancel a commodious vestry with fuel-chamber beneath is provided. The bell is hung in a western gablet. The walls are built in

courses with the dark grey local stone, relieved by windows and dressings of Westwood stone, and the roofs are covered with light grey slates. The pavements consist of a mixture of stone flagging and Webb's (Worcester) encaustic tiles in patterns. The altar standards were made by Messrs. T. Brawn and Co. of Birmingham. The whole outlay has not exceeded the original estimate of £1,500. Messrs. Balcombe and Price, of Pembroke Dock, have carried out the work. Mr. Hay, of Brynamman, acted as clerk of works, under the directions of the architect, Mr. E. H. Lingen Barker, of London, Hereford, and Tenby.

COMBAMARTIN.—Combamartin, an old-fashioned market town about six miles from Ilfracombe, has now a restored church, or, at any rate, a church suitable and fit for public worship. About thirteen or fourteen years ago the Rector, at his own cost, restored the chancel, and a new reredos was added. The chancel-roof was then put in order, and some new seating introduced. From time to time small additions of seating have been made, and several good stained-glass windows have been furnished. The exterior is considered to be one of the best in the county. It has a lofty and symmetrical tower, with bold projecting buttresses, having foliated niches in the third stages. The principal attraction inside is a carved rood-screen, with paintings of our Lord and the Apostles on the lower panels. In addition to this there is a screen separating the chancel from the north chancel aisle, perhaps one of the finest specimens of oak carving in North Devon. In order to get into the church from the south entrance the parishioners have first to descend one step at the porchway and another three steps into the church. There is a north porch; and the church has a spacious nave, north and south transepts, north aisle, and north chancel aisle. The present works have extended to the plastering of the walls, the cleaning and repairing of the internal stonework, and the reseating of the nave and north aisle. The interesting oak-seating in the north chancel aisle has been refixed and carefully preserved. The whole of the works have been carried out by Mr. Burgess and Messrs. Goss and Sanders, all of Combamartin, under the personal supervision of the architect, Mr. W. C. Oliver.

DEWSBURY.—The corner stones of the new Infirmary at Dewsbury were laid last week. The new institution is being built at the junction of Halifax, Carlton, and Hirst-roads. The main front will be to Halifax-road, and in this will be the visitors' entrance, from which a corridor (7ft. 6in.) runs east and west the whole length of the building. The large general wards will be on the pavilion principle, and placed at right angles to the central building, running parallel with Halifax-road. The corridors will have Dennett's arched fire-proof floors in concrete, finished with cement surface and mosaic tiled borders, and the floor-boards on the ground and first floors will be of oak, French polished. The architect, Mr. Albert Kirk, has adopted the Gothic style, treated in a domestic manner. The main feature of the front will be the clock-tower, rising to a height of 90ft.; in this tower will be the visitors' entrance, over which will be an oriel window with moulded corbels and castellated battlement, prepared at the top for the reception of a sculptured figure representing "Charity." Over the figure will be a carved canopy in ashlar. The tower will be finished with ornamental moulded cornice, with three clock-turrets in ashlar, and covered with wood roof and Westmoreland slates, the whole being surmounted by ornamental iron cresting. At the end of the large general wards will be two angular towers, each rising to the height of 75ft. from the ground, having moulded cornices, and finished with slated roofs surmounted with ornamental iron cresting. The building is being erected with white delph-stone from Hipportholme quarries, with white ashlar dressings from Holbairth. The interior walls will be built of brick. The following is a list of the contractors:—Masons, Messrs. Jas. Brier, Sons, and Wilson, Savile Town; joiner, Mr. George Syles, Batley Carr; plumber, Mr. S. Hoyle, Batley Carr; slaters, Messrs. J. T. Rawsthorne and Co., Dewsbury; plasterers, Messrs. Richardson and Binns, Dewsbury; painter, Mr. J. H. Dyson, Dewsbury; fire-proof arching, Messrs. Dennett and Ingle, London. The clerk of the works is Mr. Alfred Heyworth.

Glossop.—The new Littlemoor Independent Schools at Glossop were opened on Friday week. Native rubble stone has been used for the walls throughout; those towards Victoria-street and the chapel burial-ground (north) being faced with pitch-faced wall-stones from local quarries. All the block stone for the dressings or architectural features of the elevation is also from local quarries, and some red stone from Kincorn has been introduced. The roofs are covered with Venetian slates, and all the internal wood-work is of pitch-pine, varnished. The style is Italian Gothic. A contract was entered into with Mr. Aaron Houghton, of Goley, for the whole of the work, at £2,570. The architects are Messrs. Paull and Bonella, of No. 2, Clumery-lane, London, W.C., and No. 1, St. Peter's-square, Manchester. The total cost is about £2,880.

MANCHESTER.—The foundation-stone of the new Church of St. Edmund, Alexandra-road, is to be laid to-day. The church, parsonage, and site will cost about £11,000. The style is Early English. The church will be faced with Yorkshire stone, with white stone dressings. The total length of the building will be 117ft., and the width 70ft., the nave being 100ft. by 36ft., and the aisles being each 15ft. wide. The chancel is 25ft. wide, and will be lighted by seven large traceried windows, the aisles by 12 double-light windows, and the clerestory by 26 single lights. The church will accommodate 1,000 persons. The architect is Mr. Henry R. Price, 25, Cross-street, Manchester, and the contractor, Mr. James Herd, Ardwick.

NEWBOLD PACEY.—The new church at Newbold Pacey, near Leamington, dedicated to St. George the Martyr, was opened on the 29th of June. It was begun about twelve months ago, and intrusted to Mr. James Kibler, of Wellesbourne, by whom the work has been carried out from plans prepared by Mr. J. L. Pearson, R.A., the architect of Truro Cathedral. The clerk of the works was Mr. H. Timms, of Liddington. It is built on the site of the old church, which possessed no features of interest except two old Norman doorways, a rude specimen of the 12th century. They have been refixed on the north and south side of the new church, which is of Early English type, very simple in its design and ornamentation; it consists of nave, chancel, south aisle, with transept and vestry; the principal entrance is on the north side, under the tower, which stands near the west end. The roofs are of open timbers, covered with tiles. The church itself is built of local limestone, with dressings of Warwick stone, the inside being plastered. The floors are laid with wood blocks under the seats, and tin quarries elsewhere. The altar-space is laid with Godwin tiles, ancient make. The seats of nave and aisle are chairs; the pulpit, which stands on a stone base, is of oak, with tracery panels and carving; the stalls are of pitch-pine. A tracery screen separates the chancel from the vestry and organ-chamber. The altar-table is raised five steps from the nave-floor and is also of oak. The font is octagonal, with clustered shafts; it stands under the west window. The building is warmed by an underground stove, with a pilot-stove in vestry. The carving of the pulpit was done by Mrs. G. Greenway; the font, the work of Messrs. Jones and Willis, of Birmingham and London, was the gift of Capt. Nichols; the organ was given by J. M. Paterson, Esq.; the cost of the building is about £2,600, and will seat about 200 people.

NEWCASTLE-ON-TYNE.—St. George's Church, Newcastle, which has been closed since Easter Sunday and has undergone a thorough restoration, was reopened last Friday. The church was erected about 53 years ago by the Ecclesiastical Commissioners, and is of the style of Gothic architecture in vogue at the commencement of its revival. About two years ago considerable alterations were made to the east end, as far as the funds permitted, by the formation of a chancel out of the eastern bay of the nave, and the formation of a proper choir therein. The completion of the whole scheme of restoration has now been carried out by the removal of the high-backed pews, the rearrangement of the aisles, and the re-roofing of the whole church with open benches of pitch-pine. The interior has been cleaned and painted in a plain but thoroughly effective style. The old stone paving has been removed from the aisles, and new tile paving substituted for it. The

projecting part of the west gallery has been removed, and the remaining part of this gallery over vestries has been re-seated and a new front of pitch-pine added, the design being a remarkably neat one. A new font, by Jones and Willis, of Birmingham, has been fixed near the south door. Just before the closing of the church on Easter day of this year, a new stained-glass window, by Messrs. Hardman, of Birmingham, was opened at the east end of the south aisle. Since then the old east window has been removed and a five-light tracery window substituted. This will shortly be filled with stained glass by Messrs. Hardman, and is the gift of Mr. H. Coghill. A new tile reredos is in course of preparation by Messrs. Minton, Hollins, and Co. The whole of the works have been carried out by Messrs. H. and R. Inskip, of Longton, from the designs and under the superintendence of Messrs. Thomas Lewis and Son, architects, of Newcastle. The cost of the restoration has been about £1,400.

SALISBURY DIOCESAN CHURCH BUILDING ASSOCIATION.—A meeting of the general committee of this association was held in the Board-room Close, Salisbury, on Tuesday week, the Very Rev. the Dean (in the chair), Rev. Chancellor Swayne, Rev. Canon Hatchings, Rev. Tapper Carey, Rev. W. P. S. Bingham, Mr. John Jeffreys, and the Rev. Sir Talbot H. B. Baker, Bart., and the Hon. and Rev. Canon Gordon, diocesan secretaries. In the case of Chideock Church, in the rural deanery of Bridport, Dorset, where an extensive work of restoration has been carried out, the committee ordered payment of a grant of £100, which had been previously promised. An application was next considered from the Incumbent of Christchurch, Warminster, in the rural deanery of Wylde, Wilts, for an increased grant, in consequence of its being found necessary to expend about £1,600 in the restoration, re-roofing, and other works proposed to be done to the parish-church, instead of the more limited alterations originally decided on, and it was, therefore, determined to add £50 to the £50 promised at a previous meeting. In the case of Manningford Bruce, in the rural deanery of Marlborough, Wilts, where an increase of accommodation in the parish church is in contemplation; permission was given to proceed with the work, the subject of the grant to be considered at a future meeting. The remaining case was South Wroxall, in the rural deanery of Potterne, Wilts, the application being for a grant to increase the accommodation in the parish-church, by rebuilding the chancel and restoring the entire fabric. It was decided to refer the matter to an architect, and to make a conditional grant of £10, subject to such reference.

SALTON.—The ancient parish-church of Salton-in-Rye-lake, near Mutton, was reopened on Tuesday after undergoing restoration at a cost of about £2,000. The church is dedicated to St. John of Beverley, who was formerly a prebend of York. It was originally built about the year 1100, and perhaps a few years before Archbishop Thurstan gave it to the Priory of Hexham. There are no traces of work earlier than the Conquest in the church. The tower has been carefully restored. The wall in many places on the south side has been partially taken out and rebuilt; the lower part of the tower cut off from the nave by an oak screen, so as to form a vestry; and a three-light Perpendicular window inserted in its west face, in place of the original lancet, to give light to the vestry and the west end of the nave, which was very dark. New floors have been provided, and the bells rebung in new oak frames; the belfry windows repaired, and on the old corbel-table has been erected a parapet, formed out of that removed from the nave. Other important alterations in the details of the interior have been carried out, more especially in regard to the flooring and the windows, and the whole of the work has been efficiently done by Mr. J. Wood, of Pickering, from the designs and under the superintendence of Mr. C. Hodgson Fowler, F.S.A., of Durham.

St. Clement's Church, DARTINGTON.—The *Nottingham Express* says: "Those of our readers who read Mr. Pritchett's history of this building, which appeared in the *Dartington and Richmond Herald*, will remember that the chancel had carved oak panelling behind the stalls until 1778, when it was removed by Lord Viscount Vane. It was, we understand, Mr. Pritchett's wish, in restoring the chancel some fifteen years since,

to replace this; but the funds then at his disposal did not allow it. The Duke of Cleveland has, however, as lay rector, now instructed him to carry out this improvement; and the churchwardens have agreed to remove the unsightly hot-water pipes which disfigure the front of the stalls, so that gradually we may hope to have the church finished."

WALSALL.—On Wednesday week the foundation-stone of a new Presbyterian church was laid at Walsall. The internal dimensions of the church are: length, 63ft. 6in.; breadth 15ft. 9in.; height, from floor to ceiling in centre, 35ft. Sitting accommodation will be provided on the ground-floor for over 400 adults; and, including the additional sittings in the gallery over the main entrance, the sacred edifice is computed to accommodate about 500 persons. The schools comprise a large room 32ft. 6in. by 21ft. wide, and four class-rooms, varying in size from 12ft. by 7ft. 6in. to 15ft. 6in. by 11ft. 6in., thus securing a total accommodation for upwards of 200 children. The buildings have been designed in the Gothic style, of the early 14th-century period, and are to be constructed of brick, faced on the fronts with best local pressed bricks. The contract for the various works has been taken by Messrs. William Trow and Sons, of Wednesbury, and they are now proceeding with the buildings, from the plans and under the superintendence of Messrs. John Cotton and H. H. McConnell, joint architects, of Birmingham and Walsall, whose designs were selected some three years ago. The cost of the buildings, including lighting, warming, and furnishing, is estimated at about £3,000.

WIMBORNE.—Wimborne Church, having undergone a thorough restoration, was reopened on Thursday week. Such portions of the wall as had become dangerous have been made good, and such as were past repair rebuilt, but every old stone carefully replaced in its former position—just as it formerly stood, the stones having been numbered and replaced. All the principal timbers to the chapel are original, but the boarding and paterae are new. The turret, which has replaced one of modern date, is also new. The floors have been relaid with Godwin's encaustic tiles. While the restoration was in progress interesting work was brought to light. The architect was Mr. William Jeffrey Hopkins, of Worcester, and the builder Mr. Stanley, of Broom. The carving is by Messrs. Martyn and Emms, of Cheltenham.

COMPETITIONS.

BIRMINGHAM AND MIDLAND EYE HOSPITAL.—An adjourned meeting of the committee of this Institution was held on Friday, the 22nd inst., for the purpose of selecting a design for the reconstruction of the hospital. Six sets of drawings had been submitted by the invited competitors. Those under the motto, "Mens tunc ego" received the greatest number of votes, and the authors, Messrs. Payne and Talbot, of Birmingham, were appointed to carry out the work.

CHIPS.

Three members of our Designing Club have passed the Advanced Stage Building Construction Examination, all being students of the Colchester Art Classes and pupils of Mr. G. Gard Pye, A.R.I.B.A., of Colchester. Mr. E. Farman passed the elementary, Mr. C. Dickinson the advanced, and Mr. G. A. T. Middleton the honours stage. Mr. Butler, a clerk in another architect's employ at Colchester, and a student of the Art Classes, also passed the advanced stage.

Lady Yester's parish-church, Elinburgh, was closed on Sunday last for the purpose of alterations on pulpit-stairs, choir, and session seats, which will be enclosed with new open rail. The old pews are to be lowered, and the doors on the whole of the pews are to be taken off, and new soffits at end, and book-boards made flat. The windows are to be reglazed, and the whole church painted, and to be lighted with coronas instead of the present sunlight. The estimated cost is about £500, from plans prepared by Mr. J. A. Dorell, architect, Elinburgh.

A patent has been granted, according to the *English Mechanic and World of Science*, to O. Saydel for supplying pure air to cities by conveying it in pipes from the sea-shore and delivering it to houses through suitable taps. It is numbered 5,281, 1880.

"To a practical man with a taste for mechanics, and the bumps of constructiveness fairly well developed, we can conceive no higher mental rest than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Two-pence of all newsmen, or post free 2½d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 5s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) for any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33fr. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Mr. CHARLES WILSON, of 13 and 15, Light-street, New York City, is authorised to receive American subscriptions at the rate of 6 dols. 40c. per annum.

Mr. R. M. TUTTLE, of Titusville, Penn., U.S.A., is also authorised to receive subscriptions at the same rate.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL, Price 12s. A few bound volumes of Vol. XXXIX, may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—J. P. M.—W. and Son.—C. W. and Co.—K. J. L.—C. P. and G.—R. P. C. Co.—H. B. and E.—S. R. S. A.—McN. R. and Co.—B. W. C.—W. G.—E. and R.—S. P. Co.—W. G. S.—T. W.—R. M. and Son.—M. J. Co.—J. S. and Sons.—P. Bros.—E. S. S. J.—T. R. and Son.—P. and M.—W. and J. R. F.

Correspondence.

VENTILATION OF SOIL-PIPES.

To the Editor of the BUILDING NEWS.

SIR,—I have read the remarks upon this subject from Mr. Michael Drury, on page 87, and from Mr. W. H. Willett, on page 119. The former makes several mistakes, e.g., he so writes as to give the idea that the smallest air-hole in a pipe upon the outside of the trap will prevent siphon action. Now, that is wrong. I have seen the letting off of a Bramah closet suck the water out of a bath-trap 12ft. from it, even when said bath-trap had a 2in. air-pipe!

As to a ¾in. composition gas-pipe being a sufficient ventilating pipe for a soil-pipe of any length, that is an error; it is better than nothing, and helps to prevent concentration of the sewer-gas at the top of the pipe; but for actual service it is something equivalent to feeding a man upon a farthing biscuit a day, while to prevent siphonage where Bramah closets are used, or large quantities of water sometimes sent down the soil-pipe at once, said ¾in. pipe is too small. It also prevents sufficient fresh air from passing through the pipe. Further, the use of a thin compo gas-pipe upon a soil-pipe belongs to the cut-and-run or scamping style of doing the work.

Mr. Drury's criticisms upon Mr. Hellyer's objections to the Mansergh trap are not to the point, and the idea of a trap being thoroughly "ventilated by a ¾in. pipe" is simply laughable. With only a ¾in. inlet and a long ¾in. pipe "bent round spouting and other projections"

for the outlet, the ventilation that could then take place seems to me to belong to the region of the imaginary.

In regard to Mr. Willett's statement that he prefers to use a simple earthenware water-closet which contains its own trap (all being above the floor), instead of a w.c. with a trap under the floor, and metal apparatus and container, I think he is on the right track. The simpler water-closets are, so being they are efficient, and all above the floor, so much the safer are they, and cheaper and easier to keep up.

Mr. White says he uses Stiff's "intercepted traps" in combination with an Archimedean screw ventilator for his soil-pipes. I fear the use of said combination as described is an infringement of my patent of April 23rd, 1875, unless Mr. Willett can point to published data prior to this date showing public use of the combination before me. Can he do so? If not, he ought to use my improved traps in the combination he describes.

As to the use of the Archimedean screw-cowl upon the top of the soil-pipe, I beg to say that although I at one time mentioned it for that purpose, experience in its use now causes me to condemn it. I do not now approve of any rotating or movable cowl, with the wind for its motive power, being used when far better and cheaper fixed cowls can be got to serve the purpose, more especially as there is no liability of the fixed cowl to get out of order, stand the wrong end to the wind, or stick fast. When the screw-cowl sticks fast its blades prove a great obstruction to the passage of the air in the pipe. They are also an obstruction to the temporary passage of air quickly down the pipe, to prevent siphon action when the closets are let off.—I am, &c.,

W. P. BUCHAN, S.E.

21, Renfrew-street, Glasgow, 23rd July.

SANITARY PLUMBING, AND PLUMBERS' WORK.

SIR,—Your correspondent, Mr. P. J. Davies, does not mention that Mr. Hellyer offered him 10 minutes at the close of the lecture, to reply to any remarks made in reference to the Bramah closet having a trap. Mr. H., as I understood, said that in the specification the trap was not mentioned, therefore he could not agree with Mr. D. And as Mr. D. made such a miserable attempt at proving that Bramah did fix a trap under his closet, Mr. H., as far as I could judge, only expressed the opinion of, at least, a part of the audience present, when saying that "Mr. Davies was not worth smoke," and through Mr. D. failing to defend his argument, he greatly disappointed many present, who expected to hear a good discussion, which, instead of lasting 10 minutes as intended, scarcely one minute had expired before Mr. D. resumed his seat.

As to Mr. H. taking his glass trap away from his model, was he not illustrating that the soil-pipe continued full-bore up to the roof was sometimes really no ventilation, unless air was admitted at the bottom; so why should he remove his trap? For according to Mr. H.'s showing, smoke, or sewer-air, would not always rise up even a perpendicular pipe, unless assisted by a current of fresh air, and had he removed the trap fixed at the foot of his model, as "Mr. D. wishes in his letter of the 22nd inst.," it would then have been simply no experiment whatever.

As to Mr. D.'s question on hydraulics in reply to my letter of the 15th, does he wish us to believe that the water leaving the w.c. apparatus strikes against the sides of the trap and thus escapes into the soil-pipe, never falling on and covering the surface of the water in the trap? Really this is something novel, and requires an explanation from Mr. D. I am glad to see that Mr. D. is prepared to prove, as he imagines, the superiority of the trap; the present is a good time, so why does he not practise what he attempts to preach, and let us have the proof? It will certainly not be by such means as Mr. Pullen advocates through his circular, for a visit to South Kensington and Parkes' Museum, will quite upset the greater part of that theory; in fact, nearly opposite to Mr. Pullen's stand in the Medical and Sanitary Exhibition there is an old trap shown (and anyone can inspect it); the interior is covered with foul matter, and quite corroded through the top in no less than three places. How does this agree with according to Mr. P. and Mr. D.'s ideas—namely, "it is never in the body of the lead that the leakage occurs, but at the joint's of the trap"? Now the

trap I mention proves this to be incorrect, for the joint or solder is perfectly sound, whilst the lead is perforated by the action of the sewer-air, again proving that Mr. P. and Mr. D. are wrong, and showing that the trap even requires ventilating. I cannot but think that to the pitiful opposition shown by Mr. D. and his friends to Mr. H.'s lectures, we owe the omission of the last lectures, besides not having the others in a more complete state, for Mr. H. must have been at no little trouble and expense, and had he had the encouragement he deserved, I believe he would have endeavoured to practically illustrate much further by experiments his ideas; but as so much opposition is shown with regard to the first course of lectures given to us, we must expect that others desirous of taking the subject up, will think twice before attempting to do so, thus preventing, to my thinking, what might have been most beneficial to all interested in this subject. I am, &c.,

Lambeth, July 27.

H. B.

BUILDING-STONES.

SIR,—On reading your correspondent's (Mr. D. A. Masey's) remarks on the way in which bad stone is often used unknown to architects, I could not but endorse his opinion, I am well aware myself that the reputation of Caen stone has been much damaged in this country by being in many cases used otherwise than on its proper bed, to avoid cutting other blocks, and thus save cost. Also, I know for a fact that, thirty years ago, when the Caen-stone trade was then in vogue in this country, and the demand was almost too great for the supply, anything was sent over, and with gratuities to foremen and others, the stone was accepted.

With such doings it is not strange that we should now reap the bad results.

I can say that where I have supplied Caen-stone within the last fifteen years I have had nothing but praise for its quality. I think it would be always well if the architect would correspond with the stone-merchant.—I am, &c.,

EMILE FOUCARD.

London, 23rd July.

COMPETITIONS: A THOUSAND DOLLARS DOWN!

SIR,—I have just come across a story from "the other side," the moral of which is obvious. A New York architect was requested to send a design in competition. He asked for a thousand dollars down. This quite staggered his "friends," to whom, however, he at once explained that the money would not be for his professional services. "But anyone," said he, "who prepares a design for a building committee to decide upon is a fool; and I think I should be paid at least a thousand dollars for making a fool of myself."—I am, &c.,

Leigh.

J. R.

COOPER'S HILL COLLEGE.

SIR,—In your report of the Duke of Argyll's speech, his lordship is made to say that, "the Indian Government annually lost enormous sums of money by the carelessness and incompetence of the Civil Engineers in India." If for *Civil* he had said *Royal*, he would have been much nearer the mark.

Again, he says many of the new barracks "were so insufficiently built that it was found they would not last more than a few years, and in some cases even the lime that had been used was pronounced to be bad." His lordship seems to forget that the *Executive Engineer* in charge of the Sangar Barracks at the time of that scandal was Captain F.—, of the *Royal Engineers*.

"Give the devil his due" is a good old maxim; and, although I am far from considering the C.E. element in India as immaculate, I like to see fair-play.

Cooper's Hill was the offspring of the fertile brain of Col. Chesney, R.E., and had it not been for his personal influence and excellent management, it would probably have collapsed years ago. The place was not required, and so the Duke of Argyll would have found had he given the open market of Engineers a fair trial, which he and his satellites never did. Now, the young engineers learn their work in India to the vexation of their superiors, and at the cost to the Exchequer of £420 a year each. When they have learnt it, I do not deny that a large pro-

portion turn out well. It is a mere question of £ s. d.—I am, &c.,
25th July. PETER PLAYFAIR, C.E.

FRESH-AIR VENTILATION.

SIR,—Permit me a brief comment on Mr. Willett's letter in your last week's B.N., wherein he testifies "that the fresh-air method of ventilation is far in advance of any others." He does not even hint that he has ever tried the small pipe vent. I have tried it; with or without a "fresh-air method": it is equally successful; hence I conclude the "fresh-air method" is only a superfluity. Still's "Interceptor" is very good, but it will not, of itself, prevent the siphonic action of a trap; nor will it prevent the generation of noxious gases in the soil-pipe and the branch therefrom to the w.c. basin, and the consequent probable accumulation of such gas in the apex of the w.c. trap. To secure these great desiderata, there must be an ever open vent in the apex; this is the one thing necessary which will effectually prevent any accumulation, destroy the possibility of siphonic action (the greatest evil of w.c.s.), and also secure safety even in the rare cases where a trap is nullified through evaporation. Roughly estimating the specification quoted in the letter, a special cost exceeding £10 is involved by the very complicated system thus developed. I maintain that the full advantages thus painfully secured (and something more of the greatest importance) is to be obtained with an outlay of about 5s.—I am, &c.,

MICHAEL DREY.

Lincoln, 25th July.

SURBITON COTTAGE HOSPITAL COMPETITION.

SIR,—Can any of your readers inform us what has been the result of the above? We sent designs some time ago; but the committee, with the courtesy usually extended to competing architects, have neither acknowledged their receipt nor replied to our letters asking for information.—Yours, &c., E. AND G.

BUILDERS.

SIR,—An assertion so sweeping and unfair as that made by Mr. Philip E. Masey in your last journal, relative to builders, should not pass without some protest. Connected with the office of the late Sir Gilbert Scott from the days when it was "Scott and Moffatt," to the present time (some thirty years or more), tempts me to think I have seen somewhat of builders, good, bad, indifferent, varying from the specimen which "neither treaties could bind, nor oaths render firm," up to men like the late Mr. Ireson, of Northampton, whose dimensions, even in the case of a disputed settlement, I should have taken without doubt, or question of their accuracy. Many builders, in truth, are men of the highest honour, the major part (thank Providence for it), fair tradesmen, who, if dealt with in a proper business way, are reasonable enough. Some, as in other trades (and professions also), no doubt, desiring to find "the reter of their tethers" when they begin, but, when once found (along with the fact of the architect desiring but honest action), will give satisfactory works, provided the clerk of works fairly represents his master, cannot be bought, and is properly supported in his duties when right is on his side. To the above testimony that of the whole older members of the Spring-gardens office would, I doubt not, correspond.

Mr. Masey must certainly have rambled Jericho way in the West; but ought, with a little caution, to have enjoyed when even dealing with Bristol builders, a few hours' calm sleep of both his eyes. My own experience in their case was, on the whole, much more kindly, for, if obliged to "use a lantern" at rare moments (a thing not unknown elsewhere), it never, after all, became necessary to perform a promise of "sleeping with two legs out of bed and two eyes open," once made in reply to Sir Gilbert's jocular caution respecting the smartness of the craft in that watchful city, and I had a good deal to do with them.

On the Bath-stone question, I would venture to ask Mr. Masey if it can be right for an architect to leave to the sole responsibility of either the clerk of works (his servant), the quarry master, or builder the settlement of what is good or what is bad Bath stone—one so easily settled,

provided the architect will but visit the various quarries and obtain the knowledge of a question he can there so readily obtain, and of which question ninety-nine in the hundred of his clients expect, and fairly so, that he should be able to settle for their protection? Surely the architect must be the proper person, and none other.—I am, &c., JAS. THOS. IRVINE.
Lichfield, July 25.

BAGSHOT CHURCH COMPETITION.

SIR,—I am entertained by the perusal of the letter in last week's News, as Mr. Rayne, the acting hon. sec., wrote me practically the same letters.

I was much annoyed, however, to have my drawings returned, and to have to pay the carriage. I immediately thereupon inclosed the receipt to Mr. Rayne, requesting him to remit the amount.

If this meets his eye, he may learn that the charge of eightpence stands against him in my books, and that I should be glad to know who is the chosen architect.

ANOTHER COMPETITOR.

ABBOTT'S HOSPITAL, GUILDFORD.

SIR,—In reply to "E. L. L.'s" letter in your last, my reason for doubling the final £ in Abbott is obvious, as furthering the important distinction I desired should be made in my previous letter. My chief authority is long usage. I have no tomb, will, or charter to refer to; the only reference I can make is to the headings in rewards received during my long term in the school, and these, inserted by the authorities at that time, support my view—possibly, a modernised one.

I regret under the initials I fail to recognise my old schoolfellow, but beg him note—I am, &c.,

JOHN (not James—another lapsus) WILLIAM STEVENS.

Intercommunication.

QUESTIONS.

[6579].—**Nave Roof.**—Will some one kindly give a section of a portion of a church nave roof span, say, 30ft., pitch 50ft., wall 2ft. 3in. thick, showing the bearing, scantling, and best method of framing the principal rafter with curved brace and tie beams together at the foot? What are the usual scantlings of the rafters, purlins, and ridge in a roof of this description? How are the common rafters and inner and outer wall plates framed together and in relation to the principal? Should the inner plate be moulded, and how is the spout fixed? Is there any recognised method of finding the correct proportion of an Early English window, and of the pier and chancel arches of this style? Is it usual for the window-heads inside to have the same play as the jambs? How are the angles treated when the walls are stuccoed, and what is the usual height from the top of the sill of the aisle windows to the floor line?—STUDENT.

[6580].—**Floors for Dancing.**—I should feel much obliged if any one would give me any information regarding swinging floors for dancing on. Have any been constructed, and where? I have to put one up 70ft. by 35ft., and shall feel obliged for any information. I hear they consist of beams or rolled joists which carry the flooring planks, the former being suspended by chains, and resting on indiarubber blocks to give the necessary undulation.—S. F. C.

[6581].—**Timber Building Construction.**—I contemplate building a timber engine-house of about the following dimensions:—70ft. by 20ft. and 10ft. high to wall plates. I shall be glad to have any hints on the matter from any one who has had experience in such construction. I wish especially to know if feather edged weather boarding or vertical planking is the best. In the latter case the building would be planked with boards, say, 1 1/2 in. by 7 in. spaced 1 1/2 in. apart, centre to centre. This would have a clear space of 1 in. between the boards which would be covered with boards of the same size, lapping 1 1/2 in. over each edge, where they would be nailed.—PITCH PINE.

[6582].—**A Local Board Difficulty.**—I shall be glad if any of your readers can inform me whether it is possible and my proper course to adopt to compel the authorities of an inland watering place to provide a new sewer or to deepen an existing one which is found to be but 3ft. from the bottom of it up to the surface of road, as they refuse to pass plans of a proposed house because the floor of basement (consisting of larder, coal, and wine cellar) is 2ft. below the level of sewer, which, I should add, is at the head of the street, on high ground, with no fear of flooding, and full 50ft. distant from the proposed cellars. The stipulation of the authorities for a drain from the floor of cellar, besides being objectionable, practically forbids my client having any basement at all. A drain in basement being unnecessary, can the authorities be compelled to pass the plans without one, the drainage in all other respects being approved?—M. G. L. B.

[6583].—**Cast-Iron Tubes.**—I will be obliged to any correspondent who will furnish me with accurate data for ascertaining the thicknesses to be given to test iron tubes or pipes to withstand external pressures. The several treatises written upon the resistance of tubes to collapsing do not quite give me the information I want. For particular reasons, I propose inserting cast-iron tubes under shallow railway embankment, in lieu of the ordinary masonry culvert or timber box-drain. One of the

pipes or tubes will be 6ft. 9in. wide by 5ft. high (oval shaped), another will be a circular pipe 4ft. in diameter, and a third will be a circular pipe, 3ft. in diameter. The tubes will reach up to under-side of railway sleeper, so that the entire weight of the engine carried by the driving-wheels will represent the greatest weight to be carried, and this weight I have assumed as being twelve tons. Assuming, therefore, that a sleeper is laid immediately along the top of each tube, what thicknesses are required in each case? I will be glad to have an accurate formula and note of any experiments made.—HOLLOW CYLINDER.

[6584].—**Party Wall.**—Is not one of the owners of a party wall entitled to raise it by giving notice to adjoining owner?—SCOTLAND.

[6585].—**Soil-Pipe.**—Will some one kindly give short description, with sketch, showing manner of forming disconnection between soil-pipe and drain, so as to leave discharging end exposed to the atmosphere as advocated in Mr. Hellyer's lecture?—EARL STEEFOLD.

[6586].—**Testing Iron Girders.**—Would any of your experienced readers inform me as to the method adopted in testing iron girders, description of means of testing, &c. &c.—LEARNER.

[6587].—**Plunge-Bath.**—Will some one who has experience be kind enough to inform me the best method of forming a suit water plunge-bath below the ground, size about 25ft. by 60ft., and 3ft. 6in. to 6ft. deep? Will concrete do, with clay puddling at back, or is it best to build it in brickwork, with glazed brick lining?—ASSISTANT.

[6588].—**Measuring Paintwork to Windows.**—A little book on Quantities that I have seen commence by telling the reader to "take the total width from out to out of architraves, by the height from under-side of window board to top of architrave. Is this the actual method pursued by surveyors? The resulting superficial area is nearly all glass, which, of course is not painted at all.—PAINT.

[6589].—**Sashes and Frames.**—Will some of your readers kindly inform me what is the standard size in measuring sashes and frames at per foot super, which super less than 15ft.? I am told that if they super less than 15ft., that 15ft. are always charged for! Is this so or not?—DOVER.

[6590].—**Oak and Pitch Pine.**—I shall be glad if any of your readers can tell me the best way of finishing oak and pitch pine work exposed to the weather. If oak is only oiled, I notice that after a year or so the work looks very bad, and it seems to be seldom thought necessary to re-oil.—OMEGA.

[6591].—**Cracks in Concrete Walls.**—Are cracks in concrete walls ever caused by shrinkage of material, or must they manifest some structural defect, such as thrust or roof or bad foundation?—J. F.

[6592].—**Cistern.**—Would any correspondent oblige by stating the strongest manner of constructing a cistern of wood 1 1/2 in. thick, 10ft. 6in. by 4ft. 6in. by 4ft. deep to hold 1,000 gallons of rain water.—R. S.

[6593].—**Gas-Tar Asphalte.**—Would any reader kindly inform the writer what it is that is mixed with gas-tar, instead of boiling the tar, in making asphalte for walks, &c. &c.—MOWERAY VALE.

[6594].—**Floors.**—In a house which has recently come under my notice I find the floors are invariably wet in dry weather and dry in wet weather. The floors are formed of concrete and Portland cement, the level of which is about 5ft. below ground-level. The house stands upon a clay soil, and the land in locality is drained by means of agricultural drain-pipes laid about 3ft. below surface of ground.—W. Y.

[6595].—**Ranges with Firebrick Ovens.**—I should feel obliged if any reader could inform me if ranges or kitcheners with firebrick ovens are to be had at a price that would allow of their being put into good cottages. I have inquired for them at some London houses, but cannot get them. It is for bread baking chiefly that I want them.—J. T.

[6596].—**Measuring Drawings, &c.**—I. Would any reader tell me if he thinks it advisable, in making measured drawings of a building on the spot, to use the mathematically divided paper in squares of twelfths of an inch, in preference to using a scale board, T-square, &c. &c. 2. Which is the shortest way from Stamford to Lyveden (New Building) so as to entail as little walking as possible?—ARTHUR CLAPTON.

[6597].—**London Bridges.**—I should be glad if you or any of your numerous readers would kindly inform me where I can quickly find an account of the construction of any one of the Thames bridges—say, Blackfriars, Charing-cross Railway, or Westminster-bridge; also of the Thames Embankment?—BESRA.

REPLIES.

[6541].—**Canada.**—I would venture to advise "Glasgow" that he weigh well the following facts, which may determine his future course:—1st. That the great Canadian Pacific Railway will not, for years to come, afford any employment for architects. The manner of settlement along the line of some 1,500 miles being very scattered, villages being what Dickens' "Eden" consists of, viz., paper, &c. 2d. The principal cities on the route affording employment to architects being Winnipeg and Emerson, and both of these are amply provided for in the architectural line by my young men, who, having a thorough knowledge of the habits and requirements of the country, and possessing the requisite knowledge, have gone west to touch it for the present, that they may stand a chance in the future. 3d. Our older cities are well supplied, and with men who know what they are about. Even in this immediate neighbourhood there are gentlemen in practice who served their articles with Street, Emerson, Brooks, the late Sir Charles Barry, and Sir Ed. Smurke; but with all it has been a great struggle, and now they have educated a generation of pupils who, by the personal connection of their parents, step into a good practice. It is not of any importance here to be able to boast of English experience, being perhaps, excepting art knowledge, of very little help, rather

hindrance. We have here no quantity surveyors, or any helps of that kind, and so a man must have a very good drilling in the art of writing a clear and lucid specification. I may say that in this province of Ontario the most go-ahead and richest part of this vast dominion of Canada, the feeling of the profession, aided by the judges of the principal courts, is strongly in favour of a bill of incorporation to architects with compulsory diploma—the same as is now required of all practising surveying. I see that you, and my old friend, Harry Hems, contemplates a tour here; but if your correspondent "Glasgow" will take the advice of one who has practised here for 11 years, he will not be hastily advised to come out. May your esteemed periodical long continue to be a weekly treat to—J. ADEE FOWLER, Architect, Toronto, Ont., July 4, 1881.

[6553].—**Top-light for Public-room.**—Read the leading article in *Building News*, Oct. 2, 1874, "On Light." There are formulae for calculating the superficial area for light-openings, but none are to be depended upon. The Pantheon at Rome is lighted by a single eye at the crown of the dome, the area of which gives about one square foot of opening for every 3.3 cubic feet of space in the building. A far larger proportion of opening would of course be necessary in this country; in some picture-galleries it approaches closely to half the area of the ceiling. It is better to have too much light than too little, as blinds can subdue it when too strong; but if insufficient, the ceiling would in all probability have to be renewed. Also use double glazing, to interpose a layer of air of medium temperature between the exterior and interior when required, as large windows and skylights are often a source of cold owing to draught or the sudden cooling of the warmer internal air. For hospital windows, one superficial foot of opening is recommended to every 50 cubic feet, half this should be sufficient for a top-light.—HUGH McLACHLAN.

[6554].—**Decoration.**—As "Occupier" has painted the upper part of his walls, I would certainly not recommend him to have any fancy paper as a dado. The dado should also be of a plain colour and might be painted chocolate. I have seen large sheets of brown-paper used as a dado, it proved very effective having a tinge of green; it has also the advantages of being without gloss, very substantial and economical. A bold yet simple stenciled bordering in black would also be advantageously used above the skirting, and at the junction of dado and upper part of wall.—HUGH McLACHLAN.

[6555].—**Covering Concrete with Plaster.**—Plaster of Paris is far too soft a material to use as covering to a floor. In salenitic cement, plaster of Paris is mixed with ordinary lime, sulphuric acid being set free from the former during the union of the two materials. Possibly this is what "G. B." refers to. I have never heard of tartaric acid being used with building materials, though it is a necessary for baking-powder and effervescent drinks. "G. B." should use as a covering to his concrete-floor Portland cement with two of sharp sand.—HUGH McLACHLAN.

[6556].—**Veneering Round Column.**—I believe the information required is to be found in Gwilt's "Encyclopedia."—HUGH McLACHLAN.

[6557].—**Natural Wood-Finishing.**—Let the marks caused by working with the plane and chisel remain visible, use no sand-paper. When fitted together, the work may be left plain or dead-polished. French-polish and plain varnish may also be allowed, but no staining.—HUGH McLACHLAN.

[6558].—**Staircasing.**—The most recent work on this subject appears to be "Walton's New Treatise and Practical Guide to Staircasing and Hand-railing," illustrated with forty plates. A long critique on this work appeared in the *Building News*, June 8, 1877, in which other works were referred to, the price was not stated. The following works on the subject are by Mr. R. Eddell:—"Carpenter, Joiner, Stair-builder, and Hand-railer," fifty-nine plates with cardboard models of wreaths, thick imperial 4to., cloth, £1 18s.; "Riddell's New Elements of Hand-railing," forty plates, 4to., cloth, 17s. 6d.; "Seventeen Additional Plates to the First Edition of the New Elements of Hand-railing," imp. 4to., 5s.; the first-named work includes the two latter, and the "Carpenter and Joiner," was published about 1874 at £2 5s. Also "Nicholson's Practical Carpentry, Joinery, and Cabinet-Making," revised by T. Tredgold, with plates, 4to., cloth, published at 3s. (in Mr. Batford's recent lists at 16s.; I believe this to be a useful work, and is to a great extent the foundation of the more recent work of Mr. Scott Burn to judge from appearances. "Nicholson's Staircases and Hand-railing," thirty-nine plates, 4to., calf, ss. 6d., published 1829. "Newland's Carpenter and Joiner's Assistant," numerous plates and woodcuts, half bound, £1 18s., published at £2 18s. "Jen's Orthogonal System of Hand-railing," with practical illustrations of the construction of stairs, second edition, 8vo., 5s. post free. Read *Building News*, March 9, 1877, pp. 254 and 255, also March 16, 1877, p. 278 and 279. Any good work on Joinery and Gwilt's "Encyclopedia" also give information.—HUGH McLACHLAN.

[6559].—**Well Pudding.**—Well puddle should be of clay, well tempered with water, sufficient small sand being introduced to bind it together, but not to allow the water to percolate. It should be placed in layers about 9in. thick, and should have not less than two layers, though one correspondent considered that 12in. was sufficient thickness. The thickness of brickwork should be that of a semicircular arch fully loaded of the same diameter as the well. This is not generally considered; the pressure of the earth being forgotten; hence so many wells have the brickwork distorted, with the further result of breaking up the puddle and allowing surface water to penetrate freely.—HUGH McLACHLAN.

[6560].—**Defective Rain Water Tank.**—It the "User" does with his tank as "G. H. G." suggests in your issue of July 15, 4in. brickwork will be sufficient. "The User" should take care that the new brickwork is close up to the old work, and well flushed up at the back.—C. F. M.

[6562].—**Defective Rain-Water Tank.**—To prevent percolation, after a tank has been built, is a somewhat difficult and tedious job; but with such a thickness as 4in. and a little perseverance, the work

ought to be accomplished. I have on several occasions adopted the following method with success:—If coated with cement, take off the cement where the water percolates. Take out the joints as for plugging, and fill up the spaces with tallow, which must be well forced in. Nothing is handier than candles cut to suit length of joint taken out. If there is much pressure, small plug driven in the joint will prevent the tallow from being forced out. The foregoing may seem a somewhat unscientific method of proceeding, but will prove effective if carefully executed, that is if the bricks are not of such a nature as to allow the water to pass through them. The cementing may be made good after the percolation has been stopped; but it is quite useless to attempt doing so before.—Buck-LAYE.

[654].—**Disputed Contract.**—Having seen the question asked by "J. McD." and having had great and lengthened experience in the class of work he inquires about—i.e., concrete floors—and, although he asks for a direct answer from Mr. Hugh McLachlan, we trust he will pardon us for taking the liberty; but we thought it would certainly do him no harm to have the opinion of more than one party. We notice "J. McD." says that "the ground on which this floor is formed is soft and damp, and that the concrete must be 2in. thick." When we have any floor to lay 2in. thick, whatever may be the nature of the ground on which it is laid, the exception being rock, we insist upon having not less than 5in. hard debris or ballast put down and well rammed. If the bottom be very soft, a greater depth than 5in. But we may say, regarding the concrete, that we never on any account whatever, use sand in floor work; one reason being inability to procure, except at rare times, sand of sufficient grit and cleanliness to suit the work, and another and better reason is that there is much better material to be had for a little seeking. Sand is too globular in form to make good concrete, and by its use repeated failure will be the result. We recommend the use of riddings, though 4in. m. sh. of any hard grit which has passed through a stone-crusher, thus destroying all round arrises and making them sharp, and of good key to the cement; great care to be exercised in proper proportioning, and in mixing on boards by repeated turnings both dry and wet. It is utterly impossible that a good floor can be made on soft ground without any stone bottom. The cement, in all probability, has been good, but the sand probably has been very dirty, possibly loam or clay mixed in among it. Any kind of dirty matter tends to destroy cement. We should certainly say that the fault lies with the party who drew out the specification. He certainly seems not to know anything about concrete floors, and it also seems by "J. McD.'s" description as if the "clerk of works" had some animosity against the builder, who seems to have carried out the specification as well as it would allow him. The great mischief concerning concrete flooring is that persons are set to do this kind of work, and parties also make specifications of same who really know nothing whatever of the nature of the substances with which they are dealing. There is as much art to be used in laying a concrete floor as in any other trade, and it is an art very few persons are acquainted with. It is impossible to make a good concrete floor unless you have materials which are perfectly clean and hard, with sharp arrises to key, the best Portland cement obtainable, and a thorough knowledge of what you are about to do. This does not seem to have been the case in this instance. We certainly think the lay of the floors is not to blame.—ECCLES CONCRETE.

[6561].—**Disputed Contract.** Whoever employed the carpenter in the first instance has I consider little to complain of. He was, to judge by such an example as a "2in. concrete floor," incompetent. Second. Would any sensible person expect the carpenter to act fairly as clerk of the works after being defeated in tendering?—If he did, he would be more than human. The clerk of the works did not do his duty, if he permitted the work to be done wrongly and badly without strong protest. The opinion of "J. McD." that it is "unreasonable to hold the contractor responsible in the absence of a proper specification for a properly-made floor," and faults should have been remedied as they occurred "by removing the objectionable materials and works, or if the contractor became refractory, suspend the work till it was done" are correct. I consider the contractor cannot be made answerable for the floor or for the value of the materials used therein. Such a floor is bound to wear out speedily, even if executed with the best materials. To say that the Portland cement is to be of "best quality" is not enough for a specification. The other floor mentioned is not an instance, it had solid foundations. As to other matters, deductions can be made for lower walls or other omissions from plans or specifications unless a written authority can be produced or the alterations are not disputed.—HUGH McLACHLAN.

[6563].—**Smoky Chimney.**—If there is a blow-down, I should recommend "Down Draught" to use one of the cowls made by Byle and Sons, which prevent this. The plates are fixed horizontally, and the outer casing is made with sloped sides of > 90°, the effect of which is to cause a slight vacuum to be formed at the smoke outlet. One of these cowls would not cost much, and in all probability would answer the purpose. If there are any chimneys or buildings close which disturb the escape of smoke, simply lengthening of the pot will often effect a cure, as chimney-flues act as siphons, the short flues supplying air to rooms with the taller chimneys.—G. H. G.

[6564].—**Excavation.**—Each depth of 3ft. should be entered in separate items, owing to the increase of cost at the greater depth, the nature of soils should also be noted in bill. The rule given by "G. H. G." for the cubic contents is another and perhaps a simpler method than that usually given, which is, multiply the square of the diameter by 7854, and then by the depth.—HUGH McLACHLAN.

[6567].—**Bosses and Dogs.**—I believe bosses in plumber's work to be another name for solder dots, used for fastening lead cheeks to dormers, &c., and much fancied by some architects of the Queen Anne school. Have also seen the term used for the finishing or covering the ends of the wood rolls in laying flats, &c. I believe the term bossed joints is sometimes used for blown joints; if I am incorrect, some of the plumbing correspondents will perhaps rectify the error. "Dogs" is a term sometimes used for the hook irons let into the stone jambs of church and other doors to hang the hinges by

when no door-frames are used, they are generally divided into two branches with the ends turned down to catch in the stonework.—HUGH McLACHLAN.

[6568].—**Measuring Buildings.**—It is not necessary to have board and squares on the spot for plotting, though the plan is to be advised when great correctness of detail is wanted, and is often done for taking correct drawings of old buildings when competing for the medals given by the Royal Academy and the architectural societies. It is seldom done in measuring for alterations and additions to old buildings, as plotting on the spot though more exact requires more time. In measuring plans it is always necessary to have diagonals, though many avoid them if the rooms appear square. For correct work it is advisable to see that the plans can be divided into triangles where possible. For sections and elevations, heights only are generally necessary. Practice will help "Student" more than a column of letterpress.—HUGH McLACHLAN.

[6569].—**Measuring Buildings.**—I should advise "Student" to have a small drawing-board and square if he desires accuracy. A small square for testing the angles and a plumb-bob are useful and necessary in taking heights, the profile of eaves. For rough sketches, the dimensions may be taken in a dim-noson book, being careful to make the rough eye-sketch as nearly correct as possible, and to refer all minor dimensions to a baseline one side of the building, or to a centre line.—G. H. G.

[6568].—**Measuring Buildings.**—Set the dimensions of the building down accurately in your notebook; also by making a rough drawing on the spot, will, I think, be much better than carrying your board and squares about with you. You can then make a scale drawing of the building at home.—FRED. J. FREEMAN.

[6575].—**Parian Cement.**—I should recommend "Old Subscriber" to try one of the silicate paints—a light tint of colour could be applied. The Silicate Paint Co. and the Sanitary Paint Co. both supply paints for this purpose.—G. H. G.

[6577].—**Graphic Statics.**—I beg to inform "E.D." that one of the best elementary treatises I have seen is G. Sydenham Clarke's "Principles of Graphic Statics," published by E. and F. N. Spon, Chancery Cross. Another recent and more elaborate treatise on the subject is "Chalmers' Graphic Determination of Forces in Engineering Structures," published by Macmillan and Co. Both of these works have been noticed in the *Building News*.—G. H. G.

LEGAL INTELLIGENCE.

THE OLD ROMAN CAMP AT WALLINGFORD.—(Before Vice-Chancellor Hall.)—The Attorney-General v. the Corporation of Wallingford.—This was an action to restrain the Corporation of Wallingford from destroying an old Roman camp at Wallingford, which was used as a recreation ground, and was described as being an interesting relic of antiquity. The corporation appeared last Friday and submitted to a perpetual injunction upon terms which had been agreed to.

IN RE CHARLES BARTON.—The bankrupt, described as a builder, of Golborne-road, Westbourne-park, applied last week in the London Court of Bankruptcy for an order of discharge. The adjudication occurred in July, 1878, and at a meeting of creditors, recently held, a resolution was passed testifying that the failure had arisen from circumstances for which the bankrupt could not justly be held responsible. There was no opposition, and Mr. Registrar Pepys granted the order.

IN RE S. E. ADAMS.—The debtor, who recently presented a petition for liquidation, was a builder and slater carrying on business in Belvoir-road, Lordship-lane, his liabilities being returned at about £21,000 in the aggregate, with assets £23,500, subject to realisation. Mr. Marsden now applied, with the concurrence of creditors, for about £7,000, that Mr. Lucas, the receiver, should be also appointed manager of the estate, the object of the proposed appointment being the completion of pending contracts. Mr. Registrar Pepys granted the application.

IN RE W. SMEETON AND SONS.—The debtors, William Smeeton, John Smeeton, and William M. Smeeton, who have presented a petition for the liquidation of their affairs, are plumbers and sanitary engineers, carrying on business in Whitfield-street, Tottenham-court-road, and Moorgate-street, under the firm of W. Smeeton and Sons. Their liabilities are estimated at £20,000, with assets £3,250. Mr. Registrar Pepys on Tuesday appointed Mr. J. Cunliffe, accountant, receiver of the estate, and granted an injunction to restrain proceedings in several actions.

ALLEGED DEFECTIVE CONSTRUCTION OF A BUILDING IN HULL.—On Tuesday afternoon, Mr. J. J. Thorne, the Hull borough corner, held an inquiry into the circumstances attending the death of a child named Sarah Hannah Bowman, who was killed on the 4th inst. through the falling of a chimney at the manufactory of Messrs. Thacker, brick and tile manufacturers, Gibson-street, Hull. Mr. Thomas Thacker, a partner in the firm of Thacker and Co., produced the specifications and other documents for the erection of the chimney and other buildings. The plans were prepared by Mr. R. Wilkinson, architect and contractor, Newland, and the contract was signed by George

Sargent. Both men witness had known for years, and had confidence in them. The chimney, which was a little over 70ft. high, was erected about a foot and a half from the position indicated on the plans at witness's request to Sargent, so that more room might be obtained for an office. The concrete foundation had been in all the winter. It was stated by Mr. Wilkinson that the plans were altered several times, and that the foundations were laid according to one plan, and the chimney erected from another. One plan was prepared to suit the concrete which had been put in in the period which had elapsed since the previous plans were sent in.—Mr. Thacker's examination was resumed. He said that whilst the chimney was building his attention was called to the fact that it leaned. He told Sargent so, who said that he would see differently when the scaffolding was down, and that he knew how to build a chimney. The chimney was finished about nine days before it fell; but in the mean time he saw Sargent at Newland, and he asked him to get a big saw for the purpose of cutting some grooves into it to make it straight. Sargent had always insisted that it was plumb. The saw was not used. Witness took no means to ascertain whether or not the chimney was perpendicular, but left it to Sargent, who always asserted that it was correct.—By the Coroner: Sargent did not work at the chimney after it was 15ft. or 20ft. high. Witness had not heard of the architect complaining of the building. Had always been satisfied with Sargent's work before the building of the chimney, and if it had not fallen he should have been satisfied with the work. He did not recollect meeting Sargent and hearing him express his doubts as to the chimney being all right.—Mr. J. Baynes, borough analyst, deposed to analysing a sample of the mortar which had been used in the erection of the chimney. He thought it fair mortar. He did not find the mortar had adhered to the bricks, but that he could not account for it. It was more a question for a builder than for him to judge of. It was fair mortar, but he analysed a portion of the concrete foundation, than he should be rather inclined to speak of the cement as not being of good quality.—Other testimony having been adduced, the inquiry was adjourned.

NUISANCE FROM GASWORKS.—Among the cases which Mr. Justice Field had before him on Wednesday was that of "Bonner v. the Governors of Sutton Hospital." This was an action of nuisance. The plaintiffs are builders at Godalming, and had purchased some land on which they had erected some houses. The defendants, who are the authorities of Charterhouse School, are owners of some adjoining land, on which they had erected gasworks for the purpose of supplying the school buildings with gas. James Bonner, the plaintiff, stated that in 1869 he purchased the piece of land and built houses on it. One of the Charterhouse masters became tenant of one of them. Gas was first made in September, 1875. After the tenant in question left the house remained untenanted for twelve months. The smell from the gasworks was very bad. Mr. Collier, manager of the Godalming Bank, and estate agent, said that the property in question was put into his hands to let in March, 1880. He spent £15 in advertising. He was of opinion that the gasworks seriously depreciated the property. On cross-examination, he said there were two or three smells at the place in question, one arising from the drainage. Several other witnesses stated that they had observed a smell of gas. The manager of the Godalming Gasworks was one of the witnesses for the plaintiffs. Mr. Clarke, for the defendants, contended that the nuisance complained of had been greatly exaggerated, and called several witnesses in support of this view. These included Mr. Louis M. Stuart, the tenant of the plaintiff's house, who said that he took it first at £30 and afterwards at an increased rent of £45. On the average, there were 16 boys boarding in his house. He felt no inconvenience from the proximity of the gasworks. After some time the jury intimated that they had made up their minds that the gasworks were a nuisance; but the learned counsel for the defendants not agreeing that the verdict should pass against the governors alone, tendered as evidence a scheme for the regulation of Charterhouse School for the purpose of showing that the governors were bare trustees; also a statute passed to determine the constitution of the governing body under the Public Schools Act. The learned counsel for the plaintiffs then withdrew the case as against the governors, and judgment was given against Dr. Haig Brown, the head-master, the mode of assessing the damages to be settled by the learned Judge in case of difference between the counsel on both sides. Mr. Jeune then asked for costs on behalf of the governors, and the learned Judge, after argument, reserved the question.

The operative masons of Glasgow and the suburbs decided, on Wednesday week, to accept the employers' proposals and return to work on the conditions that the rate of wages shall be raised from 6d. to 6½d. after August 1st.

Our Office Table.

AN American correspondent writes:—"The best wash for covering walls, &c., that I have ever heard of is made as follows: For one barrel of colour wash—1½ bushel white lime, 3 pecks hydraulic cement, 10lb. umber, 10lb. ochre, 1lb. Venetian red, 1lb. lampblack. Slake the lime; cut the lampblack with vinegar; mix well together; add the cement, and fill the barrel with water. Let it stand twelve hours before using, and stir frequently while putting it on. This is not white, but of a light stone-colour, without the unpleasant glare of white. The colour may be changed by adding more or less of the colours named, or other colours. This wash covers well, needing only one coat, and is superior to anything known, excepting oil-paint. I have known a rough board barn washed with this to look well for five years, and even longer, without renewing. The cement hardens, but on a rough surface will not scale."

A RAILWAY tunnel through a volcano has been constructed, probably for the first time, in the southern island of New Zealand. Among the extensive volcanic phenomena of the island are the extinct volcanoes upon the Banks peninsula, east of the town of Christchurch. This peninsula, now only connected by bands of low and recent deposits with the mainland, was once a complete island, only formed by volcanoes which rose up from the bottom of the sea. The special construction of such an extinct volcano has been made visible by a tunnel of 2,620 metres length upon a railway between Christchurch and Littleton, which has pierced through the walls of a volcanic cone, and thus has laid bare its structure of successive streams of lava and beds of scorie, ashes, and tuffe, which are again intersected by dikes of younger volcanic rocks.

LAST week the Lord Mayor opened a Free Gallery of Fine Art for South London at the back of the free library, 143, Upper Kennington-lane. It is a loan exhibition, comprising works by Mr. C. B. Birch, A.R.A., Mr. E. B. Stephens, A.R.A., Mr. A. Elmore, R.A., Mr. G. F. Watts, R.A., Mr. T. Woolner, R.A., and Sir Frederick Leighton, P.R.A., who contributes three pictures. There are also interesting specimens of sculpture, including a group of marble busts lent by Sir John Bennett. In the centre is Mr. Gladstone, with Homer and Shakespeare on his right, and Gambetta and Oliver Cromwell on his left. Some fine examples of Wedgwood wares are also worthy of mention.

It is intended to open a museum of architectural, building, and sanitary appliances at Inverness, next month. Inverness, the capital of the Highlands, and the business centre of a very extensive district, is considerably removed from manufacturing towns, and the architects and builders have difficulty in bringing before their clients examples of articles specified or wanted. An exhibition, therefore, of such articles as are constantly wanted in the building and other allied trades cannot fail to prove beneficial alike to exhibitors and to the public. Central premises have been secured in the town, and will be properly fitted up for the reception of exhibits. The secretary is Mr. Daniel Warren, of 46, Union-street, Inverness.

DR. W. DOMETT-STONE gives the following directions for the preparation of chlorine, to which, of all the disinfectants at our command, most chemists give the preference:—Mix two table-spoonfuls of common salt, two tea-spoonfuls of red-lead, and half a wine-glassful of strong oil of vitriol in a quart of water. The bottle should be kept cool, tightly stopped, and in a dark place. A little of this fluid exposed in a saucer, sprinkled on the floor, or soaked in sheets of old linen and hung about the rooms, rapidly deodorises and destroys effluvia. In a paper published in the *Lancet* some years ago, Dr. Goolden spoke of this disinfectant as the most powerful and economical agent for eliminating sulphide of hydrogen from the atmosphere, as well as from all organic matter in a state of decomposition or putridity. He found it to be the most simple, the least expensive, and the most successful of all the disinfectants that had come under his notice.

THE death is announced of a prominent

Massachusetts architect, Mr. Alexander R. Esty, who died at his home in Framingham, July 2nd, aged fifty-four years. Mr. Esty received his early professional training in the office of the late Richard Bond, of Boston, and has practised in and about that city for many years, with eminent success. Among his principal works are the Union Congregational Church on the corner of Columbus-avenue and West Newton-street, the Harvard-street Baptist Church in Cambridge, Grace Church at Newton, Emmanuel Church, on Newbury-street, Boston, the new station of the Boston and Albany Railroad in Boston, the buildings of the Colby University, Waterville, Maine; the State Normal Schools at Framingham and Worcester, and the University of Rochester, N.Y. For the past five years he had been Superintendent of Construction to the new United States Building in Boston, and was a member of the special commission appointed by the President last winter to prepare a report in regard to the proposed Congressional Library at Washington.

THE United States Census Bureau has undertaken an important work in collecting information relating to quarries of building, flagging, ornamental, and other kinds of stone in all parts of the country. The inquiries cover not only the location and extent of the stone, but the amount of capital employed, the annual output, methods of quarrying and dressing, number of hands employed and wages paid, methods of transport and their cost, number of structures of all sorts made of each sort of stone, and so on. Duplicate samples of rough rock, in the shape of 4in. cubes, are being got from each quarry for physical and chemical examination. This part of the work is in charge of Dr. Hawes, and one object is to ascertain how each stone will act under different conditions as to temperature, &c. A stone which answers admirably for building purposes in Florida quite fails in New York, and *vice versa*. As an example of various interesting facts brought to light, some samples of rock (a kind of sandstone) were received from the only quarry in Florida, and analysis showed that the stone contained about 16 per cent. of phosphoric acid, so that it is a great deal more valuable as a fertiliser than as a building-stone. Sandstones and limestones which have never been thought worthy of any better place than in the foundation or wall of some rough structure, have been smoothed and polished, and found suitable for the most elaborate and elegant work. Dr. Hawes is convinced, from the samples already received, that no country is better supplied with stone for both building and ornamental purposes than the United States, and he considers that when the results of the present inquiry are fully known, importation of stone from foreign countries will be given up.

ANOTHER of the remaining churches in the City of London, which were erected after the Great Fire in 1666, will soon have passed away. The church of St. Mathew, Friday-street, is about to be demolished. It appears that the earliest record of the church, before its re-erection, is from 1322, when the patronage was vested in the Abbot of the Convent of Westminster: the establishment, however, was, in the language of the rescript, "dissolved," and Westminster created a Bishopric by Henry VIII., the living of St. Mathew's being conferred on the new diocesan. Subsequently it was bestowed by Edward VI. on the Bishop of London, who at the same time abolished the Bishopric of Westminster. After the fire above referred to, by which this church, as well as many others, was destroyed, the parish of St. Peter, Westcheap, was joined to it in 1685. The altar-piece and Communion-table, and other portions of the church, exhibit some noteworthy specimens of wood-carving.

THE United Kingdom Fisheries, Limited, is being formed for the purpose of supplying the public direct with fresh fish at all seasons of the year at a price much lower than that at present charged, and without the intervention of the middleman. The company have secured the business and services of Mr. Samuel Hewett, of Billingsgate Market, the well-known fish-salesman on commission, who has a large connection among consignors of fish, and has had many years' experience in every branch of the trade. The capital is £200,000, and the first issue £100,000 in shares of £1 each, payable 2s. 6d. on application and 7s. 6d. on allotment.

THE BUILDING NEWS.

LONDON, FRIDAY, AUGUST 5, 1881.

THE NATIONAL COMPETITION
DRAWINGS AT SOUTH KENSINGTON.

THE exhibition of prize drawings at South Kensington in connection with the National Competition is a fair yearly record of the progress made in the art schools of the United Kingdom. This year thirteen gold medals and fifty silver medals, besides a larger proportionate number of bronze medals and book prizes, have been awarded, in addition to the honorary awards to students in training-class, and national scholars at South Kensington. Edinburgh, Birmingham, Liverpool, Nottingham, Bradford, Coalbrookdale, Salisbury, and Dover are represented on the list of towns which take the gold medals this year, and scanning down the silver-medal list we find prizes awarded to students of Brighton, Southampton, Birkenhead, Barrow-in-Furness, Macclesfield, Cirencester, Kidderminster, Aberdeen, Sheffield, and a few other towns, in addition to those already mentioned. In the present notice we confine ourselves to the architectural and decorative designs and drawings. In these departments of art, Nottingham, Coalbrookdale, South Kensington, Salisbury, and Dover, carry away the highest honours, and other places deservedly rank high. The architectural work of the year is perhaps equal to that of any former period. Gothic design still occupies a prominent place in the schools, though several well-directed efforts in Late Domestic and Renaissance are to be noticed. We have had occasion before to remark the very ambitious kind of subjects set before students, and we must again repeat our objection to the florid types of architecture which students select, as calculated to lead to a mistaken view of architectural design. Why always select a cathedral for the principal gold-medal design? Might not a more ordinary kind of building, a town hall, a museum, or a library and art gallery exhibit the qualities required in the architecture of the present day more usefully? If architectural design is to be taught as a living useful branch of education, it might be better exercised in buildings of every-day requirements instead of in a cathedral, the object of which seems to be to teach the student the historic type and styles, though for this purpose measured drawings of old work would be more useful.

The architectural drawings this year are numerous, and perhaps rather above the average. The gold medal goes to Mr. Herbert G. Smith, of Nottingham, for a design for a cathedral. As we have said, the work is marked by that high-reaching kind of effort we have before discountenanced in these competitions. The design is florid to an excess, and the west elevation suffers from a crowding of gables and buttresses, despite its well-drawn and careful detail. What we most find fault with is the want of proportion and outline which generally characterise these ambitious attempts of students. Mr. Smith's design, clever as it is, is spoilt by an effort to condense as much drawing as possible in a certain compass, and the result is less effective on that account. A very spotty appearance is given to the drawing also, by the manner the stonework is hatched, and much loss of breadth is due to this cause. The plan is cruciform, with a central lofty tower and spire, and two west towers, also having spires.

There is a lady-chapel and library on the north side. The proportion of the plan is faulty, and the eastern and western arms have nearly the same length, six bays in the choir and seven in the nave. The flank elevation shows tall, narrow aisle windows elaborately traceried, and the lofty stilted proportion of this side is not agreeable. Nor can we admire the arrangement of the west and transept gables, with the elaborate rose-window under an inclosing arch; there is generally a cramped appearance in the bays, and the buttresses and pinnacles are crowded and lumpy in the towers. The east front is more successful, and the large, lofty Geometrical window has a dignified effect. The detail and tracery are firmly drawn, a sort of German character pervades the tracery, and much credit is due to the author for undertaking so laborious and difficult a subject.

Another gold medal has been awarded to Mr. Frederick W. Woodhouse, of South Kensington, for a series of designs for church-porches—a deservedly bestowed reward. Five drawings are sent. One shows a Late Perpendicular porch, covered externally with panelling, and having a stone roof, and an open-panelled stone drop-arch, dividing the porch into two bays. The elevations are well proportioned, though the details of capitals and base-mouldings are clumsy. Another sheet of three designs, in Early English, Geometrical, and Flowing Decorated, accompanies the set. Of these, the first two are the best; the latter has very heavy open-angle pinnacles, too large for the front. Sections are given which show pierced and traceried ribs beneath the stone roofs. The porches, from measurement by the same author, represent drawings of examples at Middleton Cheney, and St. Peter and St. Paul's, Chacombe, both in Northamptonshire. These are divided into bays, with stone divisional ribs or drop arches, and are interesting types. The porch of St. Mary's, Bloxam, Oxfordshire, is groined, and has a Norman inner doorway, enriched by zigzag; another at St. Andrew's, Sandon, Essex, shows a heavy brick porch with straight embattled parapet and large corner buttresses. Two open-timbered porches, one at Terling, Essex, Perpendicular in style, and the north porch of St. Margaret, Margaretting, in the same county, 15th century, show admirable examples. The details are carefully drawn.

A bronze medal goes to Mr. Hedley J. Price, Nottingham, for a design for cathedral. This work noticeably contrasts with the gold-medal design. It has a long-drawn nave and choir with Lady-chapel, the crossing being nearly central. A baptistery and chapel with apsidal ends are planned as a transept to the eastern part, and there are three towers. A commonplace Perpendicular treatment prevails, and the repetition of segment-pointed windows gives rather a stiff and hard effect to the details, which are also weak. We notice the flying buttresses are much too heavy for the pinnacles carrying them. A few other designs for a cathedral are hung which do not call for criticism; some of them are poor copies. A design for a church is the subject of some drawings. Mr. Alfred Williamson, Leeds, receives a book prize for a rather poorly proportioned design, but the alternative drawing for west doorway is well executed, and the details and section of roof are meritorious. A better design receives the same prize. The author is Mr. A. Hemingway, Barrow-in-Furness. The octagon and spire over crossing, and the west towers and gabled treatment, show some good points.

The same student wins a bronze medal for architectural details of St. Mary's Abbey at Barrow-in-Furness, illustrating the chapter-house, a building four bays in length and three wide. Another bronze medal is taken by

Mr. Alex. Pope, of the same town, for details of the Priory Church of St. Mary's, Cartmell, a Perpendicular structure with a peculiar central tower set diagonally. The carving to stalls is a good example. The drawings are boldly executed in line, and the Perpendicular window of nine lights is a feature. Mr. T. Smith, of Glasgow, receives a bronze medal for a design for an episcopal church. There is considerable boldness in the west-front, the lofty lancets and wide buttresses are broadly handled, and the tower and spire are well proportioned. A series of gables relieve the side. The drawings are in ink, but are rather poor. A bronze medal is won by Mr. W. Sydenham Richards, Cardiff, for a design for Colonial Houses of Parliament, a large and boldly drawn design, in French Gothic, with a lofty centre and flanking towers, the latter crowned by flat bulbous-shaped cupolas. The plan is quadrangular, disposed in a rather ambitious style. Mr. Richards is also the recipient of a book prize for a design for a picture-gallery and museum in the same style. We cannot commend the want of balance so conspicuous in the front elevation, where a central tower of some height rises between masses of building of very unequal heights and character. Both these designs we have seen before among those sent in for the Institute prizes. Merit there undoubtedly is, the stiff foliage-pinnacle-and-crochet style, if we may so designate it, has been ably carried out, with all the extravagances sanctioned by votaries of this type of eclectic Gothic; the drawing of detail has little in it to find fault with, though we cannot help regretting so much clever draughtsmanship has been expended on ideal architecture.

Domestic architecture is illustrated by a clever sketch design in pencil for a country mansion, in the Elizabethan style, by Mr. Frank Chester, West London, the plan of which is well conceived and grouped. The author takes a bronze medal. A similar reward is won by Mr. Haywood Rider, York, for a design of villa, in which red brick and half-timber work has been introduced with much feeling and good grouping in a Domestic style. It has a fairly-designed plan, and the drawings are neatly coloured.

Among other recipients of prizes for architectural drawings we may here mention a book reward is won by W. Morris, a student in the Training School at South Kensington, for an artist's residence in red brick, Renaissance in style, showing some good detail; and another to S. H. W. Llewellyn for two clever designs for public elementary schools in red brick and timber, effectively treated and coloured. The one-storied design is the best. This author is the winner of a silver medal for a chalk drawing. A bronze medal for a well-drawn elevation of an Italian residence goes to A. Whitehead, a training-school student, who exhibits an effective design, though the plan has many defects in it.

The drawings from measurement include a few carefully-tinted of a portion of the river-front of Greenwich Hospital. The silver medal is awarded to Fredk. W. White, a student in training class at South Kensington. The portion shown is the front of Charles II.'s building. The single order of Corinthian columns, with its lofty attic, are neatly drawn and shaded in sepia, if we overlook weakness in the detail. A bronze medal is given to the same subject, and J. Somerscales's drawing is equal, if not firmer, in the detail of the order and the mouldings. The three book-prize drawings also compete well for the honour, and the subject was a good one to exercise a student's knowledge of Classical orders and shading in monochrome. In another part of the room we see a few ink drawings of old work. G. F. Henny, Birmingham, takes a

bronze medal for some details of wood and ironwork from Aston Hall and other places. The chimney-piece and staircase are well drawn and tinted, and the ironwork details from Hampton Court are worth notice. J. Feek, Norwich, obtains a book prize for a measured drawing of oak screen, Elizabethan in date, curiously carved with pilasters.

We pass on to notice the designs for wall-decoration, and here a little more critical taste might be usefully exercised by those who have the management. Ornamentation is made apparently the measure of the ability of the student, and he who can crowd the most figures of graces, fountains, and scrolls in a given space, stands the best chance. The silver medal design by Thomas Smith, Coalbrookdale, for a side of a room in painted and majolica tiles, is worthy of the honour it obtains; the arabesques which form panels between pilasters exhibit some taste, and the colouring in a low key of browns and neutral greens is in good harmony. George W. Shepherd, of the same place, fairly obtains a silver medal for a design for music-hall decoration. The drawing takes the first prize of the Plasterers' Company. A rather weak pencil elevation, slightly shaded, shows the wall, divided by pilasters into panels, the latter having figures in the centre, with musical terms introduced in medallions in the dados of pilasters. The large scale drawing of panel is creditable; the figures in the centre and the scroll-work are well distributed, and the ornamentation, which is in Italian Renaissance, is refined. The frieze is broken by pediments, and there is a bold coving, but no section is shown, as there should have been. Another silver medal goes to the second prize of the Plasterers' Company by A. Hall, Cirencester, for the same subject—and here we regret the judges should have placed this design on an equal footing with the last-named, which is far its superior as a work of art. The panels are laden with coarsely-designed heavy scrolls, the centres having a group of ill-drawn figures representing the Three Graces. Vainly does the eye seek rest; dados, pilasters, frieze, and all are crowded with ornament, and of a kind devoid of all sense of gradation. The heavy scrolls in the panels overpower those in the dado below, instead of being lighter. The designs for mosaic floor are highly creditable to their authors. The silver medal drawing by James Thomas, of the Architectural Museum, Westminster, is well worthy of the distinction. The design shows a large circular panel in a semi-Greek or Byzantine style divided into radial compartments. The square border is filled with a guilloche pattern, and the colours are pleasingly combined. Much ability is shown in the coloured detail of one panel. The panelled arrangement with medallions, comprising emblematic figures by E. Jarratt, Coalbrookdale, receives also the same reward, and exhibits much merit, particularly in the colour arrangement. Meritorious also is the bronze-medal drawing by William Stevenson, Edinburgh, for a tessellated pavement designed in the style of ancient Celtic work, and the colouring is very quiet and pleasing, and we must not omit to refer to some excellent studies of designs for Italian mosaics, by James F. Mein, Kidderminster.

The designs for wrought-iron work show a few clever studies. The silver medal this year is won by Omar R. Albrow, Yarmouth, for a study of wrought-iron panels in which the material has been sensibly treated. The *motif* is a conventional adaptation of natural stems and leafage, with flowers here and there, and the author has succeeded in giving a freshness to the work. The bronze-medal gates, by Francis C. Jessop, Rotherham, is spoilt by an overcrowded effect, but the india-ink drawing is well executed.

John H. Marston, Great Yarmouth, also wins a bronze medal for a spirited and freely-treated design for gates, of more merit than the last; and Joseph Hope, Durham, sends a design (bronze medal) for the ironwork of a church-door, which has been freely treated, the scrollings filling up the pointed head of the door and the spaces between the hinges. The drawing is carefully outlined. Ernest Thickett, Sheffield, wins the same prize for wrought-iron gates, fairly treated; and a book prize is taken by McCulloch, Belfast, for a design in which the gate-piers of brick are connected by an iron archway and centre lamp, and with gates in which some pleasing upper panels appear. Another bronze medal has been awarded to W. B. Pratt, of the Training School, for a design spoilt by confused detail and over-elaboration, a fault from which most of the designs suffer.

Passing to the designs for wall-papers and textiles, the works hardly appear equal to those of former years in quality. The Owen Jones's competition has brought out a great deal of talent in one department, though none of the designs this time has been considered good enough to deserve the silver medal. Rose Phillips, Northampton, wins a bronze for a pleasing geometrical arrangement of leaves with flowers of rose tint on a grey ground, intended for a wall-paper. J. Clews, Nottingham, is also a winner in the same rank, the paper having a dark chocolate ground with bunches of yellow flowers. Of other bronze medal designs from Nottingham we note one by H. Williamson, in which the poppy flower has been introduced on a dark ground, exceedingly rich. Another, by E. Davies, in which the dark ground is covered with a leaf of the nasturtium order; also by A. Middleton, a black ground with leaves and flowers of a russet shade. Two other designs (book prizes) must be noticed, one by J. Jackson, Manchester, in which shades of green and pale foliage are pleasingly arranged, and the other by Rosa Carter, South Kensington, a delicate white flower on a grey ground naturally disposed. The designs for carpets are few. Salisbury this year wins the gold medal, the student's name being Gideon Fidler. An arrangement of leaves and flowers, thoroughly geometrical, in which shades of green predominate, is the characteristic of this design, and the author has produced a pattern eminently suited for textiles of this description. A kaleidoscopic regularity in the figures prevails. John H. Lamb, of Kidderminster, wins the silver medal for a clever adaptation of leafage. The ground is entirely covered and is of a dark colour, while the prevailing tints of the foliage are red, blue, and green. Mary Denley, Lambeth, also sustains her ability by winning a silver medal. The other prize drawings are creditable. Lucie Sheppard, Northampton, shows a conventional treatment of foliage, the colouring being good; a book prize goes to Janet M'Goun, Edinburgh, for some chaste wall-decoration. Octavia Liberty, Nottingham, receives a gold medal for a conventionalised Italian design for wall hanging, in which flowers and shields are introduced. The designs for lace are not equal to those of last year, and we find no remarkable pattern. Agnes Dickeson and Mary Joyce, Dover, are the winners of gold medals for designs for pillow-lace; and Margaret Douglas, Birkenhead, wins a silver medal for needlepoint lace borders, which show a want of clearness in the pattern. W. Bucknall, Nottingham, also secures a silver medal for a clever adaptation for a lace curtain; another design represents a handsome plastron of Honiton lace. L. Kirk receives a silver medal for lace-curtain design, and T. Dutton, A. Rowland, and Blanche Story, S. Birmenshaw and Meldrum do honour to Nottingham as winners of prizes. Designs

for muslins, are not numerous. G. Fidler, Salisbury, wins a bronze for a design for damask. Among other designs of a different class we may refer to some painted pottery, the best design of which is a chastely-painted plate, Persian in character, which receives a bronze medal, and another for a tazza. Alma Hodge, S. Kensington, and W. Nicholas, Coalbrookdale, and Edith Robinson, Bloomsbury, win bronzes. A few designs for fans, one a conventionalised landscape, are to be seen; and we notice designs for salt-cellar (J. Fisher, Sheffield), and for a silver candlestick (A. Winterbottom, of the same town), which have received silver medals; and J. Bradburn, Coalbrookdale, well known as a successful competitor in this class of design, this year receives the gold medal for design for a seven-branched candelabrum.

Drawings of ornament from casts are, as usual, numerous, and a few clever studies are to be noticed on the screens. The rewards here, as in some other classes, do not appear to have been bestowed purely on merit. C. Crane, Hull, has a book prize for a well-drawn monochrome study of frieze, and J. W. Elliott, Preston, for a monochrome in oil of flat ornament, creditably executed. Barbara Jackson, Preston, contributes a water-colour monochrome drawing of folial ornament. Silver medals in the same class are awarded to R. C. Daws, Bradford, for an ornament in monochrome from the cast, representing an acanthus leaf acroterium; to E. Marsden, Chesterfield, for a drawing in water-colour of a folial ornament; and to W. J. W. Stubbs, Bradford, for a Byzantine panel of sculptured foliage and birds. Several bronze medals are given to drawings from the cast in oil and water-colour, to which we may refer again.

We can only refer here briefly to those who have won distinction in oil and water-colours, reserving a more complete notice of them till next week. Of studies from the Antique in monochrome oil-colours, James C. Michie's work (Edinburgh) has been awarded the honour of a gold medal; and a similar distinction has been conferred on Robert E. Morrison, Liverpool, for a group in still life; on W. Breakspear, Birmingham, for an oil-painting of figure from the nude; and upon A. Hitchens, South Kensington, for a chalk-drawing from the nude model. Gold medals are also given to Mary H. Surene, Edinburgh, for a chalk-drawing from the antique; and to Frank Suddards, Bradford, for a group in water-colours. In the same classes, silver medals have been bestowed upon Thomas Alison, Edinburgh, for a monochrome-oil figure from the antique; Constance L. Anson, South Kensington, for a chalk study from life; Elizabeth Bark, Liverpool, for an oil group; W. Beeching, Brighton, for a chalk figure from the Antique; W. Busk, South Kensington, for the same; Mary E. Carter, Bloomsbury, for still-life group in water-colour; Thomas C. Castle, Birkenhead, for a water-monochrome of horse's head, from the Antique; Arthur Ellis, West London, a chalk drawing of head; John K. Fergusson, Edinburgh, for a chalk figure from Antique; Annie Hastling, Manchester, for oil-colour group; Rowland Holyoake, West London, chalk drawing from Antique; T. M'Keggie, Aberdeen, ditto; Samuel May, West London, oil-colour group; Margaret F. Moore, a water-colour ditto; Julia Mountford, Birmingham, monochrome in water-colour of head from antique; Ethel C. Nisbet, flowers in water-colour; E. L. Osman, South Kensington, chalk drawing of figure from the antique; A. Pearce, Lambeth, chalk study from nude; Constance Prince, Manchester, oil-colour group; Florence Reason, Bloomsbury, chalk drawing from antique; J. W. Stubbs, a monochrome in water-colour, and group in ditto; Ida

Taylor, Lambeth; Miss Wight, Kidderminster, monochrome in oil from antique; and A. Young, Edinburgh, chalk drawing. The bronze and book-prize drawings are too numerous to mention now, and to those and the merits of the chief drawings we hope to refer again.

BUILDERS' ARCHITECTURE.

STRAIGHT lines, red brick dressings, and tuck-pointed joints, seem to have a strange fascination for the speculative builder. The interminable rows of "neat suburban dwellings," varied here and there by "eligible villas," force the inquiry on the least inquiring mind, whether it is not possible to introduce a little more variety of shape and colour into our ever-growing suburbs. It is true there is not much room for invention in the planning and design of 6 or 10 room houses, confined to the limits of a narrow frontage, and builders are averse to adopt new plans, owing to the increased cost they sometimes entail. The stereotyped house in a row, with its conventional arrangement of entrance, passage, and stairs, its front and back parlours, and projecting offices in the rear, appears to be the nearest approach that can be made to economical house construction. It may be varied a little, but the extent of the variation is small, and the internal arrangement of the apartments remains much the same. The position of the front entrance is the chief consideration, and in a row of houses the doorway has to be placed somewhere in the front, either on one side or other of the principal apartment. There are two alternatives; one is to place them in pairs or group the entrances of the two adjacent houses, another to place them singly; and it must be confessed builders do not generally take much trouble about the matter, or do more than follow the common treatment, which makes a very insignificant feature of the entrance. Probably the most architectural manner of avoiding the isolated, disconnected look of our house doorways in narrow frontages, is to unite in some way the window with the entrance. This has been done in some houses we have seen by running the cornice-mouldings or entablature over the entrance, or by arcing the spaces left between the bay projections of the windows, and making a lead flat above. Both these plans can be treated architecturally if a little more time and patience be given to the working out of the problem.

Why there should not be more coherence between the bay-window and porch is not very manifest, seeing they are often quite close together on the same level. But the builder fancies somehow he must make a display of isolated features, and their connection would not make the most of his resources. So at least he thinks: it is for the architect to show how these every-day features can be rescued from their present stereotyped sameness. The objection to single doorways would disappear by an arrangement which united the entrances and bays in the manner we have mentioned. A plain flat wall from end to end of a street, pierced by windows and doors, or perhaps broken only by bay windows, has the most wearisome effect. Little or no effort is ever made to break up this long stretch of brick by any play in the line of frontage. If the bay windows are carried up two stories, and hipped back to the roof, there is at least a play of line, light and shadow, the flatness of the frontage is broken, and the eye less fatigued. The increased cost is very trifling, and the additional space thrown into the rooms is well purchased. Nearly all the houses we see have the roofs hidden, and their summits finished by straight parapets plain or pierced. Very seldom do we see the roofs honestly exposed, and the eaves

made to project, and throw off the water from the wall. Here again we see the object is to give a fictitious height to the house-fronts, to make them appear higher than they really are, and to give them an air of importance. Three or four feet is easily added to the elevation in this manner. But this expedient also pays the builder. The roofs being concealed, they can be constructed in the common centre-gutter fashion, so universal in London, with low pitch and a saving in timber. The front wall hides everything, and the abominable plan of laying a leaky gutter through the centre of bedroom ceiling is not even imagined by those who scan the almost palatial frontage of dwellings of this sort. The front wall becomes a mask which the builder finds pays him a good percentage as a return for the outlay. What we desire to point out is that the builder's front in virtue of its being a mask depends chiefly on its superficial ornamentation, which is never much deeper than the $\frac{1}{2}$ -brick reveal of windows and doors. An inspection of several estates shows what such ornamentation consists in. Colour is a cheap substitute for architectural relief and ornamentation; it captivates the vulgar taste, and we are not surprised to find it plays an important part in the speculative builder's *role*. Malm or stock brickwork looks very dull by itself, and a few stripes of red brickwork cost nothing and relieves the wall more effectively than solid relief or moulded work. This red brickwork is generally disposed of in the shape of cornices, arches, or simply neckings and dentils, though it is usual to find bands of it on the level of window-arches, or in courses of red brick lower down, suggesting a sort of appearance known by some as the "streaky-bacon style." The natural red-brick colour is not bright enough to relieve the London malm stock or "seconds" facing brick, and so they afterwards get rubbed over or coloured with red-ochre, as may be seen wherever new fronts are being finished, and as neatness in the jointing is another trap, the joints are "tuck pointed," a process which never covers the original joint. Very often the whole front is coloured yellow and tuck-pointed with lime-putty for the express purpose of making rough brickwork look respectable, though the brick-joint never covers the original properly and is constantly scaling off. The whole care is centred in making the mask perfect, and it is this trim neatness which takes the public unaware of the trickery and unreality of the building beneath this thin disguise. Why a little more boldness should not be attempted, and the straight front give place to a little more solid relief is chiefly to be answered by the disinclination builders of this class of property have to do anything fresh. A less glaring contrast of colour and more variety in plan and outline is easily secured by making the windows project, and by gabling them above; by setting the doorways back from the general line of frontage. There is much yet to do in prevailing on builders to adopt the gables and other devices found in the brick domestic architecture of Belgium and the Low Countries. Little is attempted in producing play of fronts, as we find it in the houses of Bruges or Amsterdam, chiefly from the fact that such breaks necessitate expensive guttering and more leadwork. By roofing with transverse ridges and gutters this difficulty can be avoided; and each house may be made to have its own gable without adding to the cost of the roof. A saving of brickwork in the party-walls would perhaps be rather overbalanced by the front and rear gables, but there would in return be more individuality in the design of street frontages. Much variety might be attained by even making a gable occur here and there in a long row, or in grouping them

together, if they are used throughout. The carried-up bay window is, as we have hinted, a step in the right direction, and a flat projecting bay is capable of being gabled in a variety of ways, without following closely the half-timbered and corbelled arrangements seen in houses of the Gothic or Queen Anne kind. If a projecting window is not desired, the cornice line can be broken by carrying up the head of the upper-floor windows and hiping or gabling the top, and the brickwork saved in thus allowing the front wall to be kept low, and the bedroom obtained partly in the roof, would more than repay the cost of valleys, extra flashings, and gutters.

All the suggestions we have made would, of course, make the roof a feature; but as this is the object the builder strives so much to hide from the gaze of the passer-by, very little reform can be expected till the roof becomes to be kindly looked upon as a feature rather than to be shown than kept out of sight. On artistic grounds alone, if nothing else could be pleaded, we might venture to recommend the tile roof. A very agreeable alteration would be evident if our long, wearisome streets of stock and red brick could show red-tile roofing above them, which would take off the glaring white fronts. The ribbed (Italian) tile, such as the Broomhall tile, or even the common pan-tile on a front of grey stocks, adds immensely to the appearance, and if there are any trees to be seen the artistic colour-sense is much gratified. A mass of red makes a more pleasing mixture of colour than a few streaks of it in the dressings, which latter are better shown by white Suffolks, or some darker shade of buff. Speaking of colour brings us to the question of the painted work. White soon gets dirty in towns, or there are reasons for advocating the clean, white window-frames and sash-panes of the Queen Anne; but why do builders persist in painting all the sashes black, or some colour which is made to assimilate in tone with the glass, and to make the eye believe the windows are in single sheets of plate? There is not a large choice of colours; but dark oak, or chocolate, without the graining, seems to be a far more sensible colour to paint the woodwork of doors and windows than black. The whole question of reform in our suburbs must rest mainly with builders. If they desire to follow in the wake of other art industries, they must aim at a higher standard of taste in ordinary house-building than we are accustomed to see, and must avail themselves of improved planning and elevations in the erection of dwellings which ought to represent something better than a multiplication of units in which human ingenuity, labour, and taste have been reduced to the lowest possible limits.

THE FURNITURE TRADES EXHIBITION.

AN exhibition was opened yesterday (Thursday) at the Agricultural Hall, Islington, in which furniture, decoration, and ironmongery are the leading branches of industry represented. From a general view of the stalls and the exhibits, still in a rather imperfect state, the Furniture Trades Exhibition is intended, apparently, to occupy the same ground in connection with these trades which the Building Exhibition did with reference to the particular industries connected with it. Furniture and decoration include a very large number of trades. Wood, metal-work, stained glass, wallpaper, textile fabrics, stoves, are a few of the materials displayed at the Agricultural Hall. As the catalogue was not prepared or published when our notes were made, we can only give the reader the result of a hurried visit to the exhibition when barely

half the objects were in place. The main body of hall is divided by avenues, and the principal exhibitors occupy stalls along the centre of these.

On entering, we find each side of the doorway set apart for the display of goods exhibited by Messrs. Wells and Co., of Shoreditch. On one side, brass-work and gas-fittings of every conceivable kind are displayed, and on the other we find furniture and decorative accessories in the furnishing trades represented. Messrs. Ashton and Green, St. Mary Axe, have a selection of chimney-pieces, in real and imitation marble in Italian and other styles, coal-vases, fire-irons of fashionable design, including "Queen Anne," beside-kitchens and the more useful kind of house-fittings. Messrs. Loder and Mr. Vaughan, of Old-street, are other exhibitors of furniture. Shutters and blinds are a class of manufacture in which considerable improvements have been made of late years, and those who wish to see what has been done to make the revolving shutter perfect may inspect the stall fitted up by Messrs. Clark, Bunnett, and Co. Besides revolving shutters, we see a smoke consuming fireplace, a double-box dinner-lift, to which we may refer again. Mr. T. Syer shows a folding ladder and other useful appliances. Mr. M. F. C. Turpin, of Queen's-road, Bayswater, has a variety of parquet floorings of simple and inexpensive patterns in oak, walnut, sycamore, &c., ranging in price from 1s. per square foot to 4s. The thin parquet, 5-16in. thick, is a very cheap substitute. Oak dados, chimney-pieces, and wood-carving are shown. Messrs. Drew and Cadman, High Holborn, have a handsome stall in which they show Venetian mirrors for walls and cabinets; and in a central position we find Messrs. Hodgkinson and Clarke, of Birmingham and Finsbury, have an artistically-designed stall in which specimens of their "Patent Metallic Venetian" blind is to be seen; also the "Queen Anne," a permanent shade for windows, combining the advantages of a blind, a revolving-shutter, and a ventilator. Stained-glass grills for windows, leaded windows, &c., are other objects. Mr. Geo. Sims, of Aldersgate-street, has a collection of overmantels, with bevelled mirrors, in ebonised wood and mahogany, after the Chippendale and Japanese styles. Several very effective specimens of wall-decoration are shown by the Papyrotile Company, Holborn. Some of these are in blue and black, in shades of green, gold and white, brown and gold, &c. The most critical taste could not fail to be pleased with a delicate blue Italian pattern on a gold ground embossed, and some friezes with festoon pattern and heads in delicate grey upon white ground. The panelled paper, highly relieved in gold and brown, with birds and foliage introduced, and one or two other specimens, may be admired also.

Messrs. Jackson and Graham occupy a central position in the hall, and their exhibits promise to be very complete. They chiefly comprise wall-decoration and suites of furniture for drawing-rooms, bedrooms, &c. We will merely mention here, a very tasteful decoration for a room in a quiet Chippendale style: walls of painted panelled work, showing a chimney-piece with stove, a mirror and neat overmantel finished in a light greyish green or apple-blossom tint. The effect is chiefly obtained by panels with sunk members in the framing and dentil mouldings in the doors and overmantel. The main relief consists in the flutings to the panels, &c., and in a deep frieze of painted tapestry. Ebonised cabinets with brass mounts, a very nice wardrobe with a middle shelf and splayed side doors with mirrors; a chimney-piece from a design by Mr. Edis, also a sideboard, and a dog-grate in black with brass mountings, are a few of

the other exhibits of this firm. The work is all machine-made.

Messrs. Carter and Aynsley, Bishopsgate-street Without, send a collection of ironmongery, brass-work, and ranges; Mr. W. Cluse, art-metal worker, of Tottenham Court-road, has also an exhibition in brass-work, including repoussé frames and mirrors, sconces, locks, cabinet furniture, &c., while near several specimens of wood, stained by "Stephens' preparations," are on view. Messrs. Pontifex and Wood have a large show of varnishes, stains, and colours; the Saxon Wood Industrial Co. exhibit their bent-wood furniture. One of the largest displays of chimney-pieces and decorative stoves is shown by Messrs. Steel and Garland; stoves with painted tile cheeks, in marble chimney-pieces, overmantels in ebony, walnut, &c., are on view. On the same side of the hall Messrs. Moore and Hulton have a large show of furniture, suitable for dining-rooms and bedrooms, entirely of oak, in a Gothic style; and Mr. Fox also is an exhibitor in the same class of goods. The very unfinished state of many large stalls preclude our mentioning them this week. Among our exhibitors we find the names of W. M. Owens, Shoreditch, cabinet manufacturers; G. Pearce and Co.; Bailey and Son; Ben, North, and Sons, West Wycombe; and Base Bros., ironmongers. The "Otto" gas-engine is one of the objects of a utilitarian kind to be found at one end of the hall, and at the other end we meet with a collection of pictures and frames, carved brackets, mouldings, chromo-lithographs, and other works exhibited by Messrs. Walmesley and Lewis. It will be seen from the above preliminary glance of the exhibition, that it appeals, not only to architects, but a large class of the public, and we hope next week to give a more detailed account of the exhibits.

THE WATER QUESTION.—XIII.

RESERVOIRS AND DAMS.

WHETHER the dry-weather flow of the drainage area should be deducted from the capacity of a reservoir found in the manner already stated, will depend upon the method by which the number of days' storage is arrived at; whether upon the basis of (1) the rainfall table, showing the absolute length of time during which no rain has fallen; or (2) upon the stream gaugings, showing the daily quantity reaching the site of the reservoir; or (3) upon the difference between two quantities, one of which is the quantity of water in an existing reservoir at the commencement of a drought, to which is to be added the quantity coming into the reservoir during the drought, whether from springs or casual rainfall—and the other quantity is that which has been discharged during the drought, as ascertained by the daily sinkings of the water-level of the reservoir, in which case it is evident that the total quantity is dealt with on either hand, and, therefore, no deduction can properly be made. But this method is true only of that reservoir, unless the dry-weather flow, where it is proposed to make a new one, is the same area for area; whereas by the other method the rule becomes general, and is applicable alike to cases where the dry-weather flow is large, comparatively, and where it is small. It is, therefore, better as a method, although the other is more exact for a particular case already existing. The dry-weather flow of the stream at the site of the reservoir is made up of the numerous small springs issuing within the drainage area, produced because of the absorbency of the ground during wet weather, and its yielding of the absorbed water gradually, and to this extent of the dry-weather production the drainage ground is essentially a part of the reservoir, and for this reason

the quantity should be deducted from what would otherwise be the necessary capacity. Were the ground wholly impermeable there would be no run of water in dry weather, and, in that case, the capacity of the reservoir itself would need to be so much larger; but where, as is assumed in the example, there is a dry-weather flow which, on the average, during a drought, is equal to 30 cubic feet per minute per 1,000 acres, that quantity may be deducted from the calculated storage-room in order to arrive at the actual capacity of the reservoir. The quantity so deducted belongs to the reservoir, and is, in fact, part of the yield reckoned upon in the available depth assumed, as, in the case adduced, 21in., and whether it be conducted past the reservoir and form part of the supply, or it run through the reservoir and form part of the discharge into the stream, makes no difference in the reservoir-room proper to be provided; but where the number of days' supply to be stored is founded on the length of a drought as ascertained from the rainfall returns the dry-weather flow ought to be deducted, and, instead of being deducted in gross, as in a preceding statement, the same result would be arrived at, if stated as follows:—

Quantity discharged from the reservoir—		208,800 c.ft. per day.
Deduct the dry-weather flow	} 43,200 " "	
= 30 c. ft. per minute		
Difference		165,600 " "

Then $165,600 \times 180 = 29,808,000$, or 30 million cubic feet as before, where the records of the rainfall show that 180 days' supply ought to be stored. Certainly, an eminent engineer might come forward and say "Shut up all your rainfall tables; I have the particulars of every reservoir in my pocket, and I can tell you exactly, by a little scale I have, the number of days to provide for. I will give it you. I do not put in these particulars, of course, because I want them myself; but you may depend upon the accuracy of what I say." This is all very well, and the engineer is fortunate who possesses all these particulars, and one is thankful for the information usually given to the public in evidence before Parliamentary Committees; but engineering evidence is often given confusedly because of the interruptions of members' questions before the witness has had time to unwind his clue and come to the gist of the question, which he can only do by proceeding step by step to what he desires to explain. Explanations of parts of his reasoning are given before their proper time and place, and the answers extracted by these inopportune questions are not exactly those he probably would otherwise have given. For instance, on a question of reservoir capacity, in explaining to what extent it is necessary to provide it, he is asked whether he includes the springs arising in the drainage-area, to which he answers, "Certainly not; they belong to the reservoir." Undoubtedly they do, and he would probably have explained at the proper time how they are to be accounted for, which can be in no other way than that above stated. So much for reservoir-capacity.

On a different basis altogether must be calculated the room required for temporarily holding a glut of water and allowing it to be discharged gradually; it must be upon (1) the depth of rain in a day, or in two consecutive days, or as long, in fact, as one rainstorm lasts—the exact time is immaterial; it is the glut of water as a whole which is to be provided for—and (2) the area over which it extends. Of such a depth we have records of four inches, but no measurements of the area covered by that depth. It is reasonably assumed, however, to be limited, and not to extend over the whole of a large watershed area. On the other hand, a less

depth of rain, one of two inches, for instance, extends occasionally over the whole of a river-basin, and produces in the lower lands even a greater flood than the greater depth over the smaller area; such was the case in the year 1875, when over nearly the whole of the Midland Counties of England that depth of rain fell in two or three days' time, and produced disastrous floods. But to confine attention to the upper lands, let the depth of four inches be reckoned upon as having actually fallen, and therefore to be provided for in the future; but over what area? One thousand acres = 1.5625 square miles, or about $1\frac{1}{2}$ miles long and one mile wide, or two miles long and three-quarters of a mile wide. These are considerable stretches of ground, over which a heavy rainfall may extend; but, not to underestimate difficulties, let the area be taken at 2,000 acres, which would be about 2 miles by $1\frac{1}{2}$ miles, or 3 miles long and 1 mile wide, or 4 miles long and $\frac{3}{4}$ mile wide, to be covered by the track of a great rainstorm, continuing for one or two days, and perhaps part of the third day, and amounting in the whole to a depth of 4in. over an area of 2,000 acres. If it be granted, as we think it ought to be, that this is a sufficient basis, we may proceed. The full 4in. in depth could not reach the dam in the time stated, or indeed in any time, for some of it must be evaporated. Let 3in. be taken as the depth over the whole 2,000 acres which would actually go into the reservoir or dam during the time of the rainstorm, or within no long time after its cessation, over and above the quantity discharged during the same time. On this basis, the space required for holding and moderating the flow off the ground of a great rainstorm in the upper part of a river basin, would be—

$$2000 \times 43560 \times .25 = 21,780,000 \text{ cubic feet.}$$

But to leave some water in the bottom, and otherwise to allow for contingencies, let this be increased to 24 million cubic feet, for regulating the flow of 3in. depth of water running off an area of 2,000 acres. More than 3in. out of a rainfall of 4in. may reach the reservoir, or dam, but it will not do so before the discharge has reduced the level sufficiently to receive it; and it may be reckoned as pretty certain that no second rainstorm will succeed one of 4in. until long after that one has been discharged by the river. It is one of the difficulties of the situation that in any river-basin the rainstorm may take place anywhere, although some parts of a large area are more subject to rainstorms than others. It seems inevitable, therefore, that works for this purpose must be numerous, but in that case the magnitude of each need not be great. In the instance above adduced, it is 12,000 cubic feet per acre of the drainage area, if the area does not exceed 2,000 acres.

So much for the capacity of a separate dam to regulate the flow off the ground of excessive rainfalls; but this and the other purpose—viz., a supply of water—may both be accomplished on the same site by the construction of one reservoir only if the demand for water in any particular situation does not prohibit it. In that case it will be a question of favourableness or otherwise of the various reservoir sites whether for any desired capacity of storage there should be one or both constructions, and if one is desirable its two functions may be performed by providing on the top of an ordinary reservoir a space equal to 12,000 cubic feet per acre of the drainage-ground if it does not exceed about 2,000 acres; and where the area appropriated exceeds that area, to provide 24 million cubic feet of reservoir room in addition to the capacity required for the ordinary reservoir. From the ordinary reservoir the water would be discharged from the bottom or below its top-water level, and from the upper space, or

regulating reservoir, it would be discharged at the top-water level of the ordinary reservoir through an opening which would discharge a given maximum quantity per minute, whatever height the water may rise to, so that in regularity of discharge it would act automatically. As the surface of the water in the ordinary portion of the reservoir will vary in altitude below a standard height, a heavy rainstorm may amount to no greater quantity than will fill it up to its standard height, but when this portion is full, or nearly so, the water of a heavy rainstorm will rise into its own space and be discharged by its own outlet.

The times when it is most important to prevent rivers overflowing are in summer, or between May and October inclusive; a winter flood is less, if at all, objectionable upon the land; and it is during those months that the greatest demand for water takes place. The winter rains fill up the reservoir to its standard height, but no higher, because the water at that height runs away automatically, and it begins to lower as summer approaches, making so much more room for an excessive flood, but this room is not reckoned upon in the foregoing calculations, so that they are all the more ample.

To take an example of a dam in the upper part of a river-basin, constructed solely for the purpose of moderating the flow off the ground of an excessive flood, such as 3in. in depth of water out of a total fall of 4in., and extending over 2,000 acres of ground, the room required would be, as before said, 24 million cubic feet. This would be found at one of the sites formerly referred to with a bank about 35ft. high, the greatest depth of water being 30ft., and covering about 37 acres of ground; or it would be found at one of the other sites with a bank 43ft. high, the greatest depth of water being 35ft., and covering an area of about 29 acres. In this case it is assumed that the rainstorm covers the whole drainage area, and then the size of the dam is at the rate of 12,000 cubic feet per acre.

To recur to a point incidentally mentioned above; that, namely, of the source, or one of the sources, from which we derive information on the question of sufficiency, or otherwise, of a stated number of days' supply—of the quantity of water resulting from the dry-weather flow of streams, &c.—viz., the evidence of eminent engineers given before Parliamentary committees—is it legitimate information? Are we entitled to make use of it in this or any similar manner for public instruction—or, to put it on the lowest ground—for our own profit? Is such information, given to a Parliamentary committee, given to the public? It is not, as it happens in this case, our only source of information; but it might have been, and so far as we have made use of the Parliamentary blue-books or notes of evidence taken at the time of delivery, and if we owe any apology to witnesses, our acknowledgments are due to Mr. Bateman and to Mr. Hawksley, who will, no doubt, notwithstanding, allow that we may agree or differ in a matter of opinion on any point in question. Indeed, we may anticipate an answer to all our queries, to the effect that we may take the information for what it is worth, and be welcome.

But the matter does not rest there. The evidence is valuable chiefly for the facts stated, facts which only they, pre-eminently, have had the opportunity of acquiring. It is not long since Mr. Bateman said casually that he was then making a dozen or twenty reservoirs, and we know that Mr. Hawksley has also had vast experience in waterworks practice, and that the archives of either of them must be a wealthy store of facts. We say again that these facts ought to have been ascertained at the public expense, so that engineers in general might found upon

them such opinions and arrive at such conclusions as they might be able to arrive at. But valuable as these archives would be, if national property, there are many facts yet to be ascertained, compared with which these would only be a beginning.

DANGERS TO HEALTH.*

THE idea of imparting in a popular manner, by means of pictorial aid, a knowledge of the dangers arising from drains and waste-pipes and other domestic fittings of our houses has been happily carried out by Mr. T. Pidgin Teale, M.A., surgeon to the General Infirmary at Leeds. The small octavo volume we have under notice is dedicated to the medical profession, and has passed through two editions in a short time—the best evidence that such a work has been found to answer its purpose. In the present edition we find the number of plates has been increased from 55 to 70, and these represent pretty completely the main typical defects or dangers to which our houses are exposed. The object of the author is to show by ocular demonstration, by clearly-printed illustrations—and these are forcibly-drawn lithographic diagrams—the sundry dangers to which every dweller, especially in our towns, is exposed. Each illustration is made to point to a defect, and the series are arranged in a scientific order, beginning with faults of a common and ordinary kind, and proceeding to those of a less direct, more rare, and complex character. In addition to these the author exposes many of the "rascalities" of the dishonest builder, and illustrates a few hints on ventilation, &c. Many of the faults thus pictorially brought before the eye are within the tenant's power to remedy; and the main object of Mr. Teale has been to educate the public in the details of domestic sanitation. The leading points in each diagram are represented in thick lines, while blue arrows in all cases show the direction of the escape of sewer-gas. Some of the sketches have been contributed by Mr. C. R. Chorley, architect, of Leeds, and the plumbing details have been supervised by Mr. R. Slater, sanitary inspector. A list of sanitary maxims introduce the reader to the illustrations.

Let us take a few of the cases represented. Passing over a few of the commoner kinds of defects, which are too obvious to require condemnation, such as closets in the centre of house, drains under floor leaking and pervious to gases, fires fed by impure air coming through doors and crevices, we come to the very frequent case of a trapless waste-pipe of sink emptying direct into drain, and the fault corrected by cutting off the waste-pipe and allowing it to discharge into a trapped gully. Next is an illustration showing the waste-pipe of sink entering the soil-pipe of closet; and the frequent occurrence of lavatory and bath-wastes entering direct into soil-pipe without traps, and their remedies; also the phenomenon of "unsiphoning" traps. The evaporation from traps below the "seal" is explained by another diagram, which shows the escape of gas into the house through w.c.'s and lavatories, cisterns, &c. Plate 10 shows a common error of making the overflow from a lavatory join the waste-pipe below trap, thus rendering the safeguard of the latter useless; and the following illustration instances a case where the untrapped lavatory-waste in a dressing-room caused puerperal fever, by allowing escape of sewer-air into a bedroom. Another plate shows the condition of a lavatory-waste, although trapped, allowing the passage of gas from closet-pipe, with which it was connected. Other diagrams show overflows from kitchen-boiler fouling water of boiler; rainfall-pipes, carried through the house, and giving vent to gases at the joints; untrapped wastes entering fall-pipe; rainfall-pipes, connected with sewer, opening below windows; ventilating pipes connected with chimneys; the inroads made by rats under floors through imperfectly-jointed sink-waste; defective water-closet arrangements, with soil-pipes within the house, and direct communication between it and cistern by the overflow. The author shows by diagram the abomination of the "pan-closet," which is called the "utterly utter abomination," and the advantage of the siphon basin and disconnector.

* Dangers to Health: a Pictorial Guide to Sanitary Defects. By T. PIDGIN TEALE, M.A. 2nd Edition. London: J. and A. Churchill, New Burlington-street.

tion. The injuries to health inflicted by lead soil-pipes, with seamed joints, and eroded by gas; by untrapped drains leading to larder, or sunk or dish-stone; dairy sweepings; soft-water eastern below floor used for cesspools; the dangers from overflows from storage tanks, cess-pools leaking into live wells, and other forms showing how people drink sewage, are equally well and cleverly pointed out. Such illustrations as Plates XXXI., showing badly-joined drain-pipes leaking into well, and plate XXXIV. will make very clear to the dullest comprehension how sewage may pollute well-water. Leaking drains under houses, broken pipes, bad laying, putty-joints, and various other causes of mischief are pointed out with suggestions for remedies, as to which we may have something more to say. Even refuse-heaps, ash-pit refuse for mortar, arsenical wall-papers, are made the subject of pictorial teaching. A chapter or two on ventilation without dirt is added, and the author's plan is at least simple. It consists, in fact, of a flat tube like Tobin's, and a screen placed diagonally from top to bottom to act like a filter. The Floral art ventilator, made by Messrs. Howell and James, is also well spoken of. We may add that many of the defects exhibited have their remedies pointed out, and this edition contains a number of newly-discovered faults, such as soil-pipes ventilated into false roofs, and other accidental causes of evil. The errors pointed out are not hypothetical: most of them have actually occurred in the author's own experience, which fact gives much weight to the knowledge which has been so pleasantly imparted. We think Mr. Teale's book ought not only to be placed in the hands of every householder and lodger, but should also form one of the text-books in our schools.

PRACTICAL NOTES ON PLUMBING.*

VIII.

By P. J. DAVIES, H.M.A.S.P., &c.

TINNING IRON PIPES, COPPER OR BRASS-WORK, BITS, &c.

IN chapter II. I described the method of tinning the bit, &c., with resin; but before this work on Joints can be considered complete, I find it necessary to speak of tinning the ends of iron pipes, &c., which have within the last 50 years been much used in conjunction with leaden pipes. This is done as follows: Take some spirits of salts (otherwise known as hydrochloric acid, muriatic acid, hydrogen chloride, HCl), in a gallipot, and put as much sheet-zinc in it as the spirit will dissolve: you have then obtained chloride of zinc (ZnCl). A little care is required when making this, as the acid is decomposed and is spread about by the discharged hydrogen, and will rust anything made of iron or steel, such as tools, &c. It also readily absorbs ammoniacal gas, so that, in fact, sal-ammoniac may also be dissolved in it, or sal-ammoniac dissolved in water will answer the purpose of the chloride of zinc.

Having the killed spirits, as it is sometimes called, ready, file the end of your iron or bit and plunge this part into the spirits, then touch your dipped end with some fine solder and dip it again and again into the spirits until you have a good tinned face upon your iron, &c.; next you require a spirit-brush.

SPIRIT-BRUSH.

You can make this by cutting a few bristles out of a broom or brush, push them into a short piece of compo tube, say, $\frac{1}{2}$ in., and hammer up the end to hold the bristles; next cut the ends of the bristles to about $\frac{1}{4}$ in. long, and the brush is ready for use.

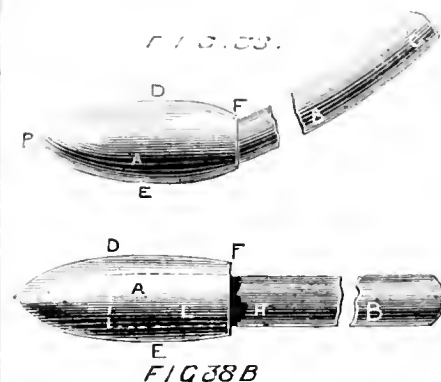
SOLDERING IRON TO LEAD.

Suppose you want to make a joint round a lead and iron pipe. First file the end of your iron pipe as far up as you would shave it if it were lead, and be sure to file it quite bright and free from grease; heat your soldering-iron; then, with your spirit-brush, paint the prepared end of your iron, and with your bit, rub over the pipe plenty of solder, until the pipe is properly tinned, not forgetting to use plenty of spirits; this done, you can put your joint together, and wipe in the usual manner. Caution.—Do not put too much heat on your iron pipe,

either when tinning or making the joint, or the solder will not take or stand.

DUMMIES FOR PIPE-BENDING.

Figs. 38 and 38b. This tool I had better describe before proceeding to the method of bending. To make it take a piece of, say, $\frac{1}{2}$ in.



iron pipe, 3ft. long, or the length required, bent a little at one end, as shown at A B in Fig. 38, and Fig. 38b. Tin the end about 2in. up, make a hole with a small plumbing-iron in some sand, and place the tinned end of the iron pipe B into this hole; fill the hole up with good hot lead, and the dummy, after it has been rasped up a little, is ready for use. It will be found handy to have three or four different lengths, and bent to different angles, to suit your work. A straight one (Fig. 38b) made to screw into an iron socket or length of gas-pipe, will be found very handy for getting dents out of long lengths of soil-pipe.

BENDS AND SET-OFFS.

Before you begin bending solid pressed pipes always put the thickest part of your pipe at the back. Lead, in a good plumber's hands, may be twisted into every conceivable shape; but, as in all other trades, there is a right and a wrong way of doing everything, and there are many different methods, each having a right and wrong way, which I shall describe. I shall be pleased if my readers will adopt the style most suitable for their particular kind of work; of course I shall say which is the best for the class of work required.

For small pipes, such as from $\frac{1}{2}$ in. to 1 in. "stout pipe," you may pull them round without trouble or danger; but for larger sizes, say, from 1 $\frac{1}{2}$ in. to 2 in., some little care is necessary, even in stout pipes.

Fig. 37 illustrates a badly-made bend, and also shows how it comes together at the throat

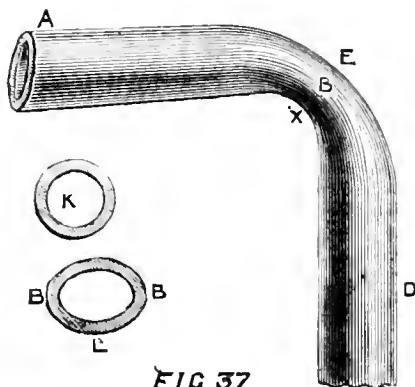


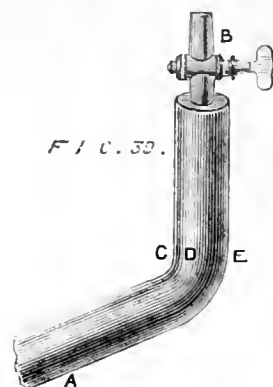
FIG 37

X and back E; L is the enlarged section of X E, looking at the pipe endways. The cause of this contraction is pulling the bend too quickly, and too much at a time, without dressing in the sides at B B as follows: After you have pulled the pipe round until it just begins to flatten, take a soft dresser, or a piece of soft wood, and a hammer, and turn the pipe on its side as at Fig. 37; then strike the bulged part of the pipe from X B towards E, until it appears round like Section K. Now pull your pipe round again as before, and keep working it until finished. If you find that it becomes smaller at the bend,

take a long bolt and work the throat part out until you have it as required.

BENDING WITH WATER (LIGHT PIPES).

Fig. 39. This style of bending is much in



use abroad, but not much practised in London, though a splendid method of work.

It is a well known fact that, practically speaking, for such work, water is incompressible, but may be turned and twisted about to any shape, provided it is inclosed in a solid case—Fig. 39 is that case. The end A is stopped, and the stopcock B soldered into the other end. Now fill up this pipe quite full with warm water and shut the cock, take the end A and pull round the pipe, at the same time dressing the molecules of lead from the throat C towards D E, which will flow if properly worked.

You can hammer away as much as you please, but be quick about it, so that the water does not cool down, thereby contracting; in fact, you should open the cock now and then, and recharge it to make sure of this.

SAND BENDING.

This is a very old method of bending lead-pipes, and answers every purpose for long, easy bends. Proceed in this way: The length of the pipe to be 5ft., fill and well ram this pipe solid with sand 2ft. up, then have ready a metal-pot of very hot sand to fill the pipe one foot up, next fill the pipe up with more cold sand, ramming it as firmly as possible, stop the end and work it round as you did the water bend, but do not strike it too hard in one place, or you will find it give way and require to be dummied out again, or if you cannot get the dent out with the dummy send a ball through (see Bending with Balls).

BENDING WITH BALLS OR BOBBINS.

This style of work is much practised on small pipes, such as 2in. to 3in., especially by London plumbers. Method: Suppose your pipe to be 2in., then you require your ball or bobbin about 1-16in. less than the pipe, so that it will run through the pipe freely. Now pull the pipe round until it just begins to flatten, as at Fig. 37, put the ball into the pipe, and with some short pieces of wood (say, 2in. long by 1 $\frac{1}{2}$ in. diameter) force the ball through the dented part

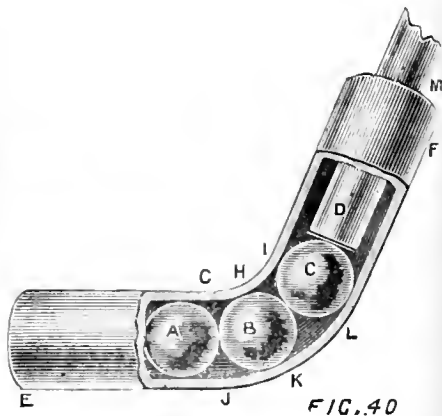


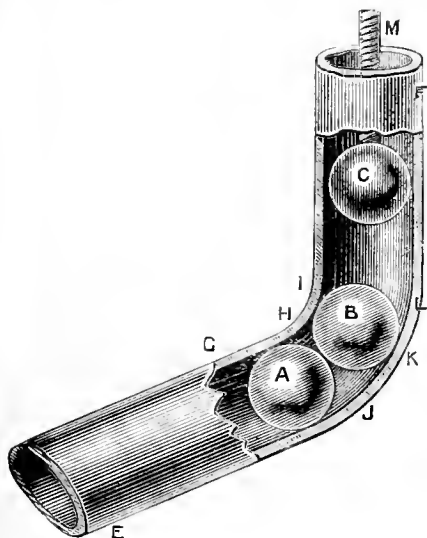
FIG. 40

of the pipe, or you may use several different-sized balls, as at A B C, Fig. 40, and ram them

through the pipe with a short mandril, as at D M. You will require to proceed very carefully about this ramming, or otherwise you will most likely drive the bobbins through the back at L K J. You must also watch the throat part G H I, to keep it from kinking or buckling-up; dress this part from the throat towards the back, in order to get rid of the surplus in the throat.

THREE-BALL OR LEAD DRIVING-BALL AND DOUBLE-BALL BENDING.

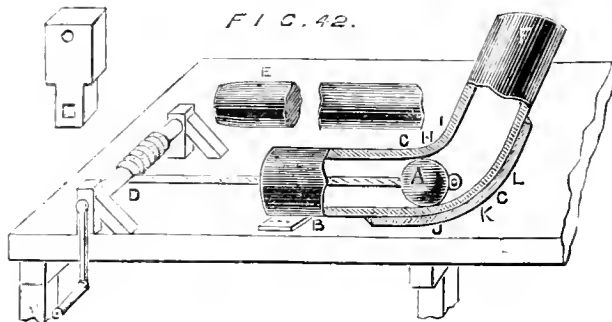
Fig. 41 shows a method of bending with three balls, one of lead being used as a driver attached



to a piece of twine. This is a country method, and very good, because the two balls are kept constantly to the work. First, put the two balls just where you require the bend, then pull the pipe slightly round; take the leaden ball and drop it on the ball B, then turn the pipe the other end up and drop it on A, and do so until your bend is the required shape. You must be careful not to let your leaden ball touch the back of the pipe. Some use a piece of smaller leaden pipe run full of lead for the ball C, and I do not think it at all a bad method, as you can get a much greater weight for giving the desired blow to your boxwood balls.

BENDING WITH WINDLASS AND BRASS BALL.

This is an excellent method of bending small pipes. Fig. 42 will almost describe itself. A is

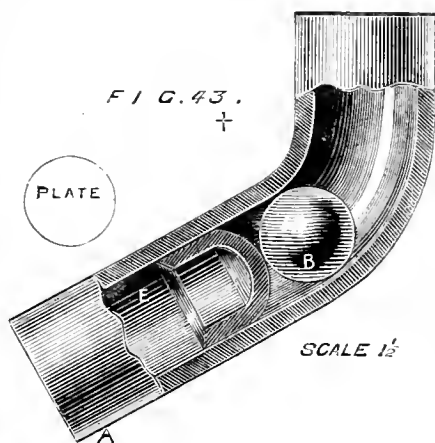


a brass or gunmetal ball having a copper or wire rope running through it, and pulled through the flattened part of the pipe as shown. It will be quite as well to tack the bend down to the bench, as at B, when pulling the ball through; well dress the lead from front to back to thicken the back. I have seen some plumbers put an extra thickness of lead on the back before beginning to bend. Notice: nearly all solid pressed pipes are thicker on one side than the other (as before remarked), always place the thickest part at the back.

HYDRAULIC OR CUP-LEATHER AND BALL BENDING.

Fig. 43. This is my own method of pipe-bending, and is very useful when properly handled with plenty of force, but requires great care and practice. You must have a union

sweated on the end A, Fig. 43, and the ball B to fit the pipe. The cup-leather E should have



a plate fixed on the front to press the ball forward. Pull up the pipe as you please, and pump the ball through, it will take all the dents out, and that too very quickly.

(To be continued.)

THE SCIENCE AND ART OF SANITARY PLUMBING.—VI.

MR. HELLYER'S sixth lecture was delivered on Thursday, July 28th and repeated on Friday 29th. Professor H. Robinson, of King's College, presided, and announced that Monday, August 15th, had been fixed for the discussion of Mr. Hellyer's lectures.

The lecturer commenced by observing that in this lecture he should treat of the connection of branch-pipes with main pipes and traps; waste or overflow pipes from safes; cistern wastes; disconnection of drains from sewers and cess-pools; drain ventilation; and the value of good water flushing. All branches, whether for conveying dirty water, soil, or sewage, should be connected to their main-pipes in such a way that the discharges through them shall pass into the main pipe in the direction of its outfall, and in such a manner as not to foul any part of the pipe, be it a waste-pipe, soil-pipe, or drain, where it would not be cleansed by the flush of water following such discharges. In fixing a range of water-closets on a floor, the branches from them were often made to enter the chief branch on its upper side, and in such a manner

to continue on the chief branch-pipe for ventilation above the highest of the minor branches, for the discharges from the latter would splash and flow up towards the open end of the chief branch-pipe, especially if more than one water-closet was discharged at one time, and as there would be no water-traffic through that part of the main branch, it would not only become foul, but would be liable to stoppage,—at any rate, sufficiently so to prevent proper ventilation. No ventilating-pipe should be taken from a waste-pipe, soil-pipe, or drain, at a point which could be closed up by a stoppage or back-flow in the pipe,—i.e., the ventilating-pipe should always be connected to the waste-pipe, soil-pipe, or drain in such a way as to make it difficult for discharges sent through such pipings to reach the mouth of the ventilating-pipe to choke it, and the connection should be so made that if anything splashed up into the ventilating-pipe it should readily fall back, or drain itself out again. How often did one see a range of lavatory basins fitted up with the branch wastes from them entering the top of the main-branch at right angles! When a basin near the main waste in such an arrangement was emptied through a minor branch into the main branch the contents of the basin would flow both ways, and the suds would hang about the pipe and corrode upon it unless the basin farthest from the main waste were immediately used. Another evil attending such an arrangement was that there would be a constant circulation of the vitiated air in the main branch from basin to basin, and such bad air, arising from stale soap-suds and other matter adhering to the sides of the pipe, would be breathed by the persons bending over the basins to wash their hands; for in the "tip-up" basins the impure air would easily come up between the basin and the "receiver," and in plug-basins (though the plug might be in its place) the air would easily escape through the overflow arm. Another error often made in the arrangement of lavatory wastes, where a range of basins discharged into one trap, was in taking the main branch into the heel of the trap in such a way that about two-thirds of the length of the main branch was always full of water. When that was the case, how was it possible to change the "standing water" of the trap and the waste-pipe with a flush of water sent through either of the basins? The body of water standing in the trap and piping might become very offensive from the use of scented soap and the washing-down of the lavatory top, and it would prevent the waste-pipe from being cleansed, for no flush of water could be sent through the pipe with any cleansing force. When a waste-pipe from one "fitting" was branched into the trap fixed under another fitting, the connection should be so made that no air could travel from one fitting to the other, as it easily could under arrangements sometimes adopted. If one trap must be made to receive the waste-pipes from more than one basin, sink, bath, or urinal, when fixed adjoining each other, the ends of such pipes should be taken into the trap under the normal level of the standing water. But, even that arrangement, though it might do for certain places, was imperfect in principle and faulty in detail, and therefore should never be carried out in fixing sanitary fittings near a living-room or bedroom. In dressing-rooms it was common to find the lavatory-waste connected with the bath-waste, but it was impossible to keep such arrangements absolutely sweet. When two or more waste-pipes discharge into one trap, with their ends under the water-line, the filth carried down one pipe floated up into one or more of the other pipes, and collected and lodged there. Though the matter sent up in that way might only be small in one usage, it became large from repeated usage. The lavatory would most likely be in constant use, but the bath might not be used more than two or three times a week, and when used the discharges from it would not wash out the dried filth, for that would have collected upon the sides of the dip, and of the bath-waste, above the discharging orifice. Besides, in such arrangements, a large trap was often used, with small branch-wastes into it from the adjoining fittings, so that the trap could not get properly cleaned out by a flush of water sent into it through such pipes. In such cases, filth collected very quickly in the dip or inlet part of the trap. When, on the other hand, each fitting had its own trap, the water flushes through it could be made to cleanse every part of it, provided that

the water-way from the fitting into the trap was of the same bore, and that the trap was of a self-cleansing form—i.e., a round-pipe trap.

It was still the practice with many country plumbers, where they fixed safes under water-closets, to connect the waste-pipe of the safe with the water-closet trap, and to fix the pipe of too small a size to be of any value in any great overflow of the water-closet. But, supposing the pipe to be large enough to take away any overflow from the closet or leaky supply valve, its connection with the trap of the water-closet, where the stoppage which had caused the overflow had occurred, would prevent the water getting away, and the safe would be of no good in preventing the water from overflowing and doing damage. But the chief evil in such an arrangement was that excremental matter would flow up into the safe and waste-pipe from time to time, fouling the pipe where it would have no chance of being cleaned out again, and every usage of the closet would cause a disturbance of the water standing in the pipe, and make it smell. The evil was much aggravated when the pipe was connected to the cheek or heel of the water-closet trap with its orifice partly above the level of the standing water, for soil-pipe air would then readily escape through the waste-pipe of the safe into the house. The system of fixing a separate trap under the safe, and taking the waste-pipe from it into the soil-pipe, was radically wrong, though it might, with a "weeping" pipe to charge it, be an improvement on the method last mentioned. But, in a tier of water-closets, such traps often got siphoned, and then they became inlets for bad air to the house, and might continue for hours, and even days, unsealed, and all the time the air from the soil-pipe would be escaping into the house, for the water-closet with which they were connected might not be used for days together to recharge them. The only safe way of fixing safe-wastes was to connect a 2in. or 1½in. lead waste-pipe to the safe, and carry it through the external wall, leaving its end open for ventilation, except where birds were likely to build in it, or where the frosty air could blow through it to freeze the service-pipe to the water-closet or the water-closet itself. There was very little fear of that when the ends of such pipes faced the south, and when the service-pipes were protected; but where the ends of overflow-pipes were open to the north or north-east, the air whistled up the pipe and froze the basin water,—perhaps breaking the basin and bursting the pipe. It was, therefore, better to solder a brass or copper-binged flap on the ends of such pipes to shut out the frost and to prevent birds building in them. When, however, such pipes could be left open, they helped to change the air in the room, with a few perforations in the water-closet seat. Of course, where that was done, the space between the top of the basin, and the seat must be packed with india-rubber to prevent any draught coming to the occupant; and when there was any frost in the air, a piece of board could be placed over the mouth of the overflow-pipe, but that needed personal attention. The mouth of the overflow-pipe should be enlarged and soldered to the safe, and the "outlet" end should be kept at least a foot below the level of the safe, so that the weight of the overflowing water might well open the hinged flap where the latter was used. Overflow-pipes to safes under baths or slate or galvanised-iron cisterns should be treated in the same way as overflow-pipes to water-closet safes,—i.e., a pipe of sufficient size to take off the supply of water to such fittings should be fixed to the safe, and carried through the external wall to discharge, with an open end outside; and, to prevent such pipes becoming inlets to the house for bad air, the ends should be kept well away from all ventilating-pipes to waste-pipes and drains, and from places where any bad air could reach them. Where stop-cocks were used for supplying a bath with water, or where any supply-valve by leaking dropped its water into a safe, provision should be made in the connection of the bath-waste with the safe for taking off such leakage, for if it were allowed to run down the overflow-pipe in frosty weather, the word "safe" would be a misnomer, for the dripping water would freeze up the outlet of the overflow-pipe, and then, if an overflow took place, it would soon flow over the safe on to the ceiling.

Waste-pipes from cisterns should never be connected with any other kind of pipe. As de-

scribed for overflow-pipes from cisterns, waste or overflow-pipes from cisterns should discharge into the open air, well away from all places where any impure air could reach them, for when they discharged over a gully or any other drain-trap, they acted as air-pipes from such traps. Any drain-air passing through the trap (caused by the water in the trap having evaporated, or by the disturbing action of discharges into the trap) would pass through the waste or overflow pipe to the water in the cistern, and contaminate it. It was also a great evil to discharge a waste or overflow-pipe from a cistern into a rainwater-pipe with which might be connected a sink or lavatory waste, for such rainwater-pipe was sure in time to become foul, and the bad air arising from it would readily escape through the cistern-waste to the water in the cistern. It was all very well to blame water companies for not supplying pure water, but when no great trouble was taking for keeping the water pure,—should it ever come into the cisterns pure,—we could not very well be angry with the water companies. The other day he was called in to examine the sanitary arrangements of a house which had recently been overhauled and reconstructed. He found about four-fifths of the work well done, but among one or two things imperfectly done was a cistern-waste. The pipe had been disconnected from the water-closet-trap and continued and made to discharge over a rain-water head. The cistern itself was on the attic-floor, and placed in a corner of the servant's bed-room. He was not then considering the position of cisterns, so he would say nothing about that, except that the water stored in such a quarter must get contaminated. The waste-pipe acted also as an overflow-pipe, and being thus open at both ends, there was nothing to prevent the foul air from the four or five lengths of rainwater-pipe over which the waste-pipe discharged, passing to the water in the cistern. The combined sink-waste and rainwater-pipe emptied itself into a large gully-trap in the back area of a house, and as such traps, as was shown in a previous lecture, were non-cleansing, every time the water was disturbed a bad smell was emitted, which partly escaped through the window just over the trap into the house, and partly found its way up the four or five lengths of foul waste-piping, and thence through the cistern-waste, to contaminate the water in the cistern and the air in the servant's bedroom. A branch waste from a sink on the third floor was taken into the combined sink-waste and rainwater-pipe, but the branch was trapped, showing that the plumber or director of the work had an idea of such piping becoming foul; but the mystery was why he carried such a pipe as a cistern-waste into it. Cistern-wastes, he repeated, should discharge themselves well away from all traps and ventilating-pipes. When they could not be made to discharge into a roof-gutter, or on to a flat or yard, and when the only place that could be found was a rainwater-head, the standing pipe in the cistern should be treated as a plug, by soldering over its top, and an overflow-pipe to the cistern should be fixed to the cistern as described for the cistern-safe, care being taken that such pipe was of sufficient size to take off the full supply of water to the cistern. If the workman erred in this matter he should err on the side of largeness.

No drain was properly connected with the sewer (or cesspool, as the case may be) which would allow the sewer or cesspool air to get into the drain, unless it was very largely mixed with the atmosphere. Every drain should be trapped off from the sewer by an efficient and self-cleansing trap, and, immediately on the house-side of such trap, an air induct pipe should be fixed to the drain; or, better still, if circumstances would admit of it, a large air-shaft should be built from the bed of the drain to the surface-level of the ground, for the upper part of the drain at such point to be well open to the air. Where the drainage of the house had been carried out on the principles laid down in these lectures, there was no risk in opening a well-ventilated drain to the air, provided the trap used for such purposes was a self-cleansing one, having a good water-seal (to allow for evaporation), and provided, also, that it was only of such a size as to admit of the whole of its standing water being changed by a flush of water sent through the drain. But to fix such an arrangement—say, for instance, in the area of a London house,—and to connect it to an old brick

drain, saturated with sewage matter, and of such a size that no amount of water that could be sent into it would flush it; or to fix it even to a pipe-drain too large to be flushed out, and, therefore, too large to be kept wholesome, was to run a great risk of getting intolerable stinks at such openings. It required good experience in such matters to treat open drains successfully; but to fix a 9in. trap where a 6in. would be ample, or to fix a 6in. where a 4in. would suffice, was to run a risk of getting bad smells into the house if the latter was near such openings, for the contents of the trap would under such circumstances only rarely be entirely changed. Where the outlet end of the drain into such traps could not be left open to the atmosphere—for various reasons, as, for instance, being an old drain which could not be properly flushed out, or because the opening would come directly under or near a window, or close to an opening into the house, or where such opening would come under a covered way where any bad air emitted from the trap or drain would get pent up, to enter the house directly a window or door near the place was opened,—then, in such cases, the opening over the top of the air-shaft or trap should be sealed up, and an air-induct pipe taken into it for the admission of fresh air into the drain from a point well removed from the house. Where the end of such induct-pipe could not be kept well away from the windows, doors, or passenger traffic, a mica valve should be fixed over its mouth to prevent, as much as possible, any drain-air escaping through it; or the induct-pipe could go up to the roof; but in the latter case the pipe should be kept lower than the up-cast pipe of the drain, so as to obtain better results from it. Though the plumber might have nothing to do with fixing such a trap for disconnecting the drain from the sewer, he had generally to do with the ventilating-pipes of the drain, for in most cases he was called upon to fix them, especially when they were of lead; and as no drain was properly ventilated unless the air in it was changed, and as that could not be done without an inlet as well as an outlet, the plumber's knowledge of drainage matters ought to extend as far as the sewer. Not that he should be required to plan the drainage of a house, but his knowledge of sanitary matters should be such as to lead him to carry out every part of his work in an intelligent manner. If sewer-air were allowed to pass freely into the drain, the whole atmosphere surrounding the upper portion of the house—where the plumber terminated the ventilating-pipes of the drain—would become contaminated, and such vitiated air would often get sucked into the house. If such smells were sufficiently pronounced to call special attention to them, they might get set down to imperfect plumbing; at any rate there would not be great wisdom in making the plumbing sanitariously perfect, and leaving the drains imperfect, for if a man was to be made ill by breathing polluted air, it might as well come from defective plumbing as from defective drainage. He supposed that at the present time the larger proportion of the house-drains of the United Kingdom were unventilated, and the other portion only imperfectly ventilated. In the scheme of house-drainage of which he exhibited a model, he had disconnected each stack of soil and waste pipe, thereby localising each of them; and that each pipe, as well as the drain, might be perfectly ventilated, he had given each its own inlet and outlet; in fact, he had treated them in the model as they ought to be treated in practice so as to secure perfect ventilation throughout the whole system. In fixing ventilating-pipes for up-casts to drains, care should be taken to keep them well above and well out of the way of all openings into the house, as explained under the head of soil-pipe ventilation in the previous lecture, so that the bad air coming out of such pipes might not get into a house through a chimney, skylight, dormer-window, or any other opening. It would really be amusing, were it not for the serious consequences likely to arise, to take note of the ill-considered positions in which such pipes were terminated. Sometimes they were seen placed where no wind could reach them at all; at other times they were left so that the slightest wind might blow the air emitted from them right into a window; and in other places, by crossing and re-crossing the roof, they were carried up some tall chimney-stack, and terminated at a point so situated that the slightest downward pressure of the atmo-

sphere pressed the bad air from such pipes down the chimneys into a sleeping or other apartments! No ventilating-pipe from a drain should be fixed inside a house if it was at all practicable to fix it outside. To prevent the possibility of drain-air escaping into a house from a ventilating-pipe through a leaky joint, broken pipe, nail-hole, or any other defect, such pipes should be fixed outside the house. When such pipes are of lead, and are wanted to stand for a century or centuries, as leaden rain-water pipes will, they should be kept out of the power of the sun as much as possible, for with soldered joints the pipe would have no freedom for expansion or contraction, as in leaden rain-water pipes with slip-socket joints.

If water-carriage was to be the system of removal, water must be used freely, if the slops and sulliage of a house were to be effectually removed; and whatever else might be limited in a house, water must not be. To make water the cleansing power of waste-pipes, soil-pipes, and drains, and then to limit its use, would be to leave the filth lodging, decomposing, and corroding in the pipes. How we should ridicule a vestry board which sent a street-scavenger to clean Regent-street, say, with one sweep of his broom, to begin at one end and push it right through the centre of the street to the other end! And yet such a swept track as that represented the treatment a soil-pipe often got. The pipe was befouled all over by an offensive excremental discharge sent into it, but the water used for washing out the pipe was only sufficient in many cases, to cleanse a channel down its sides. A pailful of slops, collected from chamber utensils, was thrown down a water-closet in a body sufficiently large to foul the whole of the soil-pipe belonging to the closet, and at the same time a water-waste preventing valve was opened for two gallons of water to pass into the closet to cleanse it; but the water, squirting into the water-closet as if it came from a boy's syringe, was of little value for cleansing the pipe, as it did not cover the whole of the parts fouled, and the parts unwashed became coated over with excremental matter, corroding up the pipe and making it unwholesome. The real cause of pipes stopping up was the want of good water flushing. It was possible to stop up a 4in. pipe to a water-closet or urinal with a bad supply of water to it quicker than a 3½in. with a good supply of water. No waste-pipe, soil-pipe, or drain could be kept wholesome unless adequate flushes of water were sent through it immediately after discharging dirty water or excremental matter into it; and before such discharges were sent through the traps they ought to be largely diluted with water—especially in such cases as the contents from chamber-utensils. Measure water into slop-sinks and water-closets by the table-spoonful, and whatever else might be clean and wholesome about the house, such fittings with their belongings would not be. He knew that it was possible to utilise two gallons of water—the quantity allowed for water-closets by the London water companies, in accordance with the Metropolis Water Act of 1871—in such a way that it should pass into a closet with greater cleansing power than twice that quantity badly supplied; but that was not the point now in question. He contended that two gallons of water were insufficient for keeping a water-closet and its belongings wholesome, and he was speaking to a body of practical men whose opinion on the matter he should be glad to hear. Were there ten men in the room who considered a two-gallon water-flush sufficient to cleanse a water-closet, basin, trap, soil-pipe, and drain after usage? ("No.") They must knock at the door of Parliament, and send in a message stating that a large body of practical plumbers found from experience that two gallons of water were insufficient to keep a "house of commons" wholesome, and that, if more water could not be allowed, such places must be abolished. Even when plenty of water could be had, however, the flush was often interfered with by bad appliances. The supply-valves, instead of being equal to flushing out a 4in. or 4½in. soil-pipe, were often only of sufficient size to cleanse a 1½in. or 1¼in. pipe; or perhaps the boiler-screw or cistern connection was of smaller diameter than the service-pipe, and the water was, so to speak, "wire-drawn" through it. The question of flushing was a very important matter, for though ventilating-pipes from drains and soil-pipes might be carried

up above the roof, the stink coming from them, where the drainage pipes were not thoroughly flushed, would be so great that the whole of the atmosphere surrounding our dwellings would at times become largely charged with the bad air emitted from such pipes, and though such bad air would no doubt get largely diluted before it was breathed, in great cities—at any rate, in a huge city like London—it would pass at times pretty freely into houses. When the drainage of London houses was properly ventilated—i.e., when every waste-pipe, soil-pipe, and drain had its ventilating-pipe, the number of such pipes would be enormous—hundreds of thousands. How important, therefore, was it that the stink coming out of such pipes should be minimised by efficient flushing.

Various opinions were now before the public as to the best method of draining a house. Several had been referred to during the lectures, and he would simply say, in concluding his remarks on "the science and art of sanitary plumbing," that it was about time that the opinions of sanitarians on such matters should be consolidated. The principles of house-drainage were so far determined upon that there ought to be no great difficulty in framing a good sanitary code as a general basis to work from. He would have the boundary lines of such a code marked out with silken cords rather than with iron bands; for, like all new things, sanitary knowledge should have room to grow. He believed it would be just as easy for a tailor to make a suit of clothes to suit all climates as it would be to lay down a code of sanitary rules to suit all cases. If he had to draw up such a code of rules, he should make them read somewhat as follows, viz.:—

1. That pure water shall be supplied to every house for dietetic purposes, and where this water cannot be drawn direct from a constant supply, it shall be stored in cisterns easily accessible for cleansing purposes; and such cisterns shall be so placed that no vitiated air can reach them, either from the house, water-closets, or ventilating-pipes,—from waste-pipes, soil-pipes, or drains.
2. That no draw-off cock to any sink or "fitting," other than a water-closet, shall be supplied from a cistern fitted in a water-closet, or standing in a place where any contaminated air can reach it, or from a cistern or service-pipe which also supplies a water-closet.
3. That every drain shall be trapped off from the sewer by a self-cleansing intercepting sewer-trap, fixed in every case outside the house; and where the mouths or inlets of such traps cannot be left open to the atmosphere, air-induct pipes should be taken into the drain immediately on the house side of such traps.
4. No drain shall enter the walls of a detached or semi-detached house.
5. In a line of houses, as in terraces and streets, where it is impossible for the drain to reach the soil-pipes without coming inside the house, such drain shall be of cast-iron, heavy water-main strength, and this pipe shall be "barfied" or coated with solution, and laid in a brick trench, or fixed on the face of the basement walls, and its joints well caulked with lead. The drain shall be so ventilated that not a foot of it shall be without a free circulation of air through it.
6. Every drain from a house shall be so ventilated that no stagnant air shall remain in any part of it; and where this cannot be done by air shafts, ventilating-pipes shall be fixed, and the drain divided into sections, and its branch drains, when of great lengths, localised, so as to insure ventilation in the entire system of drainage.
7. All soil-pipes, where practicable, shall be fixed outside the house, with their discharging ends exposed to the atmosphere,—either directly by emptying into open traps, or indirectly by foot ventilation; and such pipes shall be carried up to the highest points of the roof full size, for proper ventilation, having their terminals well removed from all openings into the roof or house.
8. All dirty-water wastes from sinks, baths, lavatories, &c., shall discharge themselves with open ends into intercepting traps fixed outside the house, and such pipes shall be continued up through the roof full size for ventilation.
9. All clean-water wastes,—from cisterns, cistern-safes, &c., shall be kept separate from other wastes, and shall discharge with open ends into the atmosphere, well away from all drain

traps or places where any bad air can reach them.

10. All wastes or overflow-pipes from safes under water-closets, baths, &c., shall be kept separate from other waste-pipes, and shall be made to discharge in the open air.

11. Every sanitary "fitting" fixed inside a house where foul matter, or contaminated water, is passed into it, or from it, shall have its waste-pipe trapped off from the house, and such trapping shall be made immediately under such "fitting."

12. All traps fixed inside the house shall be self-cleansing; and no trap which fouls itself or is not easily flushed out shall be used on the drainage outside the house.

13. All traps to water-closets, slop-sinks, sinks, baths, lavatories, &c., which can have their water siphoned out by the use of any fitting upon a pipe in connection with them, or by the use of themselves, shall be ventilated, to prevent such siphonage, and also to allow of the branch pipes being ventilated.

14. No sanitary fitting shall be fixed which will not allow a good flush of water to be sent through it to cleanse it and its belongings, to prevent any pipe from it,—be it a waste-pipe, soil-pipe, or drain,—from getting unwholesome.

15. Every house shall be provided with proper and efficient means for flushing-out the whole of its drainage.

16. The walls inside water-closet seats, the floor, and the walls of water-closets, should be made air-tight to prevent any odours in them passing to any room adjoining through a crevice, crack, or opening.

17. The rooms of water-closets should be well ventilated, so that a constant change of air may take place in them.

In conclusion, Mr. Hellyer observed that whatever charge might be laid against journey-men plumbers, want of interest in their trade could not be alleged against them, for he questioned if the members of any other branch of the great building trades would have come out night after night, during the hot time of summer, to listen to dry lectures. Lying in their strong arms, slumbering in their hardened muscles, resting in their well-trained fingers and educated hands, was, in a large measure, the health of this Leviathan city. The plumber's part in making a house, a town, a city, healthy, was enormous. He believed that if plumbing work was done on the principles laid down in his lectures, this huge city, teeming though it was with human beings, would become the healthiest, as it was now the greatest, city in the world.

ASSOS.

THE first detachment of an expedition sent out by the Archaeological Institute of America arrived in April last at Assos, and at once set about making preparations for work. The first thing done was to make a survey of the ground, noting carefully the location of the various points of interest, in order that a map might be prepared, showing the ruins just as they were found. This is now completed, and a large copy of it will soon be sent to be hung in the Museum of Fine Arts in Boston. One of the members of the expedition contributes the following account of Assos and its modern surroundings: "As one sails northward through the Strait of Adramyttium, between the island of Lesbos and the mainland, the most prominent objects in the view before him are the cloud-capped Ida on the extreme right, and the promontory of Lectum on the left. From the one to the other the mountains make a rugged, unbroken outline against the sky. Drawing nearer, a lower range appears in front of the others, directly on the sea. From the midst of these rises a cone-shaped peak, and this—the central and most commanding point along the coast—is the Acropolis of Assos. On its summit, a thousand feet above the water, stood the temple; and though there remains literally not one stone of it upon another, little effort is necessary to imagine how it must once have looked standing alone as it did against the deep blue of Egean skies. Thus beautiful in the distance, the effect is not diminished by a nearer view, for without a twist or turn one can sail directly to the base of the Acropolis, its majesty increasing every moment, until, coming into port, the objects on the upper part are lost

sight of, so steep is the ascent. It is difficult to conceive of a city more nobly placed. Even Athens is less imposing in its approach; for from the Gulf of Egea, the splendour of the Parthenon is over-shadowed by the surrounding mountains, while from every side the Acropolis of Assos attracts the eye as far as it can be seen. The hill rises, as I have said, to the height of a thousand feet; and as its inclination on the water-side is within twenty-one degrees of the perpendicular, it may well have been considered impregnable. It was on this side that the principal part of the city stood, the streets being laid out in terraces, which must have had the appearance of great steps. Here were some of the public buildings, the theatre and the porticoes, the whole crowned by the temple, from whose plane one can, as Mr. Clarke has said, throw a stone into the bottom of the ships in the little port below. The view from this plane I will not describe, because I cannot. The velvety green of the hills of Lesbos opposite, the wonderful blue of the sea which winds in all directions below, the pink and violet tints of the mountains which stretch along the Asiatic coast far into the south—all these must be seen if one would understand their charm. Looking inland, the picture seems strangely familiar. The Acropolis, which rises so abruptly from the water, sinks more gradually into the valley behind it; and one might easily imagine himself gazing from the top of some 'Prospect-hill' upon a New England landscape. To come now to the character of the city itself, or what remains of it, let us begin where we stand, upon the site of the temple. Here we have a complete ruin. A few stones still appear above the ground to give some idea of the outline of its foundation, and undoubtedly a little digging will bring more to light; but not one column remains in its place. Drums and capitals lie about in disorder, many having rolled down the hill to lodge where they might. Scattered as they are, however, some of the fragments are in fine condition, showing that the temple was of a dark grey stone, and built at an early period of Doric art. Fortunately, enough pieces have been discovered already to determine the size and proportions of the building, so that a drawing of its original appearance may be possible. A little more than a hundred yards below the temple are the remains of two long stoæ, or public porticoes, one below the other, built into the side of the hill. These were probably the principal places of resort, where, protected from the heat of the sun, the people could meet for business or conversation. The remains are much more satisfactory than those of the temple, being, in fact, among the most interesting of all the ruins. Their walls, imbedded in the hillside, are almost intact, each showing a row of large square holes, into which the beams that supported the roof were fitted. The pavement, though now covered with rubbish, is thought to be in fair condition, and the parts of several columns remain in place, to show the height and character of the structures. Midway between the stoæ and the portico lies all that is left of the theatre. Not many years ago this theatre was so well preserved that Texier pronounced it the finest of all the many theatres of Asia Minor, and in some respects of all Greek lands; but recently it has been used so extensively by the Turks as a quarry for buildings at Constantinople that now nothing but the barest outline is left, with here and there a slab in place to give a faint idea of its former character. Like the Dionysiac Theatre at Athens, it was dug out of the slope of the Acropolis, facing directly on the sea, and from it the spectators saw not only the opposite shores of Lesbos, but far down the Strait of Adramyttium in the direction of Smyrna. The site of the stage is now covered by a few rudely-made cow-pens, the removal of which may be of assistance in determining at least its outline. Passing now to the sides of the Acropolis, we come to the most magnificent feature of the remains—the walls. These give to Assos a character which no other Greek city has retained, for they are in such fine condition that their entire outline can be easily traced; and though, like the theatre, they have been used extensively as quarries, they are still thirty feet high in many places. From either side of the Acropolis they run in zigzag lines to the right and left, showing in different places three distinct styles of building, of as many periods—the rude, so-called Cyclopean; the polygonal, and the Macedonian, the latter of which is the

best preserved, and of admirable workmanship, the large stones being laid in courses as even and regular as those of the brick walls of any of our houses, apparently without the aid of mortar. Several of the gateways remain in their original condition, flanked by massive towers; and show the curious striving for the principle of the arch, the stones being laid in converging horizontal courses, in the manner made familiar to us by the discoveries at Mycenæ, though the examples at Assos are of a much later date. In the walls we have evidence, not only of the early and long-continued civilisation of the city, but also of its importance; for, as the space inclosed has been estimated roughly at about fifteen square miles, the population must have been large. Another proof of this is given in the extent of the cemetery which lies outside. Beginning at a gate west of the Acropolis, the street of tombs extended quite a distance directly inland, turning then to the right, and crossing to the eastern end of the city. It seems to me impossible that this sacred way can receive the attention it deserves in a single season, so considerable is the ground it covers, and so profusely are its remnants scattered. As one tries to trace its course, the fragments of huge sarcophagi lie about him on every side. Here he finds the broken half of a stone vault, there his foot stumbles upon a displaced cover; further on stands a sarcophagus large enough to have held two men, which would have been complete but for a hole in the side, through which it was robbed long ago. These sarcophagi, some of which are colossal in their proportions, form but one of many kinds of tombs in which the place abounds. It is certain that here some of the most interesting labours of the expedition will be carried on; and perhaps—who can tell?—the popular eagerness for a "find" may here be gratified; for although the sarcophagi themselves offer no grounds for hope, there are many large tumuli and tombs—to say nothing of the graves below the sarcophagi—from which it is possible that at least some well preserved specimens of Greek pottery may be brought to light. However, it must be borne in mind that the Institute sent out this expedition not so much for the purpose of discoveries as for careful investigation; and, although it would be gratifying to unearth some work of art, the main object will be accomplished if we can carry home with us nothing more than a thorough knowledge of the city. A result like this is not a matter of chance, and, if intelligently attained, America will have the honour of contributing to the world's knowledge of the civilisation of ancient Greece—an achievement in which every American scholar may take a just pride.

UPPER ROOMS AS OVENS.

IN the construction of perhaps nine out of ten frame houses, and oftentimes of brick, no adequate provision, if any, writes Dr. Newkirk, a correspondent of an American contemporary, is made for ventilating the space between the upper ceiling and the roof. How frequently at night the remark is made: "The lower rooms are getting quite comfortable, but the upper rooms are like an oven." "The roof gets so heated up during the day." Seldom is the real cause of the oppressive heat that prevails till late in the night, or till well on towards morning, either understood or thought of. It is true the roofs get hot during the day, but it usually consists of but a layer of strips and shingles and would soon cool if it had a chance. The trouble is there is a body of confined air under the roof that gets very hot, and as there is no outlet for its escape and replacement, it must remain hot until cooled by the slow process of radiation through the surrounding walls.

Now, the roof being usually of wood is not so good a conductor as the plastered walls of the ceiling, hence the heat must pass out principally from below through the rooms of the house. That accounts for the fact that when one goes to an upper room in the evening there comes such a sense of stifling, and the sweat starts from the forehead. It is an oven you are in; all that is lacking to make it complete is the hot-air chamber below as well as above. The builder who constructs a house with such nicely adjusted conditions for the radiation of stored-up heat, might most properly be called Macbeth, for he has certainly "murdered sleep." When the writer was a boy it was his good fortune to

sleep in the chamber of a house unfinished above. There was nothing but the roof over him, and the room became cool not long after the cooling of the outside air. It was a good place to sleep winter or summer.

Only those who have slept just under the shingles can realise what it is to "listen to the patter of the rain upon the roof." Very often in steeped roofed and low-eaved houses a part of the room along by the eaves above is walled out, leaving a space for confined air on two sides as well as above. The sides, too, are connected with the spaces between weather boarding and walls, reaching to the sills. It will readily appear, therefore, what an advantage would be gained both in preventing and reducing excessive heat by having a free circulation of air through these spaces. The provisions sometimes made for this ventilation are insufficient. A few open slits under the roof in the gable are better than nothing, but there is no good reason why there should not be at least two good large openings. An arrangement could easily be made so that shutters should be under control from below, by means of a cord or wire, remaining open day and night during hot weather except when storms might threaten. They might be made to assist greatly in cooling and ventilating the whole house.

NATIONAL ASSOCIATION OF MASTER BUILDERS OF GREAT BRITAIN.

THE half-yearly meeting of this association, held at 27, King-street, Covent-garden, on Tuesday week, was attended by representatives of upwards of 140 local associations. The occasion being so important was embraced by the London builders as a fitting opportunity to entertain their provincial brethren. A numerous gathering dined at the Criterion in the evening. Mr. Stanley G. Bird (the president) occupied the chair, and amongst those present were: Mr. R. Neil, jun., Mr. B. Hannen, Mr. Ex-Sheriff Burt, Mr. T. Clay, Mr. G. Plucknett, Mr. W. H. Cowlin, Mr. E. Hughes, Mr. J. Whiteher, Major Waller, Mr. J. Leslie, Mr. C. W. Barker, Mr. J. B. Simpson, Mr. L. J. Maton, Mr. A. Bird, Mr. J. T. McLachlan, Mr. W. C. E. Creswick, Mr. W. Knox, Mr. W. Clulee, Mr. Bennett, Mr. Beandlan, Mr. Malone, Mr. J. H. Colls, Mr. J. T. Chappell, Mr. W. A. Colls, Mr. H. G. Smith, Mr. A. J. Mansfield, Mr. A. R. Smith, Mr. R. Gurney Hoare, Mr. J. McLachlan, Mr. J. Bradney, Mr. T. E. Phillips, Mr. W. Bird, Mr. C. Bird, Mr. Bonnar, Mr. C. J. Bennett, Mr. A. Thorn, Mr. T. Patrick, Mr. H. Kelly, Mr. E. Kelly, Mr. S. E. Haward, Mr. J. Clemence, Mr. J. Wall, Mr. Barfield, Mr. T. Hook, Major Brutton, Mr. G. S. Pritchard, Mr. R. D. Lown, Mr. H. Dove, Mr. Callaghan, Mr. Nightingale, Mr. J. C. Hannen, Mr. W. Southern, Mr. Kirk, Mr. Randall, Mr. Doulton, Mr. Marsden, Mr. Edwards, Mr. Chambers, Mr. H. Burman, Mr. Little, Mr. Dove, Mr. Collingridge, Mr. Stedman, Mr. Duffield, Mr. Webster, Mr. Adamson, Mr. F. J. Dove, and Mr. E. S. Henshaw.

The loyal toasts were given from the chair, and duly honoured. Mr. E. Hughes proposed "The Army, Navy, and Reserve Forces," Major Brutton (secretary of the Builders' Benevolent Society) and Major Waller responding. Mr. Plucknett gave the toast of the evening, "Success to the National Association of Master Builders of Great Britain, and the Health of the President," which was received with cheers. He said that, considering the short period of the Society's existence, the results that had been attained were extremely gratifying. Many of the leading builders of the country had already joined them, and he felt sure that motives of self-interest, if no other motives, would induce all the great building firms to enrol themselves in the list of members. He himself looked forward to the time when, through the operations of this society, strikes and lock-outs would be things of the past. With the toast he desired to couple the name of their president, Mr. Stanley G. Bird, who had worked zealously for the objects of the association, and without whose courage and perseverance at the commencement he doubted whether it would ever have come into existence. Mr. Bird, who was heartily cheered, said he felt himself justified in declaring that the Association of Master Builders had already rendered to the trade services of a most important character.

He doubted, however, whether it was possible yet to foretell the happy period when strikes should be at an end; on the contrary, he believed that with a return of prosperous times their troubles would commence again. At that time, however, the trade generally would understand the immense advantage of being able to refer their difficulties to such an institution as this. Alluding to specific objects that had already been attained through the instrumentality of the Association, he mentioned a new form of contract, and the establishment (out of the Employers' Liability Act) of the Builders' Accident Insurance Company. Mr. Hannen gave "The Local Associations of Master Builders," insisting upon the advantages rendered by these institutions. Mr. R. Neil and Mr. W. H. Cowlin replied. Mr. Clay responded for "The Visitors."

THE NEW EDINBURGH DOCK AT LEITH.

THE new dock at Leith, which was opened last week by the Duke of Edinburgh, lies east of the Albert Dock, which is the most recent of the existing basins, having been completed in 1869. Access to it is obtained through the Albert Dock, and the connecting passage is spanned by a massive swing-bridge, which is adapted both for railway and for ordinary traffic. The Albert and Edinburgh Docks are protected by a solid reclamation bank upwards of a mile in length. This embankment is in itself a stupendous piece of masonry. The wall is 20 feet broad at the base and 10 at the top, and in its construction 100,000 tons of rubble and 8,000 cubic yards of ashlar and concrete were used. The breadth of ground reclaimed between the face of the embankment and the old foreshore varies from 1250 feet to 1400 feet—that is to say, it averages a quarter of a mile. The breadth of ground between the new dock and the sea is 225 feet, which affords ample space for sheds, lines of railway, and roadways. The new dock is 1500 feet long and 650 feet wide; but there projects into it from the middle of the eastern end a jetty 1000 feet long and 250 feet broad. At that end, therefore, the breadth of water on each side of the jetty is only 200 feet. But what is thus lost in water area is more than compensated for by the increased accommodation for berthing vessels and for wharfe and sheds. At the west end of the jetty there is a graving dock 300 feet long. This is smaller than the Prince of Wales's Graving Dock in connection with the Albert Dock, which is 470 feet long; but it will be a valuable addition to the conveniences of the port. The superficial area of the new dock is 16.2-3 acres. The Albert Dock, which is the largest of the existing docks, extends only to 10½ acres. The wharfe of the Edinburgh Dock is, in linear measurement, 4,000 feet, or upwards of three-quarters of a mile. The foundations rest on blue boulder clay. The whole works, including the railway undertakings, were estimated to cost £400,000. They have been carried on during the last five years by the trustees of the late Mr. Scott, under the personal superintendence of Mr. Scott, jun., Mr. Best, and their engineer, Mr. Clark, C.E. Including the Edinburgh Dock, there will now be five wet docks in connection with the port of Leith—three on the west side and two on the east of the inner harbour. All these docks have been constructed within the present century.

IRON PIPES.

IN the selection of iron pipes some practical knowledge is necessary to discover weak castings and imperfections of detail. One of the principal points to be observed is equality of thickness all round. In pipe-casting the core is sometimes not true, or the section of the pipe shows the core to be not concentric with the outside. In such a case a pipe is necessarily weaker, because thinner on one side than the other, and even if strong enough to stand the test, its margin of strength is not what it ought to be. Now, pipes cast with eccentric cores can only be judged of by careful inspection of the ends. With regard to the usual "spigot and faucet" joint, it is now considered, where a solid foundation is met with, almost as cheap, as it is certainly economical, to turn the spigot to fit a bored socket, both being slightly tapered, by which means as the ends are brought to-

gether they fit to a nicety; a mere smearing of white lead, or other caulking, is then sufficient, and all the labour of filling in the loose end of spigot to make it fit the socket is saved. The pipes are quicker laid, and the bore can be ranged with more accuracy. The chief advantage of the old socket plan is that it allows of play, and in case the pipes are laid in a bid or yielding soil, the large socket with its caulking allows for settlement, and is not so liable to break off as a turned socket is. For flange-jointed pipes, the advantage of turning is great, as straightness and accuracy are more essential. The loss of water by leakage in most towns has been found to be very considerable, and the percentage of leakage to the total consumption is largely due to imperfect jointing. With regard to the quality and weight of iron, that re-melted from pig-iron is considered the best. One authority gives a weight of 25wt. as a minimum test load. In specifications it is usual to specify a vertical position for casting; careful ganging of the pipe is necessary to see that the bore is perfect, and that the pipes are concentric. Testing by water-pressure is, of course, very necessary, and a pressure equal to a column 300ft. high, or equal to 130lb. to the square inch, is adopted by many as sufficient. Specifications ought to state thickness, weight, tenacity, as well as a water-pressure test of the usual kind, as the water-test has sometimes been found misleading.

INTERNATIONAL COMPETITION FOR A MEMORIAL CHURCH AT ST. PETERSBURG.

A COMMUNICATION has been received from the Foreign Office, in a letter from Lord Tenterden addressed to the President and Council of the Royal Institute of British Architects, to the effect that British architects are invited to join in a competition for a church to be erected at St. Petersburg, on the spot where his late Majesty the Czar was assassinated. The designs must be submitted to the Town Council before the 12th of January, 1882; and the conditions, &c., of the competition, extracted from the *Journal de St. Petersburg*, are contained in the following paragraphs:—

(Translation.)

Extract from the *Journal de St. Petersburg*, May 25. (June 9), 1881.

"In pursuance of a resolution passed by the Municipal Council of St. Petersburg to erect a stone church, dedicated to the Russian Orthodox Ritual, and to be sacred to the memory of His Majesty the late Emperor Alexander II., a competition is opened for the design of this edifice, under the following conditions, viz.:—

"1. The design must be so arranged that the church has three altars, the spot where His Majesty the late Emperor fell mortally wounded (shown on the plan by a cross) may stand in the centre or at the right angle of the western part of the church. This spot may be considered as treated as constituting the object of an annexed part of the edifice, though it must nevertheless form one and the same connected design of the church as a whole.

"2. The foundation-line of the west elevation of the church must not advance into the bed of the canal to an extent exceeding 7ft. as indicated by the line *a* on the plan, but the steps of the *parvis* of the church may be placed upon the bridge.

"3. The basement is not intended to be applied to any purpose other than to provide room for the heating and ventilating apparatus and the storage of fuel.

"4. The church must be designed to hold a congregation of 1,000 persons, upon the principle of allowing 7ft. square to every 16 persons. (The number of 16 persons per square *sagène* (7ft. by 7ft.) is fixed, because the Russian Orthodox Ritual does not admit of the worshippers being accommodated with seats during Divine Service.)

"5. The position of the tower or that part of the building which is to contain the bells is left to the choice of the competitors.

"6. Competitors are also required to submit designs for the ornamentation of the bridge, which is to cover part of the canal so as to form a square in front of the church; and of the ornamentation of the part of the Palace Michel which will surround it.

"7. The designs must include:—(a.) Detailed plan of the church, two elevations, one a lateral one and the other facing the park, and also a section; these drawings to be prepared to a scale of one inch (English) to the *sagène* (7ft.). (b.) The west elevation and another section must be drawn to a scale of two inches (English) to the *sagène*. (c.) A general plan, on the scale of one inch to five *sagènes*. (d.) A perspective view of the church with its approaches. (e.) An explanatory memorandum stating among other details the cubic capacity of the church, computed in *sagènes*, and describing the nature of the materials to be used in the construction.

"Competitors may elaborate the details of the building as they may deem fit.

"8. Russian and foreign artists are both eligible to take part in this competition.

"9. The designs must be submitted at the office of the Municipal Council of St. Petersburg at the latest on the 1st of December, 1881 (12th of January, 1882), at noon.

"The general plan of the site whereon the church is to be erected may be had on application either to the *Gérant*

of the Town-hall of St. Petersburg, or to the offices of the newspapers in which the present notice appears.

"10. For four designs sent in by the appointed time, which fulfil the conditions laid down in the present programme, and are allowed by the jury to be the best in order of merit, the Municipal Council will grant four premiums. For the first in order of merit, 2,500 roubles; for the second, 2,000 roubles; for the third, 1,500 roubles; for the fourth, 1,000 roubles.

"11. All designs must be sent in a portfolio, and not rolled up in a case.

"Every sheet of the drawings, as well as the explanatory memorandum, must bear a motto chosen by the author of the design. The names, rank, and address of each competitor must be supplied in a sealed letter, bearing the author's motto on the cover.

"12. All the designs sent in will be exhibited to the public during eight days in the Town-hall. After the decision of the jury the successful designs alone will be exhibited again in public.

"13. The jury undertake to publish a short memorandum setting forth succinctly the merits and defects of all the designs presented. The names of the premiated competitors will be published in the journals in which the present notice appears.

"14. The prize designs will become the property of the Municipal Council of St. Petersburg. The designs not selected for the prizes will be returned, together with the respective letters unopened, upon presentation of the receipts originally given by the *Gérant* of the Town-hall.

"15. Members of the jury are debarred from participation, direct or indirect, in the present competition.

"16. The premiums awarded will not entitle the successful competitors to take part in the construction of the church. The committee appointed by the Town Council reserve to themselves the selection of the architect to be intrusted with the execution of the works.

"17. The jury consist of the following members of the Council of the Imperial Academy of Fine Arts, viz.:—Professors A. Rzhanov, D. Grimm, A. Krakau, and W. Schreiber; of the following members of the St. Petersburg Society of Architects, viz.:—Professors R. Bernhardt and E. Gibert; and of the Mayor of the City, as well as of four delegates appointed by the Municipal Council."

The Municipal Council have sent to the Institution a few copies of the "plan of the site set apart for the erection of the proposed church," and these are at the disposal of gentlemen desirous of joining in the competition.

A ROMAN AQUEDUCT 1,600 YEARS OLD RESTORED.

AFTER a lapse of 1,600 years the aqueduct built by the Emperor Augustus to supply Bologna with water was restored to use June 5th. Nineteen hundred years ago the imperial engineers tapped the Setta near its junction with the Reno, about eleven miles from Bologna, and brought its water to the city through an underground passage. They followed the course of the Reno, tunnelling the hills, sinking their work beneath the beds of the precipitous torrents which rush from the mountains into the river, and bringing the waters to the gates of the city, where they are divided, one portion going to supply the public-baths, and the other probably destined for the fountains of streets and public squares.

The work of tunnelling and the masonry were so thoroughly well done that both stonework and brickwork are still as solid as the rock itself, the only considerable breaks being where the turbulent Reno had washed away with its clayey banks several portions of the aqueduct, or where the headlong torrents which rush down into its stream had excavated their own beds and carried away the artificial substructure.

The restoration of this important work is due chiefly to Count Gazzadini, who caused an accurate survey of the aqueduct to be made about twenty years ago, and in 1861 published the results of the investigation in an elaborate memoir. Since then the work of restoration has been going on with a thoroughness and skill calculated to make the new work as enduring as the old. The aqueduct was originally made of brick and stone cemented with lime and volcanic sand, and the unbroken portions remained as hard as granite.

Various correspondents of the *Times* are suggesting the removal of the organ-screen at Westminster Abbey, and the transference of the clergy and choir to the space east of the transepts. The screen is, no doubt, thought by some a great eyesore; but the proposed arrangements could hardly be carried out unless the altar-screen and St. Edward's shrine were also removed and the altar placed in the apse. Precentor Venables has written strongly against the scheme.

The chapel of Lincoln's Inn, which is said to have been designed by Inigo Jones, is, according to the *Solicitors' Journal*, about to be altered and enlarged, under the superintendence of Sir Edmund Beckett, Bart., Q.C.

CONTENTS.

The National Competition Drawings at South Kensington	157
Builders' Architecture	159
The Furniture Trade Exhibition	159
The Water Question.—XIII.	160
Dangers to Health	161
Practical Notes on Plumbing.—VIII.	162
The Science and Art of Sanitary Plumbing.—VI.	163
Asses	165
Upper Rooms as Ovens	166
National Association of Master Builders of Great Britain	166
The New Edinburgh Dock at Leith	167
Iron Pipes	167
International Competition for a Memorial Church at St. Petersburg	167
A Roman Aqueduct 1,600 Years Old Restored	167
Our Lithographic Illustrations	168
Architectural and Archaeological Societies	168
Chips	168
Royal Archaeological Institute	181
Kent Archaeological Society	181
Books Received	182
Building Intelligence	183
Competitions	183
To Correspondents	184
Correspondence	184
Intercommunication	185
Parliamentary Notes	186
Legal Intelligence	186
Stained Glass	186
Our Office Table	187
Trade News	188
Tenders	188

ILLUSTRATIONS.

"BENT'S BROOK," HOLMWOOD, SURREY.—DESIGN FOR A TOWER AND STEEPLE.—ST. MARY'S CHURCH, HAMMERSMITH.—SKETCHES OF OLD DOMESTIC WORK.

OUR LITHOGRAPHIC ILLUSTRATIONS.

ARTISTS' HOMES: NO. 14, "BENT'S BROOK."

ONE of our double-page plates to-day illustrates the residence of Mr. J. E. Boehm, A.R.A., the sculptor. Bent's Brook is situated at Holmwood, not far south of Dorking, on the Mid-Sussex line, and commands some fine views of well-timbered country. The site itself is comparatively low, and the soil being clay, it was advisable to keep the building well out of the ground, and in this way a rather unusually high elevation for such a house was obtained. The plan is very compactly arranged, with an ingenious approach to the well-centred hall and staircase, over which, by a mezzanine contrivance, a good store-place is secured. The drawing-room has a belvedere bay, reached from the garden by an external stair, under which is a covered-garden seat. A balcony overlooking the garden leads also from the drawing-room, and a billiard-room is arranged on the basement-level with a separate entrance from the porch. A tradesman's entrance is provided elsewhere. The kitchen and offices are on the lower-floor level, and a kitchen-yard is conveniently placed at the rear. Red brick, with cent-brick dressings, is the material used throughout for the walls, the upper parts of which are hung with ornamental tiles. The gables are enriched with wide, massive barge-boards, and the roof is surmounted with a white wooden cupola over the principal staircase. The terra-cotta panels along the entrance front, over the principal-floor windows, were designed by Mr. Boehm himself. The work was executed by Mr. H. Batchelor, builder, of Betchworth, and the architect of the house was Mr. R. W. Ellis, F.S.A., who superintended its erection.

THE GRISSELL GOLD-MEDAL DESIGN FOR A TOWER AND STEEPLE.

THE competition for the Grissell medal this year was unusually well-contested, five sets of drawings having been sent in of so much merit that the Council in the awards to four of them. The gold-medal drawings which we publish to-day fully illustrate the chief difficulties, artistic and constructive, to be overcome in dealing with a subject of this kind—namely, the mode of joining the steeple to the tower. Many of our English spires, which are beautifully proportioned when seen from the front, appear faulty when viewed on the angle, for while the spire continues the same width the tower appears wider in proportion as the diagonal of a square is greater than its side, thus making the spire seem too small for the tower, or as if it had been "telescoped" into it, and wanted pulling up. This defect is avoided in the gold-medal design

by tilting the base of the spire, which, though certainly not an original idea, is not so often resorted to as it might be with advantage when the tower is finished with a gallery and parapets. The transition from the vertical lines of the tower into the raking lines of the spire is further softened in this design by placing the large pinnacles in the centre of the wall instead of at the extreme angles, which are sufficiently marked by smaller ones. An unusual degree of picturesque richness has been given to the belfry stage by using three planes of tracery, showing the full thickness of the wall, thus combining an appearance of strength with lightness, besides casting deep and effective shadows. The construction employed is fully illustrated by the interior perspective sketch and detail sections.

PROPOSED CHURCH OF ST. MARY, HAMMERSMITH.

THE proposed Church of St. Mary, Hammersmith, is specially designed to enable the congregation to see the pulpit, and the east end of the church, with a wide nave of 35ft., narrowing to 30ft. at its east end, and with a chancel 24ft. wide. The decrease in the width of the nave is almost entirely hidden by the intersection of the nave and transept roof. The turret will serve both for a bell and ventilating-turret. The materials used will be stock bricks with red-brick dressings, and red tiles for the roof; £8,200 is the cost estimated by the architect, Mr. Arthur Baker, 14, Warwick-gardens, Kensington.

SKETCHES OF OLD DOMESTIC WORK.

WE regret we have no description to hand of these sketches of old domestic work in Essex and Suffolk. They are very interesting, and many readers would have been glad to have known more about them.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

NEWCASTLE SOCIETY OF ANTIQUARIES.—Last week the Newcastle Society of Antiquaries held a meeting in the Old Castle. The Rev. Dr. Hooppell, who was unable to be present, drew the attention of the society, in a letter, to the foundation of what appeared to him to be a very ancient building at Pandon-hill, at the extremity of the wall in Causey-bank, and between the Sallyport-gate and the river. The building adjoined the wall, and was 30ft. wide, over 60ft. long, and the walls were 6ft. thick. He suggested that the contractor should be seen, and, if possible, a man should be employed by the society to explore the foundations. The Rev. Canon Greenwell was of opinion that they should have a plan made of the building spoken of in Dr. Hooppell's letter when it was properly excavated, and suggested the appointment of some person to do this. Alderman Cail said he would see the contractor, and ask him to give them notice if he came upon any other wall (because it was likely that the Roman Wall was to the south of the present one), or any other object of interest, and perhaps Mr. Holmes would take a sketch of any such objects. Mr. Holmes promised to do so. The matter then dropped, and the secretary drew attention to the question of restoring the Black-gate. Alderman Cail said a committee appointed to consider the question had made some plans, which he supposed would be in their possession. They thought that two good floors might be put in, and the present hideous top removed, and a more fitting one substituted for it. The building might then be made a museum for all the smaller objects they had in the castle, which could not now conveniently be seen. With that view, he should propose that they approach the corporation, and ask them on what terms they would let it to that society. Mr. R. S. Johnson explained the plan of the suggested alterations, which he said would cost about £1,300. Some further discussion took place, in which it was suggested that the corporation should be asked to restore the building, and in the event of their doing so that the society should hand over their museum to be placed in it, on the condition that they were appointed the custodians of the place. Ultimately it was agreed that the corporation should be asked to appoint a committee, with which the committee of the society having the matter in hand might have an interview on the subject.

SOMERSETSHIRE ARCHÆOLOGICAL AND NATURAL HISTORY SOCIETY.—The thirty-third annual meeting of this society is to be held at Clevedon on Tuesday, 23rd August, and two following days. On Tuesday, 23rd August, the annual general meeting will be held at the Public Hall, when an opening address will be delivered by the president, and papers read. In the afternoon the following places will be visited—Clevedon Court, Yattton Church, Old Rectory House, and Clevedon Old Church. In the evening there will be a meeting at the Public Hall for papers on subjects of local interest, and for discussion. On Wednesday, the 24th, there will be excursions to Twickenham Court, Twickenham Church, Tower House, Wrasall Church, Ashton Court, Long Ashton Church, Flax Bourton Church, Backwell Church, Chelvey Church, Chelvey Court, Nailsea Court, and Nailsea Church. There will be an evening meeting at the Public Hall for papers, &c. On Thursday, the 25th, the society will leave the Public Hall, Clevedon, for Cadbury Camp, Clapton-in-Gordano Court, Clapton-in-Gordano Church, Portbury Priory, Portbury Church, Portbury Camp, Portishead Church, Portishead Manor House, Portishead Quarries, and Weston-in-Gordano Church. Mr. E. B. Ferrey will describe the various points of architectural interest visited during the excursion; the Rev. H. M. Searth the earthworks at Cadbury and Portbury; and the Rev. H. H. Wiuwood will explain the geology of the Portishead quarries.

WARWICKSHIRE FIELD CLUB.—An archaeological excursion of the Warwickshire Naturalists' and Archaeological Field Club took place on Wednesday week, when Ashby-de-la-Zouch was the chief place of interest. The party first inspected the ruins of the castle, erected by William Lord Hastings, in the reign of Edward IV., and one of the places of detention of Mary Queen of Scots. Passing to the church the Rev. J. Denton explained the recent restoration and enlargement. The church dates, probably, from the 14th century, and was much altered in the 16th. The Hastings Chapel forms the south side of the chancel; the north side of the chancel is the vestry, over which is a spacious chantry, which was put to good use in the latter part of the 16th, 17th, and early 18th centuries, being converted into a library. In the vicarage garden are remains, some very good, of window mullions from the church, removed, but reproduced. There is also a sundial, once in the possession of Sir Isaac Newton. One chalice, silver gilt, is Elizabethan—the base of it is Medieval; another chalice is supposed to be the cup given by Edward IV. to the Earl of Huntingdon. Staunton Harold Church was next visited, and is interesting, because the only church restored under Cromwell (1653); it contains some fine monuments of the Shirley family. The hall is the seat of Earl Ferrers. After inspecting this mansion the party proceeded to Calke Church and Abbey, and the Norman Church of Melbourne, restored by Sir Gilbert Scott. Time did not permit the completion of the programme, which included Breeden Church, formerly a conventual one, and beautifully situated on the summit of the Bulwark-hill, with the adjoining traces of a priory, the remains of the abbey at Grace Dieu, and the slight ruin of the castle built in the reign of King John.

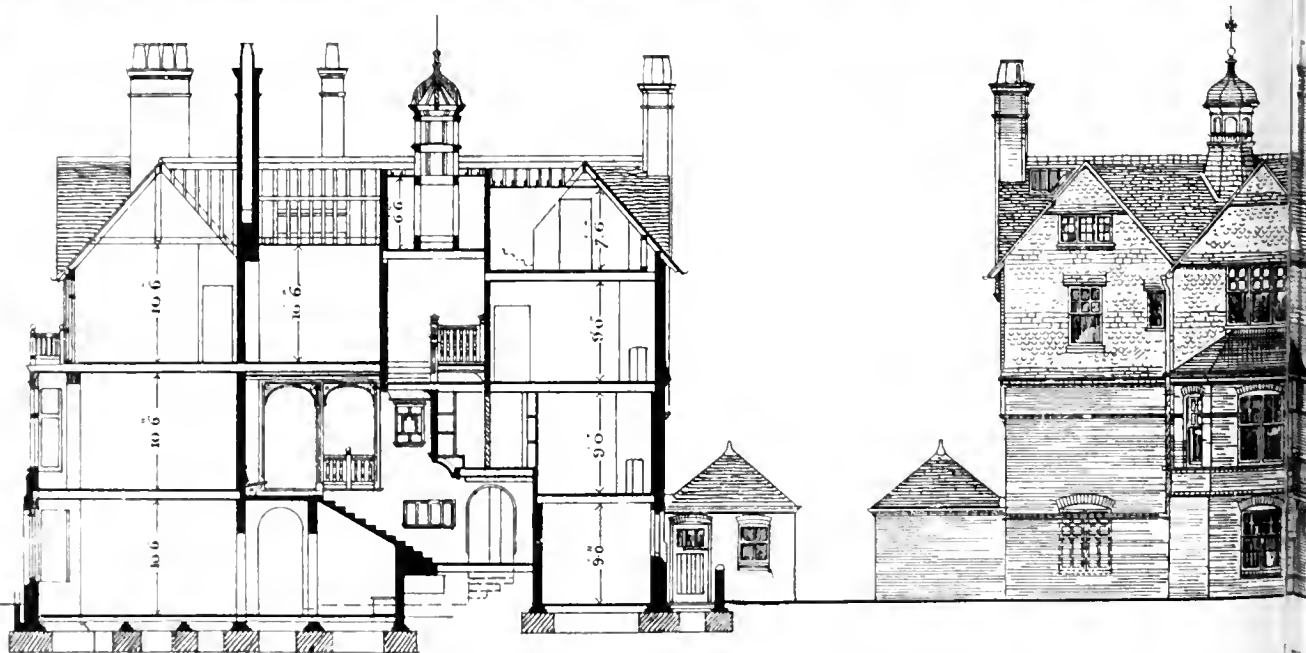
CHIPS.

The Queen has conferred the honour of Knighthood on Mr. F. J. Bramwell, civil engineer, in consideration of his services to technical education, and on Mr. James Allanson Picton, F.S.A., F.R.I.B.A., of Liverpool.

The restoration and enlargement of the parish church of Northchurch has been finally determined upon, and operations have been commenced. Mr. Cook, of Berkhamstead, is the contractor.

Messrs. Thomson and Co., of Birmingham and Manchester, have just supplied a dwarf screen, gas-fittings, and altar-furniture to St. James's Church, Wednesbury. The same firm are making a very elaborate screen for the church of St. Michael, Handsworth, Birmingham.

The new church of St. Paul, in Santley-street, Brixton, S.W., was consecrated on Friday by the Bishop of Rochester. It is built of brick, with Bath-stone and terra-cotta dressings; and seats, including accommodation in side galleries, 1,610 persons. The architects are Messrs. Habershon and Fawcner, of 38, Bloomsbury-square, and the builders, Messrs. D. C. Jones and Co., of Gloucester. The cost has been nearly £11,000.



Section on line A-B.

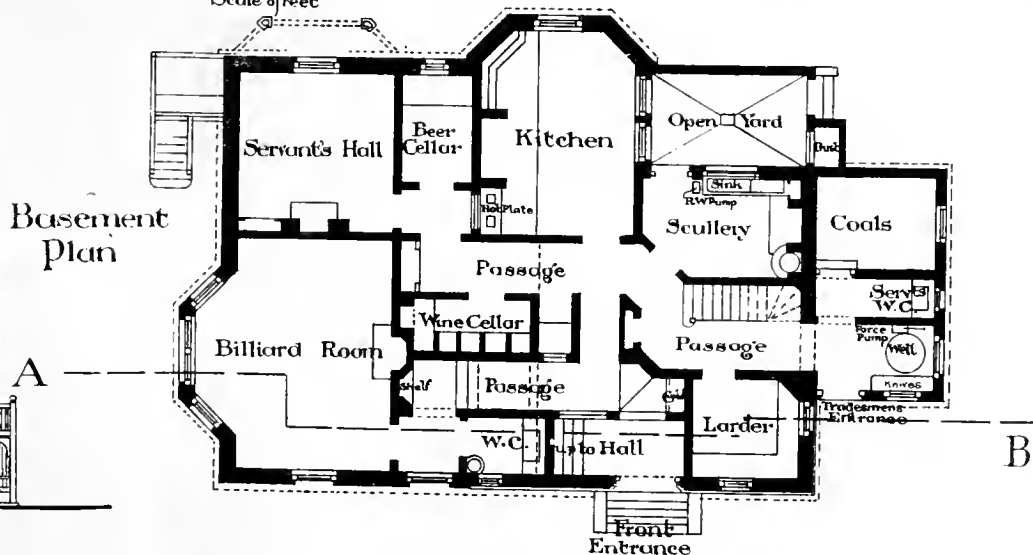
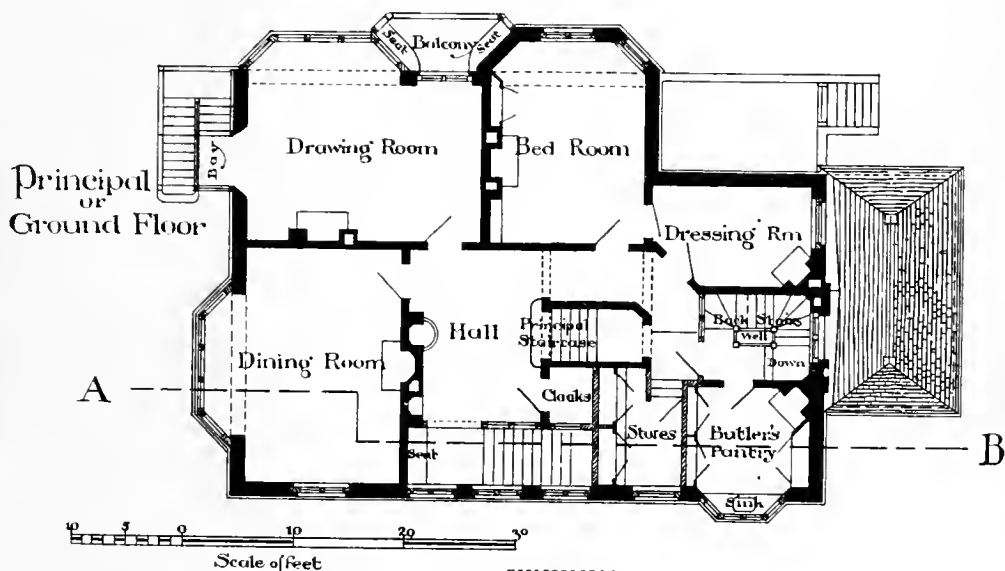
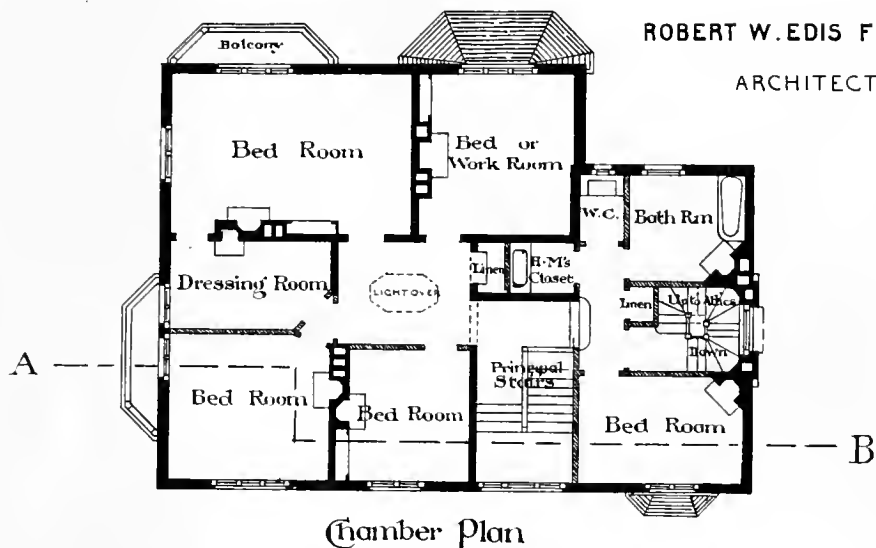
Garden

ARTIST'S HOMES N^o 14 "BENTS BROOK"

HOLMWOOD SURREY

THE RESIDENCE OF J.E. Boehm Esq^{re} A.R.A.

ROBERT W. EDIS F.S.A.
ARCHITECT





THE BUILDING [JEW].

AUG. 5, 1881.

ST MARY'S CHURCH HAMMERSMITH

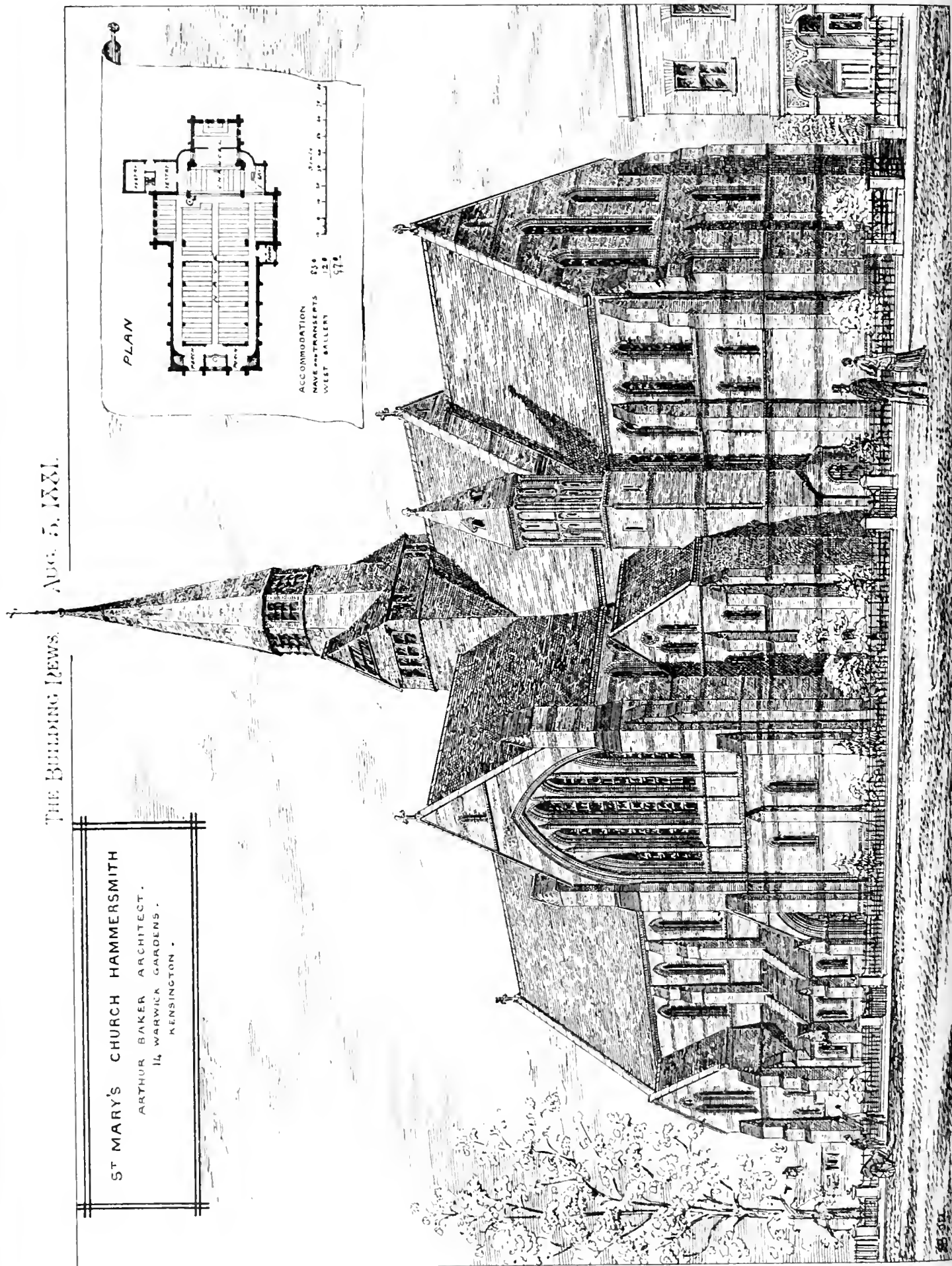
ARTHUR BAKER ARCHITECT.
14, WARWICK GARDENS.
KENSINGTON.

PLAN

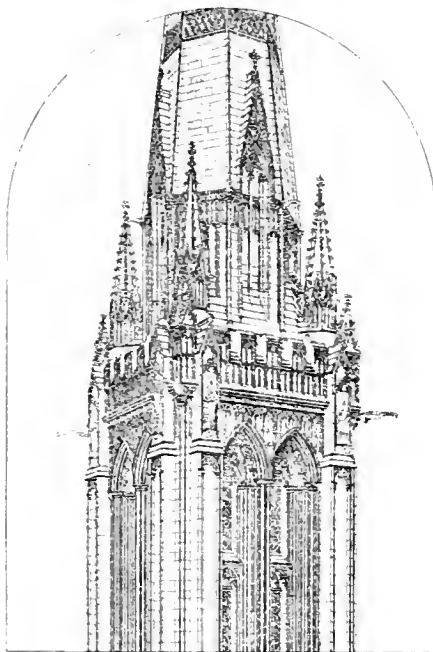


ACCOMMODATION
NAVE + TRANSEPTS 128
WEST GALLERY 97 1/2

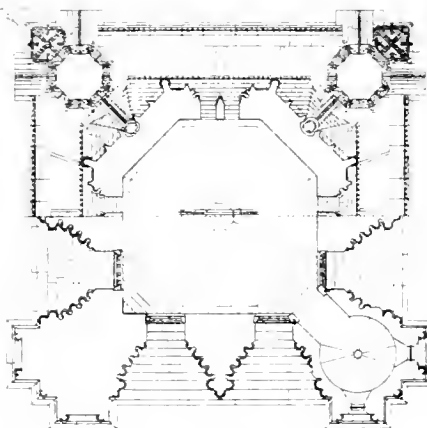
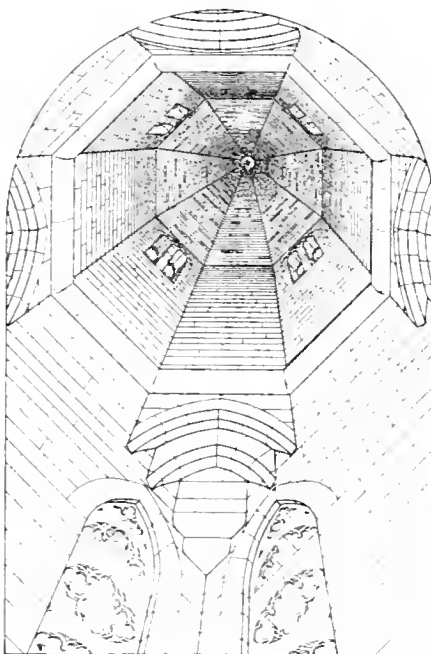
Scale
0 5 10 15 20



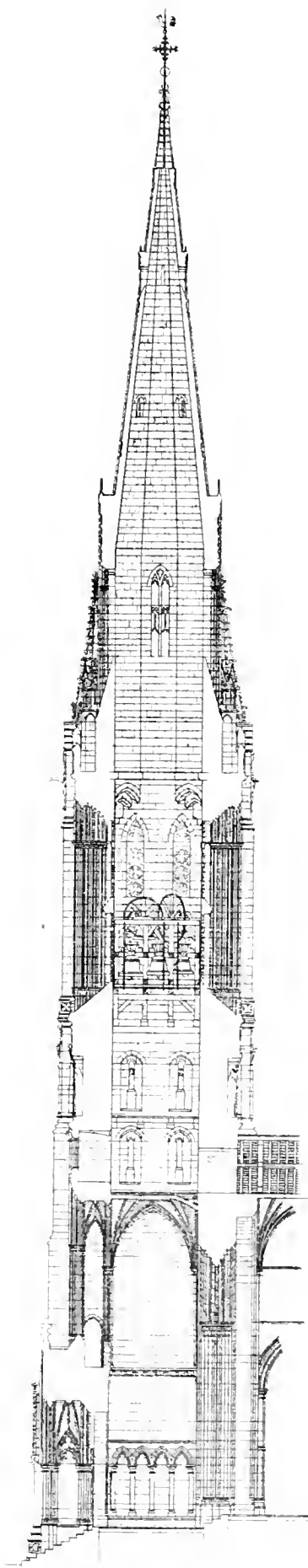
Design for a Tower and Steeple



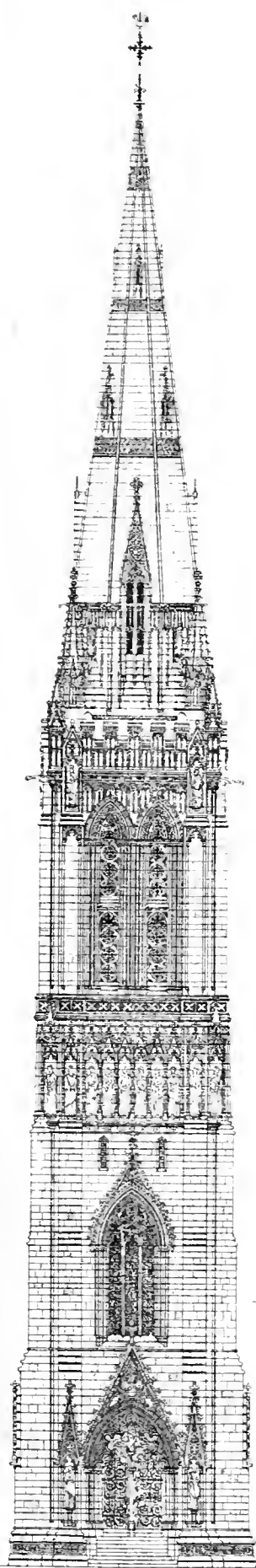
View from the North West

NU-Pharmat-Beliefs-Stage

View from Belfry floor looking up



Section



Elevation
Medal"

Scale of Feet

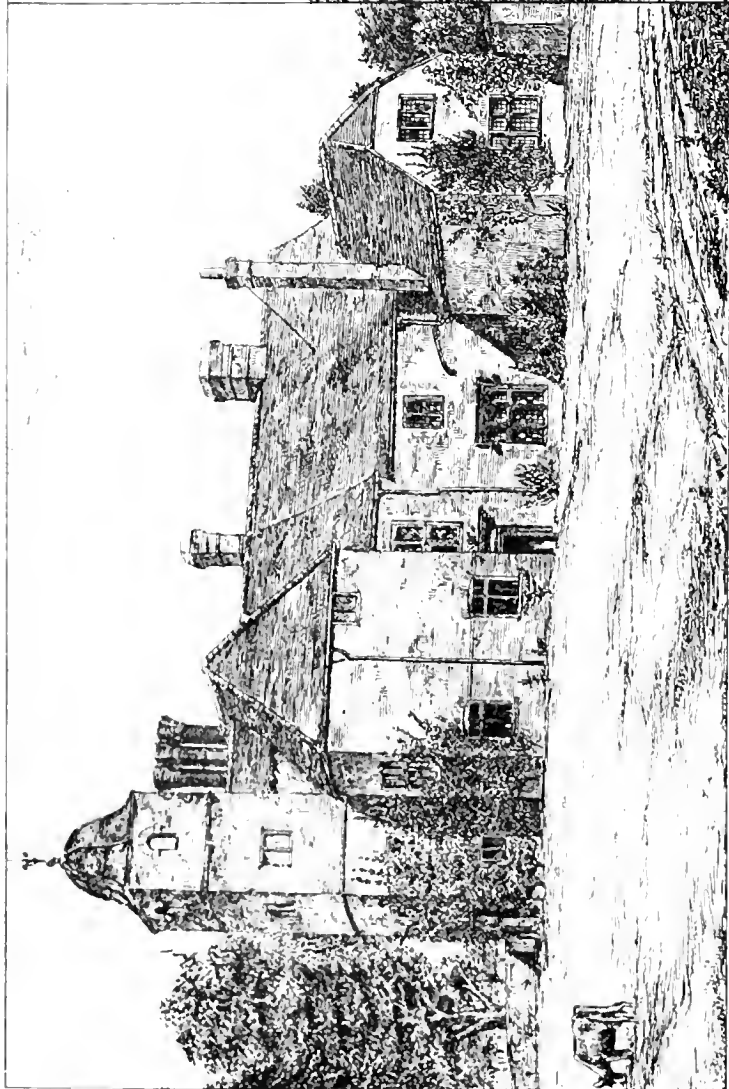
R.I.B.A. THE GRISSELL GOLD MEDAL DESIGN

OV EDEAK MILLER 1921

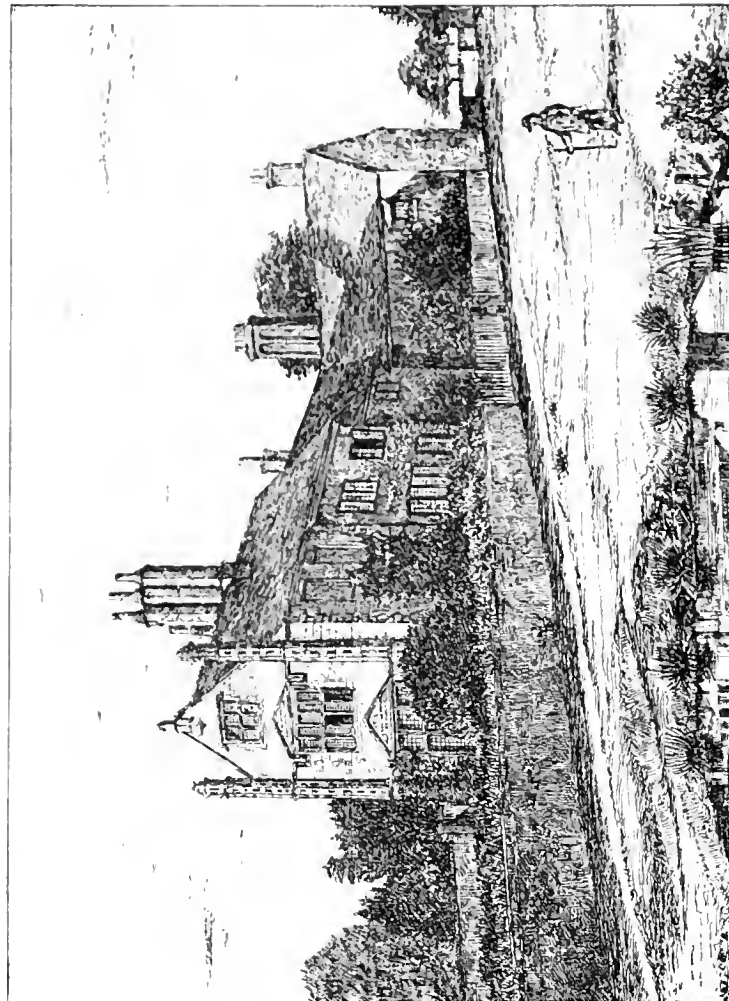
American Patriotic League



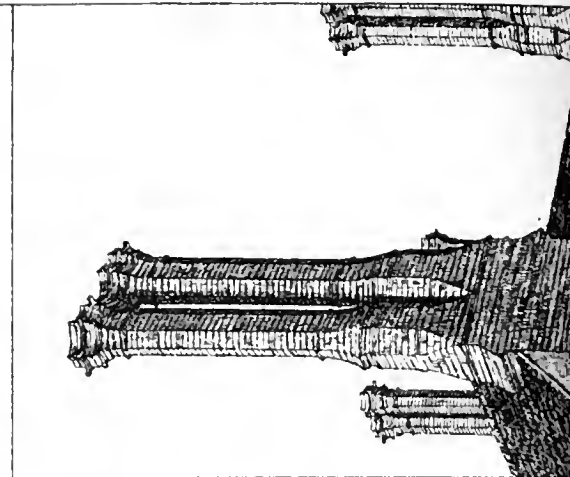
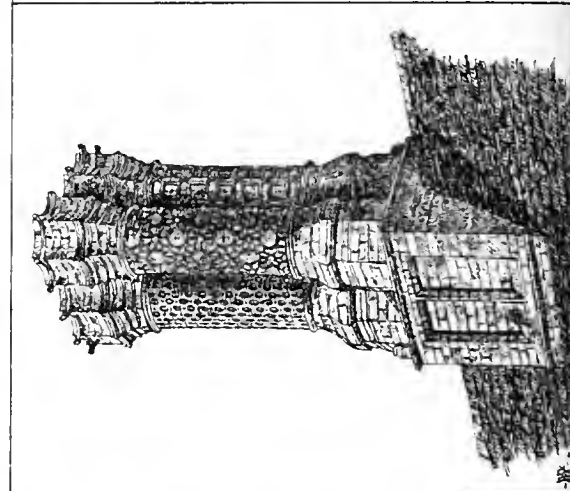
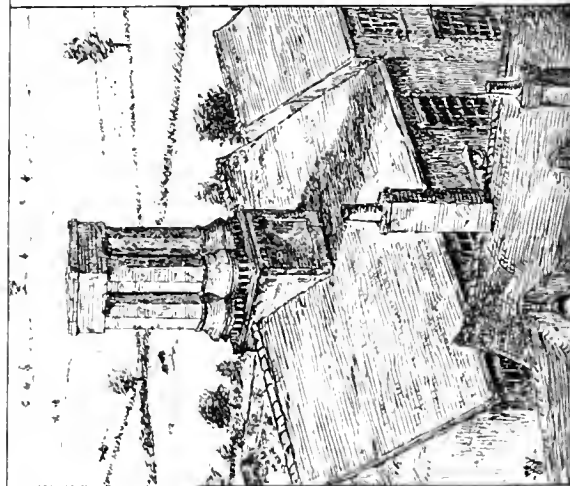
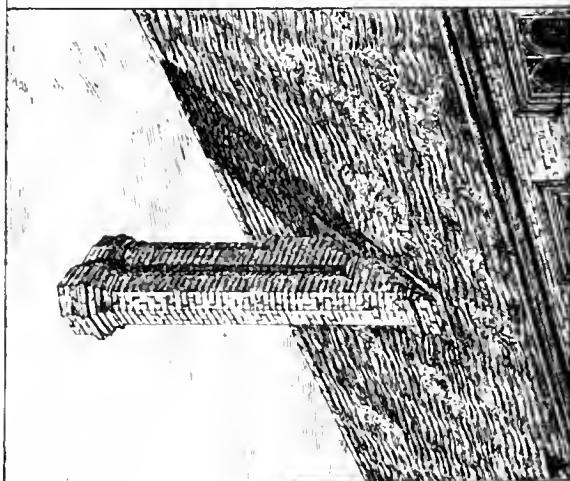




PANFIELD PRIORY, ESSEX

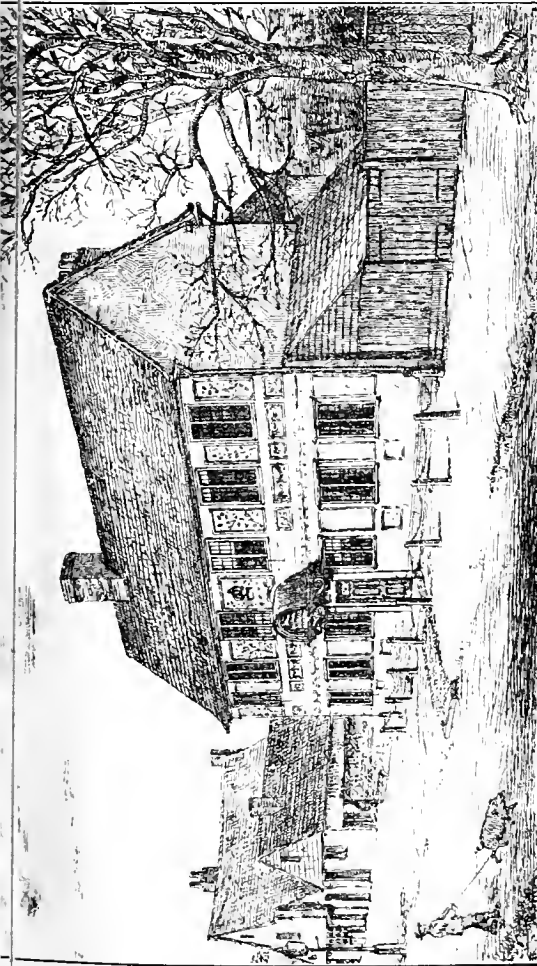


DOREWARDS HALL

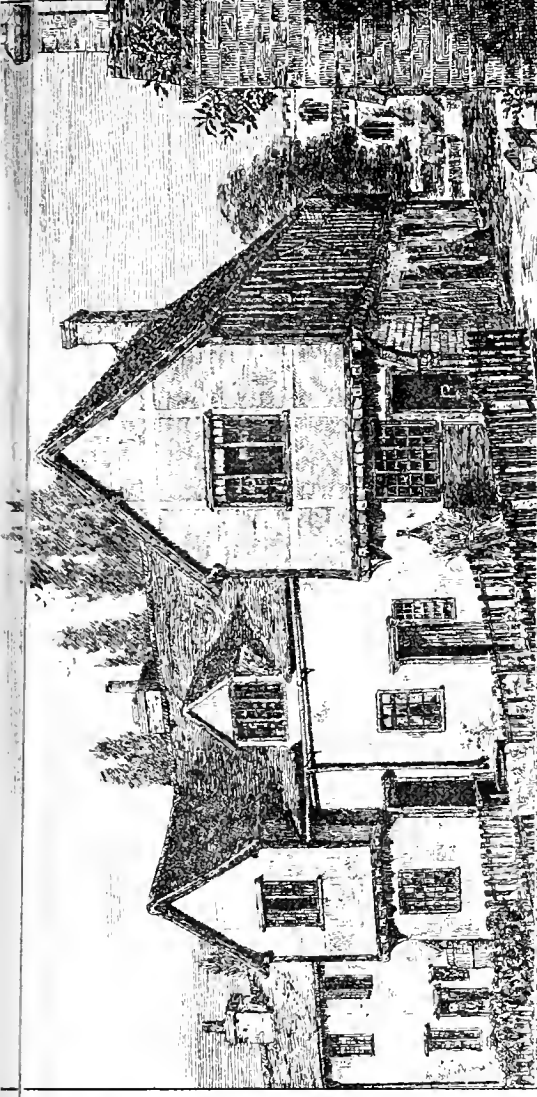


GREAT WALTHAM, ESSEX.

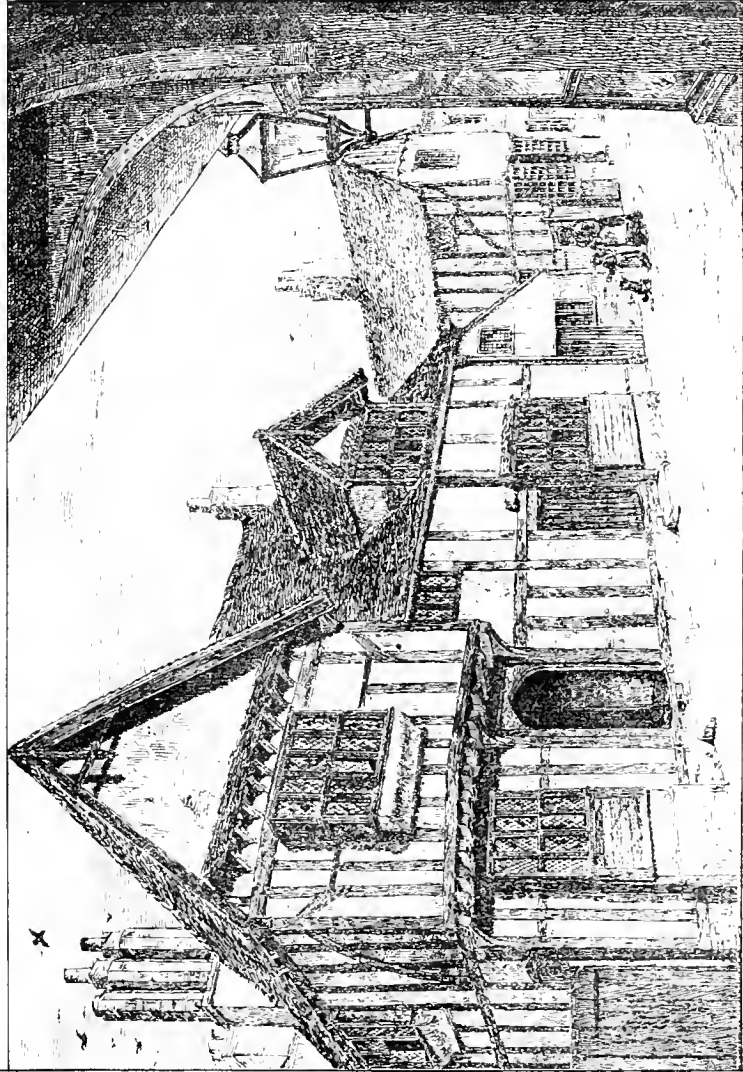
NEWPORT, ESSEX.



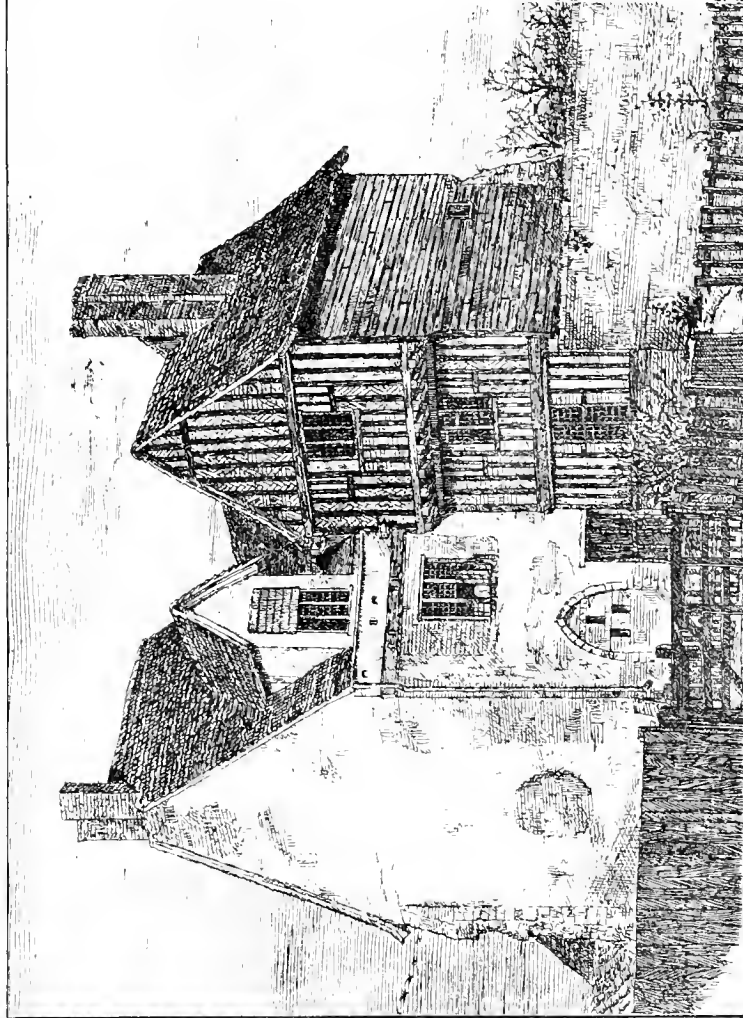
"CROWN HOUSE", NEWPORT, ESSEX, ONCE THE RESIDENCE OF NELL GWYNN.



WRITTLE, ESSEX



CROSS STREET, SUDBURY, SUFFOLK.



BEELEIGH ABBEY.

SKETCHES OF OLD DOMESTIC WORK BY F.W. WOODHOUSE



ROYAL ARCHEOLOGICAL INSTITUTE.

WEDNESDAY week, the second day of the Archeological Congress at Bedford, was devoted by the archaeologists to a rather long journey by rail and carriages to Leighton Buzzard, Wing, Stewkeley, and Edlesborough, the churches of which places were severally explored under the guidance of Mr. J. H. Parker, Mr. M. H. Bloxham, and others. At Leighton, the fine tower and spire, the scroll-work on the south door, and the restored market-cross came in for their share of admiration. At Wing, the ancient crypt, believed to be very Early Saxon, if not Roman work, was inspected, Mr. J. H. Parker acting as interpreter. The great likeness between Stewkeley and Ilfley churches was made the subject of remark by the visitors, who were obliged to content themselves with a hasty visit, as luncheon was waiting them at Edlesborough. Here they inspected the Early English church recently restored, and also an ancient barn, with windows and timbers of at least Early Tudor date. After luncheon they drove to Eaton Bray church, another very fine specimen of the Early English style; thence to Dunstable, where the excellent reparations in progress in the old Priory Church received due acknowledgment. The Bedfordshire Architectural Society has lately voted a grant of £50 in aid of these works, especially on the north aisle, but a far larger sum is needed to complete the fabric. The company were also shown over the prior's house, and part of the old Royal Palace. From Dunstable they returned by railway, *via* Luton, to Bedford, which they reached after a long but pleasant day. In spite of a shower or two, the weather was delightful on the whole, and the day was pronounced a great success. In the evening the President and Council of the Institute gave a *conversation* at the Bedford Assembly Rooms, which was numerous and fashionably attended. The company were much interested by a collection of Bedfordshire antiquities and art-treasures; specimens of Roman and British pottery; copes and altar cloths from neighbouring churches; engraved portraits of innumerable members of the house of Russell (from Woburn Abbey) and of the Byng and Whitbread families; an original portrait of the Lord Protector, and one of his military boots; and several portraits, autographs, and other "relics" of John Bunyan, including his drinking cup, his little oak cabinet, and his chair, which was lent specially by the trustees of the chapel where it is kept. But, perhaps, the chief interest was felt in the ring given by Queen Elizabeth to Lord Essex, the non-production of which, at a critical moment, cost the Earl his life. This was lent by Mr. F. J. Thynne, of Hawnes, near Amptill, one of the vice-presidents of the meeting. The papers read on Tuesday evening were as follows: On "Chancer's Monument in Westminster Abbey," by Mr. M. H. Bloxham; on "The Church of St. Mary, Bedford," by Mr. G. Hurst; and on "St. Paul's Church," by Mr. J. Day.

Thursday morning was devoted to the annual general meeting of the institute, which was held in the Bedford Assembly Rooms, under the presidency of Lord Talbot de Malahide. The annual report, which was read and adopted, recorded the fact that the Council had joined with the Society of Antiquaries in considering the steps necessary for the preservation of Stonehenge, and had also entered its strong protest against the destruction of the west front of St. Alban's Abbey, which is still going on under the name of "restoration." Lord Talbot also announced that the institute had received from the Bishop, the Chapter, and the municipal authorities of Carlisle a pressing invitation to hold the Congress at Carlisle next year, and that the invitation had been accepted. At the close of the meeting, the carriages and brakes were ordered, and the party, about fifty strong, left for Cople Church, where they inspected the monuments, brasses, and heraldic bearings of the Launceylons, Lukes, Rolands, and Greys. The next halting-place was Willington, where the monuments, and especially the helmet and tabard of Sir John Gostwick, Master of the Horse to Henry VIII., were inspected. These, it was stated, were probably worn by him on the Field of the Cloth of Gold. Leaving Willington, Sandy was reached at a little after one, when the party sat down to lunch at the Greyhound. At two they proceeded to Caesar's Camp, in the

pine woods, above the town. Thence they made their way to Galley-hill Camp, where a similar construction was noticed. The general opinion was that these camps were of British, not of Roman origin, though they might possibly have been used by the Romans during their occupation of this country. In the course of the afternoon they were entertained at afternoon tea by Mr. J. N. Foster, one of the vice-presidents of the meeting, at Sandy Place. They afterwards inspected Howbury Camp and Risinghoe Castle, two curious earthworks, probably also of British origin, and erected to defend the fords across the river. The return journey to Bedford was then made. In the evening there were sectional meetings in the Bedford-rooms, when several papers were read by Messrs. Wormall, Copner, Micklethwaite, and others. In the Archeological and Historical Section, the Dean of Ely gave the members an interesting address on the history of Bedfordshire, in the course of which he alluded to the fact that, except during the struggles of the Civil War, that inland and level county had never played a conspicuous part in the annals of England, and paid it a handsome compliment as the nurse of John Bunyan.

On Friday the expedition organised was to St. Alban's and to Luton, by railway. At St. Alban's the archaeologists were met by a large contingent from London, and by several members of the association, who were conducted over the building by Mr. J. T. Micklethwaite, F.S.A. He explained the various features of the structure, from the first foundation of the present Abbey in the early Norman times, when Saxon and Roman materials were worked into the walls of the new fabric. He afterwards commented on the portions of the great work executed by Abbots de Cella and Trumpington, and by Abbot Wheathampstead, who, he said, was the designer of the fine west window now in course of demolition by Sir Edmund Beckett. He also explained the curious history of the recent discovery and reconstruction of the shrines of St. Alban and St. Amphibalus (though he seemed to regard the latter saint as somewhat apocryphal), and illustrated the singular history of the preservation of the central tower and of the Lady Chapel. The archaeologists wished for admission to the western portion of the nave, but were refused, so they went outside the west front to survey and deplore the work of destruction, Mr. J. H. Parker stating publicly that he regarded the newly-designed window as a "grave mistake." The company, having lunched at the Peahen, inspected the church of St. Michael and the monument of Lord Bacon, and then reconnoitred the remains of Old Verulam and of the British city on the banks of the Ver, the abbot's boat-house, and the large earthworks at Bernard's-heath. In the course of their return journey they visited the large and handsomely-restored parish-church of Luton, with its exquisite and antique baptistry, and the Wenlock Chapel. Having reached Bedford in good time, they met again in the evening, at the Assembly Rooms, where papers on "The Earthworks of Bedfordshire," on "The Mural Paintings at St. Alban's," and on "The Churches and the Bells of Bedfordshire," were read by Dr. Prior, Messrs. Ridgway-Lloyd, Foster, and North.

On Saturday the archaeologists had a long day, the pleasure of which was slightly interfered with by the rain which fell in the morning and afternoon. In spite of the weather, however, they contrived to visit Clapham Church, conspicuous all round by its lofty Anglo-Saxon tower. From thence they drove on to Colworth-house, where they were hospitably received at luncheon by Mr. Charles Magniac, M.P., and the Hon. Mrs. Magniac, who exhibited to them the art-treasures for which the house is famous—books, prints, pictures, and old china, including a vase of Henry II. ware, a "Maximilian" suit of armour, a fine full-length portrait of Sir Philip Sidney, and a gallery of small early portraits from Holbein downwards. Having finished their hasty inspection they proceeded to Sharnbrook, and thence to Felmersham, where they inspected the churches at their leisure, waiting till the rain ceased. Then they made their way to Stevington, where they admired the Anglo-Saxon work in the tower, and also a curious low side-window, perforated through the wall to enable worshippers in the south chancel aisle to see the elevation at the high altar. Some

floriated crosses on stone slabs, formerly the lids of tombs, were also shown. From Stevington they passed to Oakley—a parish almost wholly belonging to the Duke of Bedford, whose pew in the church is partly roofed by an old rood-loft, much of which still stands *in situ*. Here a mixture of Saxon and semi-Norman architecture was noticed by Mr. Parker, who acted as interpreter to the party. The archaeologists drove back to Bedford by way of Bromham-bridge, a curious structure of the 14th or 15th century, which here spans the Ouse and consists of between fifteen and twenty arches. In the evening there was a large gathering at the Assembly Rooms, when papers were read on the "Doomsday-book of Bedfordshire," by Mr. Cary Elwes, and on the "Eminent Families of the County and their Heraldry," by Mr. Stephen Tucker, Somerset Herald.

Monday, the concluding day of the Congress, was in some respects one of the most pleasant of all, being devoted to a visit to Elstow, the birth-place of John Bunyan. The parish-church in which the future author of the "Pilgrim's Progress" was baptised, and which is now undergoing an entire restoration—indeed, to some extent a reconstruction—was visited by the archaeologists, who were somewhat divided in opinion as to the merits of the plan followed by the architect. They also inspected the cottage traditionally said to have been inhabited by Bunyan, and the old "moot house" upon the village green, with the base of the village cross standing near it. From Elstow the drive was short to Houghton Conquest, where the fine, but fast-fading, frescoes on the walls and the tombs of the Conquest family, with their brasses, were much admired. Thence Amptill was reached, where luncheon awaited the party at the White Hart, after a hasty visit to the picturesque ruins of Houghton-house; while some, in preference to luncheon, walked to the cross, erected a century and more ago by Lord Ossory, in Amptill-park, to the memory of Katharine of Arragon, who resided here when her divorce was pronounced by Cranmer at Dunstable, and afterwards was content to live here a disrowned queen. The afternoon was spent by most of the archaeologists in a visit to Wrest-park, where they were shown the fine gallery of family paintings belonging to the De Greys, Cowpers, and Lucases. The weather throughout was delightful, and the congress happily ended without any *contretemps* or drawback.

KENT ARCHEOLOGICAL SOCIETY.

THE annual two days' meeting of this society was held last week, the centre being Canterbury. On the first day (Wednesday) the hospital at East Bridge, in that city, an establishment founded about 1180, was seen under the guidance of Canon Scott Robertson, after which the 24th annual meeting was held in the hospital chapel, when a report of a highly encouraging character was read. It stated that interesting discoveries of foundations containing Roman masonry have been recently made at St. Pancras ruins, in the cemetery of the ancient Abbey of St. Augustine, outside the city of Canterbury. Other discoveries have been made near Canterbury and Wingham by Mr. Dowker, and the fruits of other discoveries made at Faversham and Canterbury will be seen in the temporary museum, where they have been placed by Mr. Brent and Mr. Sheppard. At the Roman castrum of Reculver, the demolition of certain wooden outbuildings has exposed to view a portion of the core of the Roman wall, not before seen. Owing to a slight landslip, this masonry needs to be underpinned. The Admiralty had resolved to underpin it and to face it with new brickwork. Colonel Pasley, the Director of Works, has most kindly ordered that instead of a complete masking-wall, nothing more than piers necessary for support shall be placed over the old wall-core.

The ancient church of St. Martin was next visited, a paper being read there by the Rev. Canon Routledge. He said: "The original church allowed to fall into partial ruin after the Roman evacuation of Britain, was probably restored towards the end of the 6th century, and rededicated to St. Martin of Tours; and portions of this building are existing even in the present day. The church has suffered from frequent partial destructions and restorations. Windows put in at uneven levels, doorways and porches

stopped up here and there, and the irregularity and incongruity of the masonry, all testify to its varied fortunes. A perfect mine of wealth for the geologist is to be found in its wall, including Roman tiles, travertine, tertiary sandstone, Kentish rag, Purbeck, red sandstone, Caen stone, flint, and green sandstone. The interior of the church assumed its present general shape at the end of the 12th or beginning of the 13th century, though many alterations and additions have been made. Of the building as it now stands we may roughly assign the different portions to the following periods:—Roman.—General prevalence of tiles, most likely some of them *in situ*, in parts of the chancel wall. Saxon or pre-Norman.—The Priests' door (6ft. high) on south of church; traces of another door south-east of nave which from measurement I have discovered to be necessarily anterior to the Norman piscina; and large portions of wall masonry—square stones with long intervals of sea-shore mortar. Norman.—Font; probably buttresses; and a piscina said to be the earliest and most complete existing in England, with two holes above it for the support of the canopy. It measures 20in. by 12in. Early English.—Chancel arch, roof of nave, and locked porch or door south-west of the church. 14th century, Decorated.—The lower and single-light windows of nave. Beginning of 15th century.—The window over the font, which is clearly half of a former two-light window. End of the 15th century.—The ambury. Mr. Loftus Brock, F.S.A., Hon. Sec. of the British Archaeological Association, considered the font, which is almost unique, from being built up of different stones in tiers—as of the Saxon period, but subsequently decorated and beautified.

The members next visited the site of St. Pancras' Chapel, so far as it lies in the grounds of the county hospital. Here excavations have been made under the direction of the Bishop of Dover and Canon Routledge, but the owner of the ground on the other side of the wall has refused to allow any digging to take place there. There are still standing, Canon Routledge said, portions of a wall built with Roman tiles and sea-shore mortar, pronounced by Mr. Parker and others to be a Roman wall, with apparent traces of the spring of an arch. The wall is about 9ft. long, and 8ft. high above ground, with buttresses of 16in. and 18in. The foundations of a wall and buttresses, exactly corresponding, have been uncovered on the other side, forming a porch 10ft. 6in. long, and 9ft. 3in. wide, with an opening at the west end of 6ft. 6in. Below the surface, at an average depth of 14in., there are parts of a pavement consisting of coloured and patterned tiles, mostly of the latter end of the 14th or beginning of the 15th century. These tiles have been found in all parts of the building, and some of the earlier ones apparently formed the pavement of that church, of which the east window and chancel walls are still remaining. About 15in. below this pavement are some remarkable tombs, in which were found bones, laid on the bare earth, and built round with stones. On the eastern side of the porch is a doorway 2ft. 8in. wide, of Norman workmanship, splayed internally, and leading into the nave. The walls turn southward for a distance of 12ft. from this doorway, then eastward, till at a little over 16ft. from the turn we come to a slab of Betherden marble, and some 15th-century work forming part of a doorway leading into the southern chapel, aisle, or porch. Then on for 24ft. till we have reached the end of the nave, where we find a lateral buttress extending 3ft. 5in. to the south, and a Mediaeval wall or buttress reaching 6ft. 9in. to the east. Here also is a massive circular pillar, apparently embedded in the wall. The foundations of the old chancel wall, on which that of the later church has not been symmetrically placed, start 10in. further in than those of the nave-wall, and can be traced for 12ft. or 13ft. more till we detect the apparent commencement of an apse; but at this interesting point we are warned off by the owner of the adjacent ground.

There are remains of a rude altar, with the pavement of 15th century tiles, complete on either side. The altar, 4ft. 4in. by 2ft. 2in. in size, is of an uncertain date, possibly cotemporary with the pavement, but built on older foundations. In addition to the later 15th-century doorway there are distinct traces of an entrance 3ft. 3in. wide, on the northern side, 3ft. from either end,

the jambs not splayed, but running straight through at right angles to the walls. Among the debris in this portion were found several pieces of glass and of fused bronze, and portions of a door and Late Tudor window, and deeper down two or three fragments of Roman pottery. Seven or eight inches below the tile pavement, under a close layer of brick earth, is a floor of concrete, showing, in parts, marks of fire. This concrete floor seems to extend beneath the present altar, and is also found just outside the porticus in the nave; and (within the pigstye) at the entrance to the chancel, where we discover something like steps. The foundation walls (20in. wide) are composed of Roman tiles with here and there salmon-coloured mortar, and in other cases mortar made from sea-shells and pebbles and even later material. Canon Routledge added that he conjectured that the remains at the east-end were those of a small Romano-British church, and this was corroborated by a story related by Thorn, a writer who flourished five centuries since. In this view other speakers concurred, Mr. Loftus Brock remarking that it will be a disgrace to the men of Kent if such a place be allowed to remain in its present wretched condition.

The members having been shown over St. Augustine's College buildings, were divided into three parties and conducted over the cathedral by Archdeacon Harrison, and Canons J. C. and W. A. S. Robertson.

After dinner, to which upwards of 200 sat down, an evening meeting was held in the cathedral library, under the presidency of the Dean.

The Rev. Canon Jenkins opened a discussion on the question, "Did Lanfranc introduce close-jointed masonry into England?" and was followed by Archdeacon Harrison, the Rev. Canon W. A. Scott Robertson, and the Dean. The last-named said that close-jointed masonry existed in the time of Lanfranc.

Mr. James Neale, F.S.A., read a paper on the wall-paintings in Canterbury Cathedral, and the means used for their preservation, from which we may give extracts in a future issue.

The second day, Thursday, was devoted to an inspection of several village-churches near Canterbury, the members proceeding in carriages.

At Ickham Church the members were received by the vicar, the Rev. E. Gelder, who showed that the tower was the only discernible relic of the old Roman structure. The north and south walls were pierced at some period in order to throw out aisles; but instead of erecting arcades, portions of the walling were left to support arches of unequal span.

At Wingham Church the Rev. Canon Scott Robertson read a paper on this large edifice, which has fragments of a Norman doorhead outside the west wall of north chancel, and became collegiate in 1286. The church was restored by Mr. Ferrey some years since.

Having seen two Mediaeval houses in Wingham, the members proceeded to inspect the important excavations recently made by Mr. G. Dowker, F.G.S. Having heard reports that Roman coins and carved stones had been found in the parish, Mr. Dowker made trial borings, and had been so fortunate as to find foundations of a Roman villa. He believed, from the great number of Roman tiles, fragments of mosaic, brickwork, and concrete he had found, that the remains of a Roman town would be disinterred here, which would quite eclipse in interest those recently found at Brading, Isle of Wight.

At Adisham a description of the principal features of the church was given by the Rev. H. Montagu Villiers, the rector. On looking round the church he supposed they would agree that it was originally a Norman church, but there was very little of the Norman building left. The nave was that of the second church which belonged to the earliest Pointed period, and was supposed to have been built about 1150. A stained-glass window has been put in the church to the memory of the late Mr. Godfrey Faussett, formerly secretary of the Kent Archaeological Society. On driving to Bifrons, the seat of the Marquis of Conyngham, the members were received by the steward, and were permitted to inspect various rooms which contained many valuable paintings and objects of interest. Patricbourne Church, near Bitons, was described by the Rev. F. T. Vine. He stated that a church existed there in 1086, the name of the place being then simply Bourne. The architec-

tural details led to the belief that the church was rebuilt in the second half of the 12th century. The last restoration was carried out by Sir Gilbert Scott in 1857. The most remarkable feature of the church was the doorway, which was the most richly-moulded Norman one in Kent. At Bishopsbourne Church, a spacious building restored nine years ago, the monument to Richard Hooker—the "judicious Hooker"—who was described as Master of the Temple and for five years rector of this parish, was seen, and a visit to the rectory, where Hooker's study and the dining-room were inspected, closed the proceedings.

BOOKS RECEIVED.

A Practical Treatise on Coach Building, by James W. Burgess (London: Lockwood and Co.), is a contribution to a branch of technical literature singularly barren, so far as good textbooks are concerned. From an antiquarian, as well as a practical point of view, the history of carriages is very interesting, and a somewhat fuller account of the gradual development of vehicles and their parts, from the first rude forms of raft and sledge, down to the shapes with which we are now familiar, than that given in M. Burgess' first chapter would have been welcome. We should also have been glad of more detailed information in the more practical portions of the book.—*The House-owner's Estimator*, by Jas. D. Simon, A.R.I.B.A., edited and revised by F. T. W. Miller, A.R.I.B.A. (London: Lockwood and Co.), is the third edition of a handy, well-compiled, and accurate price-book for unprofessional people, as well as the architect and builder.—*Birchington-on-Sea and its Bungalows*, by Athol Mayhew (London: B. T. Batsford), is a readable account of the well-known village of Hygeia, at Birchington. There is also an appendix on the Island of Thanet and its History, by the Librarian of Lambeth Palace.—*The Forcing Garden*, by Samuel Wood (London: Lockwood and Co.), is by an author well-known to horticulturists by his previously published manuals on kindred subjects. It seems just the book for the amateur who, having mastered amateur gardening in its ordinary branches, is thirsting for new triumphs.—*The A B C of Gothic Architecture*, by John Henry Parker, C.B., &c. (London and Oxford: Parker and Co.), is intended by the author to serve as a stepping-stone to larger works on the subject. It is as simple and easy as possible; a child may understand it, while many a more advanced student may profit by its possession.

CHIPS

Mr. Frank N. Pettingell, of Hull, who has recently prepared a large bird's-eye view of his native town, which is now being published by the issue of chromo-lithographed copies, is at present engaged upon a similar view of Leeds and suburbs. The picture, which is being published in water-colours, is of large dimensions, measuring (exclusive of frame or any accessories) 9ft. by 3ft. 6in.

In a chip relating to the appointment of the retiring surveyor of Bath as consulting surveyor on p. 103, the name should be Mr. Parfitt, and not Mr. Davis, as printed.

An art-treasures exhibition was opened in the Exchange Hall, Banbury, on Monday week. The exhibits are valuable and numerous; the largest number being contributed by the Earl of Jersey.

Iron gates and fencing have just been placed to the public museum at Maidstone. Mr. Hubert Bensted, the architect of the museum, designed the work, which has been carried out by Mr. Wallis and Mr. Shrubsole.

A bust of the late Field-Marshal Viscount Combermere, in the uniform of Colonel of the 1st Life Guards, is about to be placed in the officers' mess-room at Hyde Park barracks; Mr. Theed is the sculptor.

The town council of Margate received last week a report from Captain Douglas Galton, C.B., approving of the drainage-plans prepared by the borough surveyor, Mr. Albert Latham, which have been adopted, subject to the sanction of the Local Government Board.

The police-stations at Neville's Hall, in Ulverston, are being pulled down, to be replaced by a new block of buildings, consisting of superintendent's residence, constables' dwellings, and cells. The entire contract has been taken by Mr. Gradwell, of Barrow-in-Furness.

Building Intelligence.

DROITWICH.—Impney Hall, Droitwich, recently built for Mr. J. Corbet, M.P., is having its internal decoration completed. It is built in the style of a French chateau of the period of Louis XVI., from the designs of M. Iroquois, its erection being superintended by Mr. R. Phené Spiers. The internal decoration is the work of Mr. J. Taylor, of Five Ways, Birmingham. The vestibule is decorated in tints of buff, green, and salmon. In the corridor the walls are of Pompeian red, a green decorated dado extending beneath. The staircase and ceiling are of oak, and the colouring of the walls is of full-toned sap-green. From the corridors, entrance is obtained to the study, an apartment of octagon shape. The flat portions of the ceiling are ornamented with a dark fret pattern on a silver ground, while the panelled cove, enriched with massive mouldings, is more elaborately treated. The panels have central shields, portraying the Arts and Sciences, and from these spring lighter decorations, filling each panel. Beneath, the wall is painted in imitation of tapestry of a reddish tone. The woodwork is of oak, richly carved, and the marble mantelpiece has an oak overmantel reaching to the ceiling. The dining-room measures 35ft. by 22ft., and has a lofty ceiling, with very ornate mouldings. The large central panel is ornamented with a gold-colour diaper pattern on a gold ground, surrounded with belts of silver and colour; while the panels in the spandrels have golden vine-leaves and grapes, upon a ground of neutral grey, surrounded with margins of gold and light maroon. Above the oak dado the walls are painted in imitation of dull grey-green tapestry. The ceiling-mouldings of the drawing-room give a large oval in the centre, about 16ft. by 13ft., treated with an aerial clouded sky, and cherubs carrying flambeaux and strewing flowers. The angle-panels have gold grounds, with cameo-heads of Beethoven, Bach, Handel, and Mozart. In the library the flat of the ceiling is of a full turquoise-blue, with a diaper pattern in silver and gold, the cornice being relieved in red, citron, vellum tint, and gold. The boudoir is panelled with blue silk damask and gold mouldings. The woodwork is of vellum and gold, and the ceiling is painted with flying birds of rich plumage, butterflies, &c., upon an aerial ground. The builder of the hall is Mr. Wood, of Worcester.

ELY.—An extensive group of new schools, erected under a Charity Commissioners' scheme, were opened in Ely on Wednesday week. The new building will be known as Hereward's Hall, and has been erected from the designs of Mr. R. Herbert Carpenter, of London. The style is Late Fourteenth Century. The building is of red Suffolk brick with Bath-stone dressings, and forms, together with the new Theological College, an important addition to the architectural features of the city. It is situated opposite to the Ely Porta, built by Walpole in the 14th century, which is used as a large schoolroom, and stands on the site of the old Pilgrims' Hostelry. It comprises dormitories for 60 additional boys, with library, preparation rooms, private studies, masters' and matrons' rooms, and sick-quarters, with the best modern arrangements, which are now considered suitable for our large public schools. A library and decoration fund has already been started.

HIGHBURY.—On Saturday morning the Bishop of London consecrated a new church situated in Highbury Vale. The new church, which is to be known as St. John's, is a commodious structure of the 14th-Century style, and consists of a nave, transeptal aisles, chancel, and vestry. The building is of stock bricks with Bath stone dressings, and the columns are of Forest of Dean stone. There are also a handsome pulpit, reading-desk, and font, the last being the gift of a member of the church. The building was commenced in July, 1880, and will provide sitting accommodation for about 820 persons.

IPSWICH.—The completion of three important undertakings—a new dock-entrance, a new post-office, and new museum—was celebrated on Wednesday week with public rejoicings and inaugural ceremonies, in which the Right Hon. Joseph Chamberlain, M.P., took part. The new entrance to the wet dock is placed on the south or seaward face of the area, whereas the old

entrance was situate on the east side, opening awkwardly into a narrow channel; the lock is 300ft. long between gates, and 403ft. over all from pier to pier; the width is 50ft., and the depth over sills is 23ft. 6in. 35,000 cubic yards of soil have been excavated, much of which has been utilised in making concrete for the walls, which have been faced with hard bricks; the quays are edged with Bramley Fall stone, and the sills and quoins are of Cornish granite. The frames of gates are of greenwood, and the filling-in of creosoted Baltic fir. Mr. J. F. Bateman, F.R.S., is the engineer, and the contract has been carried out at a cost to the Dock Commissioners of about £45,000, by Messrs. Henry Lee and Son, of Westminster. The post-office, which occupies a prominent position on the Cornhill, is erected from the designs of Mr. John Johnson, of Queen Victoria-street, E.C., which were selected from 22 submitted in competition. The style is Italian, and the details evince considerable refinement. The two chief fronts are of Portland stone, enriched with varied carving, the other side being of local bricks. In front is a portico, on which are four sculptured female figures. The southern portion of the building, separated by a party-wall, is arranged as School Board offices, and rooms for municipal purposes. Messrs. D. C. Jones and Co., of Gloucester, were the contractors, and Mr. G. J. Farrow, the clerk of works; the carving was executed by Mr. Baird, of London, and the sculpture by Mr. Woodington. The cost has been about £10,000. The third enterprise includes the museum, schools of art and science, and free library, these being located in a Queen Anne group of buildings in High-street. They include a central hall 103ft. by 33ft., and north and south wings each about 76ft. by 23ft. The work is carried out in red brick, with terra-cotta dressings. Mr. Horace Cheston, of Great Winchester-street, E.C., is the architect, his design having been selected in competition; Messrs. J. B. and F. Bennett were the builders, and Mr. R. T. Orr the clerk of works; the cost has been about £7,800. The accepted design for the post-office was illustrated in the *BUILDING NEWS* for September 12, 1879, and that for the museum on August 29, 1879, both in Vol. XXXVII.

LLANTISSENT CHURCH.—This church has been renovated throughout, and was reopened on Friday last. The floors have been taken up and relaid on solid beds of concrete, after many old vaults were properly repaired and made safe. The whole of the nave roof has had the barrel-plastered ceiling scraped down, and a fine-sawn 14th century oak roof exposed to view 6in. and 18in. apart from centre to centre, curved and braced. The square stone tower before the restoration was in a tolerably good state of repair, and, with the exception of pointing and re-setting the battlements on the top, and repairs to bell carriages, this has been untouched. Upon removing old pewing and plaster from walls of nave and chancel, an interesting piscina and mural stairs were found. The roofs throughout have been covered with Whitland Abbey slates. A handsome new pulpit has been placed on the north side near the chancel arch, the reading and lesson desks being opposite, the chancel and choir seats properly arranged, and new Communion-rails fixed. The nave has been fitted with red pine open seats. The windows have been filled in with cathedral-coloured glass. The whole of the alterations have been carried out for about £600, the contract being let to Mr. William Blackburne, builder, of Newport, who has carried out the same from plans prepared by Mr. Lansdowne, architect, Newport, Mon.

TYNEMOUTH.—A new memorial reredos has just been placed in the parish church at Tynemouth. Mr. C. H. Fowler, F.S.A., is the architect, and the design is in the Italian style of the 13th century. The centre panel is filled with an elaborately-carved cross, and on either side are niches containing figures of the chief virtues. Below the retable the work is executed in dark alabaster, and the upper portion of white alabaster, the background of the sculpture and other panels being brought out in gold. The work was entrusted to Mr. John Roddis, of Birmingham.

The district of Church Town, St. Buryan's, is about to be drained, from plans prepared by Mr. J. Cardell Thompson, of Penzance.

COMPETITIONS.

GATESHEAD.—At a meeting of the Gateshead Board of Guardians, held on Tuesday, the 19th ult., the designs submitted in open competition by Mr. Wm. Lister Newcombe, F.R.I.B.A., of Newcastle-upon-Tyne, for proposed additions to the Workhouse, Union-lane, were almost unanimously selected as the best, and awarded the first premium.

GLASGOW MUNICIPAL BUILDINGS COMPETITION.—Mr. J. D. Marwick, the Town Clerk of Glasgow, writes as follows:—It may be of interest to those of your readers who intend to send in competitive designs for the new Municipal Buildings for this City to know that the Committee on New Municipal Buildings, acting under full powers from the Town Council, on 11th ult. appointed Mr. Charles Barry, architect, in London, and Mr. John Carrick, City Architect, Glasgow (1) to select from the designs in the preliminary competition those the authors of which shall be invited to compete in the second and final competition; (2) to advise the magistrates and council in the selection of the four best designs submitted in the final competition; and (3) to advise on the probable sufficiency of the estimates submitted by competitors. All in terms of the fourth paragraph of the conditions of preliminary competition.

EDINBURGH.—The competing plans for the new edifice proposed to be erected at Meadow-place, to accommodate the congregation of West St. Giles' Church, Edinburgh, were submitted to Mr. J. McVicar Anderson, hon. secretary to the Royal Institute of British Architects, for his opinion. That gentleman has now reported in favour of the design by Messrs. Hardy and Wight, 7, St. Andrew-square. The style of the building which Mr. Anderson recommends for adoption is Decorated Gothic of the middle period, with a tower and spire rising to a height of 160ft., the spire springing from a parapet with flying buttresses. The interior is spacious, and shows a nave, aisles, and transepts, the arcade resting upon polished columns of red granite. There is an open roof to the collar-beam, 46ft. in height, with transept and end galleries seated for about 300 people, the entire accommodation being for 1,000 persons. Space is allowed for an organ in the apsis behind the pulpit. The church as designed will not cost more than £7,000.

WALMSLEY.—At a vestry meeting held on Wednesday week, to consider the proposal of building new schools in connection with Walmsley Church, sketches submitted by Mr. John Morris, of Wood-street, and Mr. Marshall Robinson, of Acresfield, were examined. The committee unanimously voted the adoption of the designs by Mr. Robinson, who was instructed to proceed with the work at once.

CHIPS.

New wards and a disinfecting shed are about to be built at the Derby Union Workhouse; Mr. Edward Fryer, of Albert-street, Derby, is the architect.

A parish-room is being built at St. Luke's, South Lyncombe, near Bath. The architects are Messrs. Gill and Brown, and the contractor is Mr. T. Laver.

A fine-arts loan exhibition was opened at Canterbury by the mayor of that city on Monday. It is being held in the Foresters' Hall, and appears to be very successful. The Marquis of Conyngham has lent some of his art-treasures from Biffons, including works by Murillo, Rembrandt, Holbein, and Watteau, and a collection of armour and weapons; a large number of paintings and engravings, and of specimens of china, bronze, and other exhibits, are on view.

The organ in St. Mary Redcliffe Church, Bristol, has just been reopened, after extensive enlargement and alterations, carried out by Mr. W. Fowles, of Bristol.

A stained-glass window has been placed in the south aisle of St. John's church, Margate, as a memorial. The window is of two lights, and forms part of a scheme illustrating the Beatitudes; Messrs. Clayton and Bell, of Regent-street, London, carried out the work.

A new Presbyterian church was opened on Friday at Donore, near Dublin.

St. Broock Church, West Cornwall, was reopened on Tuesday week, after having been restored at a cost of £1,400.

"To a practical man with a taste for mechanics, and the bumps of inventiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *Engineering*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Bookman*. Price Two-pence of all newsmen, or post free 3d.—J. TAVISTOCK STREET, COVENT GARDEN, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and sixpence for every eight words after. All situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33s. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

MR. CHARLES WILSON, of 13 and 15, Lighthouse-street, New York City, is authorised to receive American subscriptions at the rate of 6 dols. 40c. per annum.

MR. R. M. TUTTLE, of Titusville, Penn., U.S.A., is also authorised to receive subscriptions at the same rate.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL, Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—C. W. and Co.—S. A. Co.—W. E.—M. H. and Co.—C. B. S. Co.—M. R. Co.—Rev. G. F. W.—W. T. and Son.—S. and Co.—H. V. and Co.—L. and N.—H. H. B.—F. and M.—J. B.—J. C. E.—H. and Son.—G. W. Ry. Co.—G. W. K.—D. D. and Son.

Correspondence.

FRESH-AIR VENTILATION.

To the Editor of the BUILDING NEWS.

SIR,—Will you kindly allow me to refer to Mr. Michael Drury's letters in your issues of the 15th and 29th inst. Can that gentleman be really in earnest when he so strongly advocates the use of *fin.* air-pipes to take off sewage-gas and to protect traps from siphonage? If so, I can only conclude that he has not studied the subject much.

I have tried both small and large air-pipes, and my experience teaches me that to properly protect the seal of a trap from either siphonage or waving, the vent-pipe must be of a size proportionate to the demand for air likely to be made upon it. I once tried the following as an experiment: I had 20ft. of *lin.* air-pipe, taken from the dome of a siphon-trap, fixed below an improved hopper basin. On pouring in a pail of water the seal went out level with the tongue, and virtually untrapped it. I then took out the *lin.* air-pipe, and inserted a 2in. of same length, and then again poured in a pail of water, which had no effect upon the seal. Since that experiment, which I carried out in 1879, I have fixed scores of vent-pipes, and am firmly convinced that a *fin.* one is only a little better than nothing. Mr. D. says that "Stiff's Interceptor will not, of itself, prevent the siphon-action of a trap." There Mr. D. is quite right; the fact is, that an opening at the foot of the soil-pipe, or in the drain, greatly facilitates siphon-action,

thereby necessitating the use of a larger vent-pipe than would otherwise be required. My own practice is to carry up the soil-pipe full-bore, and to take a 2in. or 3in. (according to circumstances) vent from the trap, both of which I consider necessary.—I am, &c.,

DANIEL KNITAGE, S.E.,
Dane-hill Sanitary Works, Margate,
July 30th, 1881.

SIR,—The letter from Mr. Michael Drury, of Lincoln, at page 154, shows that a real sanitary genius has sprung up amongst us—one, too, whose scientific attainments are only equalled by his financial enunciations. Let us examine him!

He says the extra cost, when fitting up the soil-pipe, of putting in a ventilating-trap at its foot, and an exhaust-cowl with ventilating pipe upon its top, will "exceed £10." Now, suppose we calculate it: Cowl, for 4in. pipe, 25s.; pipe, about 11s. (This item will vary, more or less, and, regarding the trap, I may ask—Does Mr. Drury dispense with fireclay or such-like traps between the sewer and the soil-pipe?) Trap, say, 10s.; air-grating and fixture, say, 6s.; and add 5s. for sundries—in all about £3—not *one-third* of what Mr. Drury says!

He also writes as if the putting in of a small *fin.* compo. air-pipe upon the top of a soil-pipe "without a fresh air method (or inlet) will effectually prevent any accumulation" of bad air. Now, will he tell us how the bad air that will be generated in the soil-pipe, only open at the top, is to be prevented from accumulating? He does not seem to know that it is the fresh-air coming in at the bottom of a ventilated soil-pipe continually pushing or carrying away the bad air as it is generated, that prevents "accumulation."

A soil-pipe open only at the top (and all the more with only a *fin.* opening) is *not* ventilated. It is continually full of bad air, which bad air is ever active and ready for mischief against the inmates at the first chance. Mr. Drury's plan may be compared to a steam-boiler without a safety-valve. The furnaceman may boast that such valves are superfluous, and to show his faith in his ideas, he takes dinner every day seated upon the lever. The steam, however, bides its time, and upon an unlucky day something happens, followed by a coroner's inquest.

In closing, I may sum up Mr. Drury's letter as a simple confession that he has been executing his plumbing-work in a very inferior manner, and whether to blame him or the Lincoln authorities most, is a question I shall leave to higher authorities to decide.—I am, &c.,

W. P. BUCHAN.

Glasgow, July 30th.

VENTILATION OF SOIL-PIPES.

SIR,—Mr. Buchan in his letter, p. 153, B.N., states that he had "seen the letting-off of a Bramah closet *suck* the water out of a bath-trap 12ft. from it, even when the said bath-trap had a 2in. air-pipe"; without impugnig the veracity of the statement, I cannot help thinking that there is some mistake. To me, it appears literally *impossible* that water should be *sucked* out of any S-pipe which has any kind of orifice in the apex of the bend; any "sucking" influence must inevitably operate upon the orifice and the non-resistant atmospheric air, instead of affecting the comparatively ponderous water-seal of the trap.

Mr. B. further states that the *fin.* compo tube recommended by me, "helps to prevent concentration of the sewage gas at the top of the pipe." If it does that, it does everything. If concentration is prevented, the most important and the only essential part of sewer ventilation is secured. The "top of the pipe," or what I should call the "trap apex," is exactly that spot, and the *only* spot, whence sewer gas can possibly penetrate into the house and become offensive and unsafe. The natural tendency of sewer gas to concentrate, or rather accumulate, at this "trap apex" is the motive power which compels it to pass through the easy route of the outlet-pipe, rather than force its way through the difficult, fortified obstacle of the water-seal. It is of little practical import whether the outlet or vent-pipe is 2in., 4in., or *fin.* bore, or whether it is thin compo, or thick lead, or massive iron tubing, so long as the vent-pipe is intact throughout to its outlet. It matters not if it bends here and there or anywhere, so long as it

has an upward tendency and has an open road, and it is not fair to stigmatise anything as "cut and run" or "scamping" work, simply because it is economical. I have no patent rights for anyone to infringe, and, therefore, I take the trouble of writing on these matters on purely public grounds. For the present, I need not refer to other portions of the letter which are open to criticism, but will content myself with calling the attention of your readers to Mr. Buchan's remarkable and converted condemnation of "revolving" cowl. There is *some good* in *nearly all* the patent complications, and whilst "damning them with faint praise," allow me still to maintain that they are "superfluities," or at the best, "luxuries."—I am, &c.,

MICHAEL DRURY.

COOPER'S HILL COLLEGE & THE ROYAL ENGINEERS.

SIR,—I can corroborate some of the statements of your correspondent, Mr. Playfair, from having been in India during the time of the unfortunate failure of the Sagar Barracks. It is difficult for an engineer accustomed to works in England, and who has never been in India, to realise the state of blundering and incapacity exhibited in conducting works in that country. If a wall or an arch is built under the supervision of an official, it is almost certain to crack. If a roof is erected it will leak like a sieve. If a bridge is constructed it is almost certain to fail before long, like that over the river Kantran, near Nagpore, which was founded on sand, with the rock a few feet below, on which it might have been erected with safety. Sometimes this blundering leads to loss of life, as on the failure of the Gun-Carriage Factory at Allahabad.

There was the Lawrence Asylum, which was proposed by the Madras Government in 1864, and estimated to cost £18,000, but which had reached, in 1870, the enormous sum of £118,000, and drew the censure of the Government on the architect and two engineer-officers. Again there was the Government House at Poona, sanctioned by the Bombay Government on the express understanding that the cost was not to exceed £35,000, but which ultimately rose, before the work was completed, to £155,000.

The Royal Engineers have the ear of the authorities, and can represent things as they please without risk of contradiction, and probably the Duke of Argyll was induced to believe that all these failures and imperfections were due to the employment of civil engineers. If civil engineers were employed it must have been in a very subordinate capacity, and their work must have been inspected and approved by Royal Engineers, who at that time occupied every post of importance in the Public Works Department. To say the least of it, there is meanness, if not dishonesty, when failures occur, to endeavour to saddle subordinates with a responsibility that they would not have been accredited with had the work proved a success, and which really belonged to the superior officer, almost invariably a Royal Engineer, who inspected and approved of the work. If District Superintending Royal Engineers cannot secure the Government against the imperfections of subordinates, their office is a delusion and a snare.

Poor Supervisor Bartram, at Allahabad, was made to appear a very great delinquent indeed, and, I believe, was dismissed from the Public Works Department, while much milder measures were dealt out to those who, from their supposed possession of superior knowledge, were really the persons who should have looked after the work as well as after Mr. Bartram.

There are very able and intelligent men I have no doubt in the Royal Engineers, but they do not appear to possess much practical knowledge or aptitude for ordinary engineering work. Their training fits them more for laying out boundaries between hostile nations or preparing projects for the defence of States, than for studying the details involved in the foundations of a building or the erection of a bridge, which they leave to subordinates of very indifferent acquirements, rather than acknowledge their own inefficiency, by employing persons of superior attainments.

That the defect is in the training of the Royal Engineers, rather than in any peculiarity connected with India in reference to the works of the same body of men in England, where they have it all to themselves, will show. Witness the following, taken from the *Standard*, of January 15th, 1875.

"Two out of three extensive traverses recently completed by the Royal Engineers, with entirely new brickwork at Fort Burgoyne, at Dover, have fallen to the ground."

This was attributed by the Royal Engineers to the action of frost. As if it were not the duty of an engineer to provide against contingencies of that kind, if it were true, which is doubtful.

We have a similar instance from the *Daily News* of January 1st, 1879, when a wall at Dundee Barracks fell, owing to the subsiding of the foundation caused (as stated) by wet weather.

The time cannot long be delayed until the whole question of the Royal Engineers and their mode of conducting works will be the subject of a Parliamentary inquiry, when probably many important facts will be brought to light.

As to Cooper's Hill College, its establishment was submitted to by the Royal Engineers, as a counter-move against the employment of highly-trained Civil Engineers, who would have placed them in the shade with the Government of India. It was not necessary at the time, as Trinity College, Dublin, the Queen's Colleges, Ireland; Glasgow College, and University College, London, were quite equal to the theoretical training required of an Engineer, and are much superior to Woolwich Academy.—I am, &c.,

JAALAM SMITH.

Ryde, I.W., 30th July, 1881.

SANITARY PLUMBING AND PLUMBERS' WORK.

SIR,—In reply to a letter in your last week's issue signed "H. B.," wherein he taxes me with saying that it is always in the joints, and not in the body of the lead, that the leakage occurs, I am not aware that in any of my criticisms on Mr. Hellyer's lectures that I have written anything of the kind, and if "H. B." will refer to my letter, page 57, column 2, last paragraph, he will find I have explained the cause of the corrosion and decay of the lead by the action of the acids, and also stated as my opinion that to prevent this decay every lead-trap (not excepting the \odot or \oslash -trap) should certainly be well ventilated.

If "H. B." was present at the lecture when I was invited to ten minutes' discussion, and is not troubled with a bad memory, he will perhaps be able to remember that directly I commenced to speak I was interrupted by Mr. Hellyer, and that, too, repeatedly. I nevertheless said all I wanted to say—viz., "That when Bramah's own people fixed his closets, although they had a small \oslash -trap attached to the overflow-pipe, they always fixed under the closet a \odot -trap to protect the \oslash -trap and closet at the same time, Bramah knowing that the \oslash -trap alone was not efficient. It is true that there is no \odot -trap in Bramah's specification; but why? Because he was not patenting anything but the closet, and not the trap: he might as well have added a plan of the whole of the drains."

In future I shall not answer any letters signed only with "initials or assumed names," as however much it may be the custom to write to the papers in this manner, I cannot look upon such communications as anything better than anonymous letters.—I am, &c.

P. J. DAVIES, Hon. Mem. A.S.P.

Aston—the great suburb of Birmingham, with a population of 75,000—was the scene of a rather interesting School-Board election last week. The Board, whose term of office has just expired, have built several sets of schools, at a cost of about £100,000, finding accommodation for 8,000 children. A party calling themselves "The Ratepayers' Union" declared the Board had been suffering from "architectural madness," and with a view to stopping such "extravagance" in future, brought out a set of "economical" candidates, who, however, were rejected to a man. Amongst the successful "party of progress" are an architect and a sculptor: Mr. George Ingall and Mr. John Roddis.

Part of the workmen, to the number of 75, of Thos. C. Halliday and Sons, builders, &c., of Greetham, Oakham, and Stamford, spent a very agreeable day at their annual outing (near to one of their works) at Balmisthorpe, on Saturday last, in a field kindly lent by Mr. Hind, and although the day was wet and unfavourable, the greatest harmony and good-will prevailed, every one thoroughly enjoying themselves—a good substantial tent, beautifully decorated, a band of music, and the best of cheer, and every requisite for a day's recreation and pleasure being provided.

Intercommunication.

QUESTIONS.

[6598].—**Royal Engineers.**—Could any of your readers oblige me with a description of the duties of a Royal Engineer, along with the advantages, examinations, &c., required before entering?—J. C.

[6599].—**Decoration.**—I should like to know whether it is more correct for the coloured ceiling of a room to contrast with the walls, or to be of the same shade?—ESQUIER.

[6600].—**Annealed Glass.**—Can any of your readers inform me if this material is applicable for coiling purposes, and where can it be procured?—TALBOT.

[6601].—**Flow of Water.**—Will some correspondent kindly inform me the quantity of water per minute that will pass through a square tube 12 in. by 2 in. (two), having a fall of 1 in 20, and how ascertained?—R. P.

[6602].—**Architecture or Building Trade in Colonies.**—What English-speaking colony is best as offering prospects to the young architect at the present time, and how do the colonies stand as to prospects compared with England? Agents' pamphlets seem all to one purpose—that place being one which the book treats. Possibly some returned or visiting colonist will give us some information of the kind I ask. For myself I speak as one fully intending to clear out unless prospects brighten here, and while I would prefer to work as I have hitherto, that is, in connection with architecture, still, if need be, I could "turn my hand" to kindred arts or to the bench. Information as to building trade generally in colonies would oblige.—FLECK-DE-LIS.

[6603].—**Additions.**—I would ask your readers' opinion on the following:—A builder competes for and obtains a contract to erect some Board-schools. Whilst the works are in progress certain necessary additions are ordered by the architect. When the account, which has been passed by the architect, is presented to the Board they refuse to pay for these extras, and hold to their refusal by a clause in specification which says, "No alteration or addition to be made in these works without the sanction of the Board." Another clause after the above says, "All matters of dispute that may arise between contractor to be referred to Mr. D— of C—, whose decision is to be final." The contractor demands the decision of referee, but the Board will give him no authority to proceed, and the auditor refuses to pass account. (1) Can I, by virtue of 2nd clause, legally recover the amount which referee allows? (2) Does the fact of the Board giving the referee no authority disqualify him before a court of law? Shall be glad to hear opinions on the case through your journal.—TALBOT.

[6604].—**Ice-House.**—In designing an ice-house, 30 ft. by 20 ft. by 25 ft. for above, I would like to have the benefit of your valuable "Intercommunication." I have had the experience of what is termed the "wood and sawdust cushion." What I wish to know is how the air-cushion works, and how best constructed? What is the best way of constructing the walls to insure the desired end? I have been thinking of building a 9 in. external wall in brickwork, and an inner 6 in. concrete wall, leaving an air-space between. Can any of your correspondents say the best way of doing this, and if it would be effective? Also best way of bonding walls together? What air-space should be left, and what ventilation is necessary? The building will be in a town, and floor on level with street. Any information will be acceptable as regards other methods or details. What is the best plan? Are there any authorities on the subject?—T. O. W. N.

[6605].—**Patent Laws.**—Would some reader kindly refer me to a good work on the patent laws? A digest would be preferable, or perhaps through the medium of the *Building News* he would kindly give a sketch of the procedure.—B.

[6606].—**Coloured Plaster.**—I am wishing to make the plastering between timbers of a half-timbered house I am building a reddish tint when finished. What materials could be mixed with the ground lime setting stuff to produce this, or any other tints?—Q. E. D.

[6607].—**Disintegration of Lime.**—Some two years ago I used for building purposes mortar mixed in the following proportions:—Best mountain lime, 1; sand (sharp), 1; red burnt ashes, 2. The ashes were of seagrass or fire-clay from an adjoining colliery, which, being partly mixed with coal, had taken fire and been thoroughly well burned on the pit heap. They were as hard as furnace scales or slag, and in every respect appeared excellent material for the purpose. The effect has been that the lime, wherever they were used, is now entirely disintegrated and useless, but lime in the same buildings, and of the same mixture, excepting that blackashes were used instead of red, is set well, and is in all respects satisfactory. What is the chemical explanation of this? Have the ashes killed the lime, or has the lime, in disintegrating the ashes, killed itself? I shall be glad of some explanation.—C. C. C. E.

REPLIES.

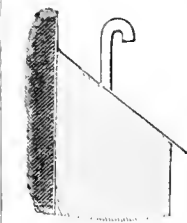
[6552].—**Thickness of Piers of Arches.**—"J. H. M." is correct generally in assuming that the thickness of piers should be increased with their height. There must however be a limit to this, since with the increase of height, the horizontal thrust diminishes whilst the vertical increases, owing to the greater weight of the higher pier, which assists in nullifying the horizontal thrust.—HUGH McLACHLAN.

[6553].—**Veneering Round Column.**—After preparing the column, cut the veneer sufficiently wide to go round it, with an inch to spare. "Tooth" all the saw-marks out both sides. (If it is knife-cut veneer this will not be necessary.) Wet one side and glue the other well with thick glue, or the water afterwards used soaking through would make it too thin. Glue the column also, and fold the veneer carefully round it. Nail on a length of webbing at one end, and roll it round as tight as possible, allowing the edge to overlap about a quarter of an inch all the way. When it is all covered secure the other end of webbing to the column. It must

now be soaked well with hot water and a hot iron passed over it until all the glue inside is thoroughly heated; the shrinking of the web will then force out the glue. After standing eight or nine hours the webbing must be taken off, and with a thin sharp chisel and a straight-edge make a cut down the length of the column, severing the two thicknesses of veneer where the one overlaps the other, then with hot iron and water loosen the veneer at each side of the cut. You will then be able to remove the two strips (the overlapping part). Rub some more glue under the veneer, and put it down with a veneering hammer, or a narrow "call" made to fit. It may be done another way. Prepare glue and place the veneer as before; then, instead of webbing take a strip of strong canvas an inch or so less in width than the circumference of column, and long enough to reach from end to end. Firmly secure each edge to strips of wood. Fold the canvas round the column and veneer so that the two strips of wood almost meet, the joint in veneer being between them. With handscrews, draw the strips together, then wet and heat the canvas. Increase the pressure on screws, let it stand eight or nine hours, and work the joint as before.—W. E. GAUDIE.

[6553].—**Durer's Works.**—In addition to the works mentioned by "East Anglian" and Hugh McLachlan, as having been published in the *Building News*, "Christ taking leave of His Mother" was published on March 17th, 1871.—JAMES ROBINSON.

[6555].—**Smoky Chimney.**—The causes of smoky chimneys are so numerous, that without knowing all the circumstances of the case, it is impossible that an efficient cure could be at once hit on. The chief causes generally are draught, choking or stoppage of the flue, too large a chimney opening or too short length of flue for its sectional area. Each of these may again have several other causes, and these have as a rule their separate remedies. The choking or stoppage of a flue is generally discovered and remedied by the sweep, though occasionally the bricklayer may be required. The chimney opening is unlikely to be too large in a third-floor office; therefore it is probable that the reason of the smoking in this case is either draught or too short a flue. If the flue is too short, the remedy of course is to add some lengths of zinc piping, but such may often be avoided, and certainly should be the last thing to be tried. Draught generally proceeds from two causes: either a want of ventilation for the room, in which case the flue becomes a fresh air down-shaft, or the overtopping of the flue by some neighbouring building or chimney from which the wind rebounds down the lower chimney after striking against the taller object when in certain directions. In the first of these two cases, whether your own fire is lit or not, the air is drawn down your flue into the room, bringing smoke with it from another flue often in the same stack, sometimes even after the smoke has escaped from the mouth of that flue, or through some faulty opening in the flue itself. Opening a window will be found a remedy, and as this can not be done permanently, fresh air inlets should be made through the walls. In the second case the best remedy is unfortunately a hindrance to sweeping, as it requires a cover over the chimney top, the simplest method I have seen in Holland, it consists in bending round a pipe so as to have the opening underneath and turned away from the higher building that causes the draught thus. It cannot well be applied in England for reason before given, or where coal is burnt. Boyle's or Milburn's cowls would probably be effective, the first is not half the cost of the latter and has no movable parts, both profess to give no hindrance to sweeping, which I hardly think correct, the second would probably be best of the two in that respect. A plan recommended in the *Builder*, May 2, 1863, consists in using a blower of fine wire gauze, 35 or 40 meshes to the inch as a blower in front of the fire, this checks the smoke



in a manner similar to the checking of mine gas in the Davy safety lamp. The best paper I have seen on the subject was read before the Irish Architectural Association by Mr. George Heghan, and reported in *Building News*, Aug. 4, 1873, it is called "Construction of Chimneys." If "Draught" is still in doubt, he can call on me at 45, Fenchurch-street.—HUGH McLACHLAN.

[6570].—**Local Board Office.**—Hampstead Vestry Hall, plans and perspective, published in *Building News*, Nov. 15, 1878; vestry halls at Wandsworth and Ealing and Greenwich Board Offices. Some of the above might give hints.—HUGH McLACHLAN.

[6576].—**R. A.—Surely "Jacobus" is joking.** Does he know that the Academicians and Associates are selected from the leading painters, architects, sculptors, and engravers, not by examination but by election? If he further knows that there are only four Academicians and two Associates architects and that probably there are at least 3,000 architects practising in Britain, he can imagine his chance of obtaining the result of his ambition.—HUGH McLACHLAN.

[6576].—**How to Obtain the "Degree" of R. A.**—In reply to "Jacobus," I regret that no certain method can be pointed out. A money qualification is, of course, indispensable. Connections in "society" may do much; but even with these, you must either be a man of some real ability, or must have built a house for some influential Academician.—Z. Z.

[The query was misprinted. It should, of course, have been how to obtain the degree of "M. A."—Ed.]

[6585].—**Soil-Pipe.**—"East Suffolk" will find a drawing of a disconnected soil pipe, with its discharging end exposed to the atmosphere, in the *Building News* for November 17th, 1874. Other drawings have been published since then in these columns, while in Buchanan's "Plumbing," and in Hellyer's "The Plumber and Sanitary Houses," various plans will be found. "Exposed to the atmosphere" does not mean exposed to view.—PETER SIMPLE.

[6586].—**Testing Iron Girders.**—For the benefit of "Learner," I herewith give some particulars of iron girders which I tested on the 5th ultimo at a manufac-

turer's yard in Lambeth. The said girders were four of the longest span of a series of fifty-four girders. They were tested in pairs in the order enumerated in the certificate. The girders are laid on their sides on the ground and held together by pieces of flat bar iron, the hydraulic press being exactly in the centre of and between the two girders to be tested. The space between the two girders is then marked upon a straight edge that the deflection may be correctly gauged. This, of course, is taken when the full pressure is upon the metal. After this the pressure is withdrawn, and if the girder remains deflected it constitutes what is known as a "Permanent set." If it does not remain deflected but springs back again to its original straight form, then there is no "permanent set."

COPY OF CERTIFICATE OF TESTING, JULY 5TH, 1881.

Section.	Span.	Deflection.	Perma- nent set.	Proof Weight.
Two 10 x 6 rolled joists, with two 1/2 plates riveted to top flanges, and one 1/2 plate riveted to bottom flanges of joists 1/2 plate 12 1/2 wide.	19' 3"	1 1/2 in. in.	None	11 tons
	19' 7 1/2"	2 1/2 in. in.	None	11 tons

REMARKS.—A pressure equivalent to half the safe distributed load, viz., 14 tons, that these girders are designed to carry was brought to bear on the centre of each girder by means of hydraulic pressure. Weight per foot run of these girders = 174 lb., thus—joists each 56 lb., plates each 2 lb., rivets 2 lb. per foot run.—ALFRED C. HURLEY.

PARLIAMENTARY NOTES.

IMPROVEMENTS IN WESTMINSTER.—In the House of Lords last Friday, Lord Lamington asked whether, before coming to any determination as to the contemplated improvement near St. Margaret's, Her Majesty's Government would not consider how far it was desirable to carry out the recommendations of the Committee on Public Buildings of 1878. He characterised the approach to the Houses of Parliament through Parliament-street as a disgrace to the great metropolis. Lord Kimberley said this question of the approaches to the Houses of Parliament had been under the consideration of four or five successive Governments and was under the consideration of the present Government; and he had no doubt that before long they would have to decide on a scheme.

WATER SUPPLY OF LONDON.—The Bishop of London asked whether any measures had been taken or were in preparation by Her Majesty's Government for improving the water supply of the metropolis. The right rev. prelate pointed out that in the north-west, south-west, and west of London, where there were many streets of large houses filled with lodger-tenants, the supply was very deficient, limited as it often was to a flow into a cistern or water-butt for an hour, or, perhaps, half-an-hour, each day.—Lord Dalhousie said it had been the intention of the Government to introduce this Session a measure on this subject, but the state of public business had made it impossible for them to do so. They would, however, endeavour to deal with the question next Session.—Lord Fortescue expressed his regret that action had not been taken in the matter before now.—Lord Red-sdale thought that much of the fault of the insufficient supply was chargeable to the owners of houses, who did not provide sufficient appliances for taking and storing the water.

CHIPS.

The parish-church of Swanton Novers, Norfolk, was reopened on the 23rd ult., after restoration, including the addition of a new aisle. During the progress of the work, many traces of Saxon and very Early Norman work were discovered, including a rude doorway, and two small circular double-splayed windows, in one of which the old oak shutter was still preserved; and in the tower an oven for baking the sacramental wafers. A piscina of Decorated character, and other 14th-century work were found embedded in the south wall of chancel. Mr. E. Dolby, of Abingdon, was the architect, and Mr. Chapman, of Ilanworth, the builder.

The work of constructing the Hundred of Illoo Railway is being rapidly pushed forward by the South Eastern Railway Company. The new line extends from the North Kent system at Stoke-ly-Gravesend, to a pier in the Isle of Grain, opposite Queenborough; it is six miles in length, and is estimated to cost £225,000. Messrs. Walker and Son are the contractors.

At a meeting last week of the Penzance rural sanitary authority, Mr. Dennis, C.E., was instructed to prepare plans and estimates for a water supply for Marazion.

LEGAL INTELLIGENCE.

THE REBUILDING OF ST. PETER'S CHURCH, PLYMOUTH.—GUY V. PRYNNE (S.I.).—Mr. Charles, Q.C., and Mr. Pitt-Lewis were counsel for the plaintiff (instructed by Ingram and Co.), and Mr. Collins, Q.C., and Mr. Bucknill (instructed by Mr. Shelley) were counsel for the defence. Mr. Charles, in opening the case, stated that the plaintiff was an architect and contractor, and the defendant was an architect only. The action was brought to recover possession of a document which was known in the profession as a "correct summary." This document the plaintiff lent to the defendant in November, 1880, and had never succeeded in getting it back. The jury would, no doubt, think it very strange that it should be necessary or worth while to institute legal proceedings for the recovery of a simple document; but when the jury came to see the effect of the document, they would readily understand the importance which the plaintiff placed upon it. Why on earth the defendant had refused to return the piece of paper he failed to appreciate. It had been applied for over and over again, but it had never been returned. It appeared that the plaintiff was at present engaged in carrying out a contract for the almost entire rebuilding of St. Peter's Church, Plymouth, a church of which the father of the defendant was the incumbent. The contract was for the entire rebuilding of Mr. Prynne's church for the sum of £9,780. The defendant was the architect who was looking after the work on the part of the employer, his father. The contract was entered into in February, 1880, and the contract itself, as originally drawn, did not contain any stipulation that the surveyor's fees should be paid by the contractor. In such cases, unless the fees were paid by the contractor, they would fall on the employer. The contract contained no provision that the surveyor's fees should be paid by the contractor. Unless these fees were payable by the contractor they would fall on the employer, the Rev. G. R. Prynne. Before it was signed the defendant wrote into the contract a clause that the surveyor's fees should be paid by the contractor. The plaintiff agreed to the insertion of the clause provided the contract-money allowed the demand. If it did not, the defendant assured him that if he had actually paid the surveyor's fees they would be repaid to him. On September 9th, 1880, the defendant sent the plaintiff four documents. One of these documents was the one in dispute, which contained, in figures, the amounts which were to be paid under the original contract. It also showed the addenda which were to be paid by the Rev. G. R. Prynne to plaintiff, and one of these amounts was for the sum of £229, being the surveyor's fees, which, as they would learn, plaintiff paid the surveyor. Of course, it would not have been wise for plaintiff to have paid the surveyor unless he procured some guarantee from defendant's hands. But as soon as he got this paper, which was duly signed by the defendant, and authorised him to make the payment, plaintiff paid the surveyor. Shortly after plaintiff met defendant in the streets of Plymouth, and asked him to lend him the document, which defendant held as a voucher, and as conclusive evidence that he was entitled to claim this money for the payment of surveyor's fees; plaintiff ultimately did lend the document to the defendant. Upon one excuse and then upon another the document had never been returned. After repeated correspondence and several conversations, defendant sent plaintiff a paper, which was not the original paper. It was a copy of the original, with, however, material additions. The importance of this document to the plaintiff they would realise when he told them that the work in the rebuilding of St. Peter's was not proceeding very harmoniously, and the consequence would be that, in all probability, when the contract was brought to a completion, the plaintiff would be obliged to resort to legal proceedings. The words which defendant wrote were "Entirely without prejudice, and to be returned to the architect when required." The addition of these words, of course, deprived the document of any force, and made it a very different instrument from what the plaintiff originally held. The contract only allowed £90 for the surveyor, although it stipulated that he should receive £200. All the plaintiff wanted was to receive back the paper. Mr. Collins: We have offered to give him the paper, I am instructed. Mr. Charles: You have offered us one which does not bear Mr. Prynne's signature, and is therefore no guarantee. This Mr. Prynne seems to be a very strange sort of person, and may dispute the payment of the surveyor's fees. His Lordship: But the plaintiff is entitled to sue for their recovery without any document. He is the contractor of the works, and has the right to pay the surveyor and charge the payment to the person who employs him. Mr. Charles: I feel some difficulty in proving our damage. His Lordship: So I should think. Mr. Charles: It's quite clear that the defendant attaches much importance to this document, otherwise he would never have done what he has done. His Lordship: Is the contract

for a lump sum? Mr. Charles: But it does not include the surveyor's fees. The plaintiff, on being called, said he valued the paper because the contract was so binding that if he did not produce a written voucher he could not sue for addenda. He lent the paper to the defendant on his faithfully promising to return it. Mr. Collins, in defence, remarked that he had never before known an action brought and counsel employed to recover possession of a paper. Defendant appeared to apprehend that there would be a quarrel, and wanted some paper, under the signature of Mr. Prynne. But Mr. Prynne's case was that he never supplied him with a signed paper. Mr. Prynne, on being called, stated that the paper he lent the plaintiff was the unsigned original; and when he desired to get it back he made a copy of it, to which he put his signature and added the words, "without prejudice." His Lordship could not understand what the plaintiff wanted other than the paper which Mr. Prynne supplied him. It was true the words without prejudice were written there, but if an action should be brought for the recovery of the surveyor's fees from the incumbent, any judge would strike them out. The plaintiff was entitled to recover the surveyor's fees by law. Mr. Charles replied that what the plaintiff wanted was an unequivocal document, to the effect that the defendant was responsible, and not himself, for those fees. His Lordship described the case as the most extraordinary he had ever known. He could not imagine what in the world induced the plaintiff to bring such an action. It was for the jury to decide, of course, but he could not help thinking that the plaintiff had made a great mistake. He was clearly entitled to the surveyor's fees, without any such document as he demanded, as the contract stipulated that they should be paid him. The jury returned a verdict for the defendant, and his Lordship certified for a special jury.

STAINED GLASS.

EDINBURGH.—The large central window situated in the south wall of the Preston Aisle of St. Giles' Cathedral has been filled in with stained glass, the design being illustrative of the life of St. Paul. The window is of large proportions, measuring fully 25 ft. in height by 12 ft. in width, and consists of ten compartments, in addition to the flowing tracery above. The two conspicuous events in the life of St. Paul are depicted—his conversion on the way to Damascus, and his preaching at Athens. The upper panels are devoted to the former, and the lower panels to the latter, artistically grouped in five sections each. The work has been designed and executed by the Messrs. Ballantine, under the honorary superintendence of Mr. Robert Herdman, R.S.A.

CHIPS.

An empty house in South-street, Southwark-square, fell into the road on Monday week, severely injuring three children, one of whom has since died from the effects of the accident. At the inquest Mr. Thomas R. Smith, district surveyor for St. George's, Southwark, stated that his attention had been called before the accident to the adjacent houses, but not to the one which fell, which consisted of but two stories; all the lower doors and windows were boarded up, and it was shut in by a high boarding. The bricks were sound, but the mortar had perished, and the roof had been injured by the theft of lead. He attributed the accident to the transmission of vibration from the railway arches to the roof of the house. On behalf of the Ecclesiastical Commissioners, it was stated that the adjoining empty houses would be pulled down at once, and a verdict of accidental death was returned.

A handsome tea-service, and several articles of plate, have been presented to Mr. W. W. Lake, city surveyor of Norwich, by members of the corporation and other friends, in connection with his approaching marriage.

The organ in St. Philip's Church, Kennington, S.E., was reopened on Sunday week, after enlargement and improvement, carried out by Mr. R. Forster, of Kennington.

The directors and shareholders of the Norwich waterworks company made an official inspection on Wednesday week of the new pumping-works in the suburb of Heigham, which are now nearly complete. The new engines will pump 2,000 gallons per minute, and have been constructed by Messrs. T. Clayton and Son, of Preston, from the designs of Messrs. T. and C. Hawkesley, of Great George-street, Westminster. The works and the erection of new offices in Surrey-street, Norwich, have been carried out under the direction of the company's manager, Mr. Ayris.

The premises above the shop of Messrs. Lund, in Cornhill, E.C., are being rebuilt in Renaissance style from the designs of Mr. E. Gregg. The builders are Messrs. Hall, Beddall, and Co., of Pitfield Wharf, Lambeth.

Our Office Table.

THE death is announced of Mr. Alfred Wm. Morant, engineer to the Leeds Corporation, which took place at his residence, Virginia-road, Leeds, last Thursday week. The deceased gentleman, who was 53 years of age, was born in the south of England, and his early life was spent in London. He first officiated in the capacity of borough surveyor at Great Yarmouth, and then removed to Norwich, where his ability as a sanitary engineer, in the construction of the Norwich drainage works, was manifested. He was appointed borough engineer of Leeds in December, 1872, in the place of Mr. Fowler, who is at present borough surveyor at Newcastle-on-Tyne. Since his appointment he has carried out the Leeds sewage works at Knostrop to their present state of completeness, designed and carried out the extension of the Kirkgate market and the fish market, the improvement of York-street, the widening of Wellington Bridge, the laying out of roads in Roundhay Park; designed and constructed the large extension of the sewerage system of Leeds for the out-districts, the connection of Armley with Kirkstall by bridges and viaducts across the river Aire and the Leeds and Liverpool Canal; and introduced in Leeds the present system of the ventilation of sewers through gullies, referring to which a few days ago at Exeter, Mr. R. Rawlinson, C.B., chief engineer to the Local Government Board, stated that the Leeds sewers were the best ventilated in England. Mr. Morant, who was a Fellow of the Society of Antiquaries, a Fellow of the Geological Society, and a member of the Institute of Civil Engineers, was a gentleman of considerable literary ability and archaeological attainments. He was president of the Association of Municipal and Sanitary Engineers for 1880-81, which body it will be remembered visited Leeds recently, and on which occasion he delivered an address on sanitary science, with reference to the departments connected with the Leeds Corporation. For one year he was vice-president of the Leeds Architectural Association. He edited the latest edition of Whitaker's "Craven," and also the latest edition of Dodgson's "Guide to Leeds."

THE trustees of the National Portrait Gallery, in issuing their 24th annual report, deplore the loss of Lord Beaconsfield, who was one of their number, and whose place has been supplied by Lord Edmund Fitzmaurice, M.P. The list of 251 donations given in former reports has now amounted to 256; and the purchases, which last amounted to 358, are now 380. Since the date of the last report 38 portraits have been protected by glass. Various autographs have been given to the gallery, including those of Sterne, Johnson, Lord Eldon, Keats, and Herne Tocke. The number of visitors to the gallery in 1880 was 76,109 or 12,075 in excess of the number the year before; the total since the opening in 1859 has been 968,571. The trustees refer to the fire which broke out in the south-west corner of the building from the overheating of a flue on the 28th January last, but was fortunately checked in time. They urge that the shaft and furnace used to heat the water for warming the building should be placed apart from the building itself. The report states that the catalogue, which had been long in preparation, has now been completed, and is issued by Her Majesty's printers, price one shilling. A cheaper and abridged edition is in preparation.

A DRAFT BILL for the improvement of the Patent Laws has been prepared by a committee of the Society of Arts, and is published by the society for public consideration. The Bill takes a wide range, and proposes to make the Patent Office—reconstituted, it is hardly necessary to say—a tribunal for the trial of patent cases. The Bill also proposes to substitute an active Board of Patent Commissioners for the present nominal Commissioners. It follows the last Government Bill of 1879 in giving great powers to the patentee to amend his specification. It increases the term of a patent from fourteen years to seventeen, while decreasing the fees to about one-half the present scale. It gives the Commissioners of Patents power, not to refuse a patent to any applicant, but to see that the applicant's description is accurate and intelligible, so that the public may have full information of the invention when it is free for their use. The Bill is

drawn in a spirit friendly to the inventor, and careful of his interests.

MESSRS. UNDERHILL and Co. have just completed new and extensive show-rooms at their premises, 170 to 173 Upper Thames-street, which are well worth inspection. They have over one hundred chimney-pieces on view, fitted in every style and material, and suitable for every class of dwelling-house. A speciality in wood chimney-pieces and tiled registers, very substantial and very cheap, is a set sold for £6 7s. 6d., comprising a wood chimney-piece in walnut, oak, mahogany or ebony, with black marble slips complete, a register-grate with tiled sides, a hearth of glazed tiles to match, and a black crest or fender. A self-setting range for cottages and model dwellings, named the "Ivanhoe," should also be examined. A new grate on an improved principle is to be on view shortly, and we shall probably have something to say about it.

At a meeting on Wednesday of the subscribers to the proposed Art Gallery and Industrial Museum for Birmingham, the Mayor, Alderman Chamberlain, who presided, announced that the total amount of the subscriptions already received was £6,949, exclusive of the Messrs. Tangye's donation of £10,000. On the motion of the chairman, it was resolved that the funds as collected should be handed over to the Art Gallery Purchase Committee, who would be guided in their purchases by the recommendations of the Free Library Committee, and would receive valuable assistance from the Department of Science and Art at South Kensington.

THE work of boring the Arlberg tunnel is proceeding very satisfactorily, and at a speed which affords a striking illustration of the improvements which have lately been effected in the art of mountain tunneling. The Mont Cenis tunnel was bored at the rate of 1,112 metres a year, the St. Gothard at the rate of 1,670 metres, and the Arlberg is expected to be pierced at the rate of 2,160 metres. The Arlberg engineers are also profiting by the experiences of their predecessors in the matter of cost, for while the outlay on the Mont Cenis tunnel was £400 per running metre, and has been hitherto on the St. Gothard £250, the expense of making the Arlberg will not exceed £150 the metre. In this regard, however, the tunnel last named benefits by its shortness, since the longer the tunnel, other things being equal, the greater is its relative cost. An interesting experiment is being made in the Arlberg tunnel with a new sort of perforator. This system is the one in use on the eastern or Austrian side of the Arlberg. The chisels cover a space of seven square metres, and make 20 to 25 holes at one time, each from 1½ to 2 metres deep. These are then filled with dynamite, and the mine exploded. Every blast lengthens the drift by about 1½ metre. The perforators move forward on wheels, and the air, compressed to a pressure of five atmospheres, is supplied through flexible tubes. On the west side drills are employed, of a diameter of 70 millimetres, to which, by means of a water pressure of from 60 to 100 atmospheres, a rotary movement is communicated. Six or eight of these drills are as effective as 20 to 25 of the atmospheric perforator, and the holes they make are so much wider that equal results are produced with lighter charges of dynamite.

WE recently visited Mr. H. Harvey's studio and found there several works of art as creditable as any we have seen for the last ten or fifteen years. Mr. Harvey has been for years a distinguished student at South Kensington. In 1878 he exhibited a bust of Dr. Zerk at the Royal Academy. He was next commissioned to make, in terra-cotta, the bust of the Right Hon. Lord Aberdare, President of the Royal Historical Society. He also executed in terra-cotta a likeness of Mr. Marshall, R.A., and in marble another of Lieutenant Shergold Smith, R.N., which is placed in the Church Missionary Hall in the City. Mr. Harvey's model of an "alms-dish," in plaster of Paris, sent in for competition to the Goldsmiths' Company, obtained the first prize of £50. About twenty raised figures form the centre-piece, representing the High Priest of the Jews in the act of laying the sins of the people on the scape-goat. The border is ornamented with pomegranates and three shields placed in triangular order, sym-

bolic of the Trinity—bear the effigies of "Fides," "Spes," and "Caritas." A small fancy composition, "A boy playing with top," now in the possession of Mr. C. J. Freake, is spirited and full of charm. The same may be said of a "Youthful Warrior," purchased by Lady Francis Bushby. A "Crusader," who, by the side of his fallen wounded horse, raises his battle-axe, apparently shouting, "No surrender!" is a composition worthy of being executed in bronze, and to be placed on one of our empty pedestals on the Embankment. The sculptor's latest work is a terra-cotta bust of General Sir Frederick Roberts.

In a report on German railways recently presented to the members of the Federal Council, by the Minister of Public Works, it is stated that on the 1st of January, 1880, the railway-lines in use amounted to 32,890k. The increase from 1870 to 1879 had been 80·5 per cent. The Government have decided to drop the work of constructing railways at present, and to give attention to the improvement of water-ways. A project for junction of the Rhine, the Weser, and the Elbe, is being studied. The waterway at present connecting the Oder with the Elbe by the Frederick William Canal, the Spree and the Havel, will, doubtless, soon give place to another more convenient. It is extremely long and costly, for it is impossible to keep it at a draught of water sufficient for vessels of more than 300 tons. The proposal is to make two direct canals, with large draught of water, one from the Elbe to the Spree; the other from the Spree to the Oder. The latter will be begun first, and should be complete in about four years.

THE preparation of a design for the diploma to be awarded by the Parkes Museum in connection with the Hygienic Exhibition, now open at South Kensington, was intrusted to Mr. Cave Thomas. The composition exhibits in the centre a female figure, representing Sanitary Science, standing at the prow of a boat in the act of casting her "life-buoy" (hygiene) into the "seething ocean of human ills." On Monday next Mr. Eric Erichsen and the Exhibition Committee will be present at the exhibition during the afternoon, to receive the members of the International Medical Congress. The exhibition will finally close on the 13th of August. The list of awards has not reached us up to the time of going to press.

CHIPS.

A colliers' hall is about to be built at Cwmtillery for the South Wales Colliery Company. Mr. E. A. Lansdowne, of High-street, Newport, Mon., is the architect.

On Tuesday week, William Imrie, late inspector of cleansing for the burgh of Perth, was sentenced to two months' imprisonment for having misappropriated corporation moneys, by entering in the wages-book the names of labourers who had no existence.

Extensive alterations and improvements are being made to the Royal Music Hall at Swansea, including the addition of a subsidiary hall in native freestone. The contract has been taken by Mr. David Morgan, of the same town.

A new manager's offices and house, entrance-gateway, and lodge are about to be erected at the Bishop's Auckland gas company's new works at Fielding's Bridge, near that town. Messrs. W. V. Thompson and Garry, of Market-place, Bishop Auckland, are the architects.

A new school at Penybanc was opened by the chairman of the School Board for Gelligaer on Monday. It cost over £700, and accommodates 80 children. Mr. John Williams, of Merthyr, was the architect, and Mr. Thomas Williams, of Bargoed, the contractor.

New Board-schools at Humberstone, near Leicester, were opened on Saturday afternoon. The buildings accommodate 407 children, and have cost about £5,000. Messrs. Bird and Sons were the architects, and Mr. Hutchinson was the builder.

A coffee-tavern was opened at Thornbury, near Bristol, by Sir Wilfrid Lawson on Saturday. The alterations to the premises, which were previously used as a school, were carried out by Mr. Burchill, and the fittings were supplied by Messrs. Paruall, of Victoria-street, Bristol.

The Plymouth Workmen's Dwellings Company are about to erect four blocks of industrial tenements on an estate at Clare-place, Sutton-place, Plymouth. Messrs. Hine and Odgers, of Lockyer-street, are the architects.

A stained-glass window has just been placed in the north side of the chancel of St. Mary's Church, Nottingham, as a memorial of the late Lord Belper. The subjects are taken from the life of St. Paul. Messrs. Clayton and Bell, of Regent-street, London, carried out the window, which will be unveiled on Sunday next.

At the Chester Diocesan Consistory Court on Thursday week, faculties were granted for the erection of a vestry on south side of St. James's, Sutton-by-Macclesfield, and the erection of a marble tablet in that church: for the filling of a two-light window in St. Mary's Church, Upton, with stained glass; and for the substitution of a new for an old font in Christ Church, Cloughton.

The Newry board of guardians have received a report from Mr. R. P. W. Birch, C.E., of London, upon the best means of draining the rising watering-place of Warrenpoint, upon Lough Carlingford, in which he recommends a plan of sewage disposal estimated to cost £3,596. The plans have not yet been formally adopted, as strong opposition is threatened by the proprietor of a neighbouring mansion.

The foundation-stone of a new Orphanage of St. Edward was laid at West Malvern on Friday. The building covers an area of 5ft. by 23ft. 6in., and will be planned as a school and class-room for 120 boys on ground-floor, with dormitories for 80 boys above; at the rear is a large playground. The materials used are Malvern stone and brick, and the estimated cost is £1,400. Mr. F. W. Hunt, of London, is the architect, and Mr. R. H. Smith, of West Malvern, the contractor.

A new Board-school for infants was opened at Dinas, in the Rhondda Valley, on Monday. Mr. Jenkin Evans, of Treorky, is the architect, and Messrs. Morgan and Jones, of Tonypandy, are the builders. The cost was £1,100.

The free library and museum in the New University Buildings at Nottingham were opened for use on Monday.

Holloway's Ointment should be well rubbed upon the pit of the stomach and region of the heart in that particular form of indigestion which gives rise to palpitation, shortness of breath, and a suffocating sensation. Every distressing symptom soon yields, digestion becomes easy, the spirits light, and good health returns. —ADVT.

Trade News.

WAGES MOVEMENT.

GLASGOW OPERATIVE MASONS.—The operative masons of Glasgow and the suburbs began work on Monday at an increased wage of 6d. an hour, being an advance of 1d. conceded by the employers.

Doultling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to **CHARLES TRASK,** Norton-sub-Hamdon, Ilminster, Somerset. —[ADVT.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates. General Repairs and Alterations Executed. Experienced Workmen always in readiness, and sent to any part of the country. —[ADVT.]

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE
CORSHAM DOWN
CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.
See trade advt. on p. XXV. ADVT.

TENDERS.

Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

BRIXTON, S.W.—For erection of offices for superintendent of visitors and for school correspondents, on a site in Stockwell-road, Brixton, for the London School Board:—
McCormick and Sons ... £1,965 0 0
Kirk and Randall ... 1,890 0 0
Staines and Son ... 1,782 0 0
Hobson, J. D. ... 1,759 0 0
Nightingale, B. E. ... 1,695 0 0
Marland, J. ... 1,647 0 0
Jerrard, S. J. ... 1,643 0 0
Hodge and Hill, Crown Works, South Lambeth (accepted) ... 1,640 0 0

BARNET.—For gas, bell, and hot-water works on the Manor estate:—

Macgillivray, D., Camden Town (accepted).

BARNESBURY.—For pewterer's work at the Montrose Tavern, 30, St. James-road, Barnesbury, for Mr. John Chinnery. Mr. W. F. Potter, architect:—

Edwards, J. C., Camden Town	£72 15 0
Watts and Co., Euston-road	68 17 0
Richards, J., Clerkenwell	61 0 0
Burley, W., Holloway	59 10 0
Lemon, S., Chiswell-street (accepted)	53 0 0

For gas-fittings at the same:—

Dodson, J., Fetter-lane	52 10 0
Cox, H., Islington	48 18 6
Butler, G. W., Barnesbury	47 7 0
Lemou, S., Chiswell-street	46 0 0
Humphreys, J. G., Holloway-road	43 10 0
Price, M., Old-street, St. Luke's	40 18 0
Crouch, J., Barnesbury (accepted)	40 0 0

BETHNAL GREEN.—For the erection of a mortuary and contagious-diseases wards, at St. Matthew's, Bethnal Green, for the Board of Guardians. Messrs. T. and W. Stone, architects:—

Edwards	£1,023 0 0
Beale	1,015 0 0
Steele Bros.	989 0 0
Thomason	990 0 0
Wire	929 0 0
Boyce	927 0 0
Young	910 0 0
Shurman	891 0 0
Jackson and Todd	880 0 0
Cox	878 0 0
Hunt	845 0 0
Johnson	822 0 0
Judd	795 0 0
Garrett	777 0 0
Wood (accepted)	777 0 0

BETHNAL HILL.—For new Congregational church, Burgess Hill, Sussex. Mr. E. J. Hamilton, Brighton, architect. Quantities supplied:—	
Estimate.	Total.
£2,529 0 0	£2,499 0 0
230 0 0	2481 0 0
20 0 0	2448 10 0
50 0 0	2424 0 0
27 0 0	2342 0 0
75 0 0	1,915 0 0
40 0 0	1,895 0 0
100 0 0	1,805 0 0
1,905 0 0	(Architect's estimate, £2,000.)

CAMDEN-ROAD.—For repairs, &c., to six houses in Sandall-road. Mr. W. Hall, 25, Southampton-buildings, Chancery-lane, surveyor:—

Medley	£200 0 0
J. nes	180 0 0
Jerrard	175 0 0

CAMDEN TOWN.—For repairs and alterations to No. 127, High-street, for Mr. Sizer. Mr. W. Hall, 25, Southampton-buildings, Chancery-lane, surveyor:—

Krene	£147 0 0
Gould and Frand	147 0 0
Rabson	138 0 0

CHESHIRE.—For deepening a well at Great Sutton, for the Wirral board of guardians:—
Thomas, W., New Ferry (accepted) £30 0 0

[Three other tenders, of £37, £97 9s., and £118 10s. respectively, received.]

EAST GRINSTEAD.—For the erection of new girls' school, for the East Grinstead School Board. Mr. S. W. Haughton, East Grinstead, architect. Quantities by the architect:—

Jones and Co., Gloucester	£1,443 0 0
Martin, F., East Grinstead	1,340 0 0
Peat, R., Redhill	1,317 0 0
Claridge, C., Bagnbury	1,220 0 0
Waters, J., Forest-row	1,195 0 0
Penn, G. and F., Fembury	1,185 0 0
Morris, J., East Grinstead	1,100 0 0
Martin, H.	1,094 0 0
Charwood Bros.	1,065 0 0
Beard	1,053 0 0
Godly, J.	998 0 0

FAREHAM.—For new dining-room and other additions to the residence, at Farnham, of Mr. E. Goble, County Coroner, Hants. Mr. A. Ford, A.M.I.C.E., Portsmouth, architect:—

Jutte	£530 0 0
Gambin	474 6 7

FERNE PARK.—For ten houses, Ferne Park. Messrs. Waymouth, architects:—

Churchward	£7,900 0 0
Shannon and Grist	7,690 0 0
Shurman	7,380 0 0
Morton	6,900 0 0

DERBY.—For the erection of a new 40-gr. brewery at Derby, for Messrs. Stretton Bros. Messrs. Scamell and Colyer, 18, Great George-street, Westminster, S.W. architects and engineers. Quantities by Messrs. R. L. Curtis and Sons:—

Contract No. 1:—Building.	
Kirk and Randall, Woolwich	£6,928 0 0
Grimwood and Sons, London	6,378 0 0
Woods, J., Derby	6,246 0 0
Dakin, J., Lichfield	6,222 0 0
Brown, J., London	6,200 0 0
Lovatt, F., Wolverhampton	5,845 0 0

Contract No. 2:—Girders and Columns.	
Morewood and Co., Birmingham	1,730 0 0
Piggott and Co., Birmingham	1,600 0 0
Horseley Iron Co., Tipton	1,585 0 0
Handyside and Co., Derby	1,465 0 0
Thornhill and Warham, Burton and Derby	1,325 0 0

Contract No. 3:—Boilers.	
Hill and Sons, Heywood	9.5 0 0
Thornhill and Warham, Burton and Derby	775 0 0
Walley, J., Derby	772 0 0
Higgott, T. and Co., Birmingham	760 0 0

Contract No. 4:—Millwrights.	
Bennett, J., London	2,765 0 0
Wilson and Co., Frome	2,600 0 0
Woods, H. and Co., Manchester	2,460 0 0
Abell, W., Derby	2,300 0 0
Thornhill and Warham, Burton and Derby	2,267 0 0

Contract No. 5:—Coppers and Underback.	
Shears and Sons, London	£81 0 0
Blundell Bros., London	850 0 0
Bennett, J., London	823 0 0
Smith, J., Derby	783 0 0
Bindley & Briggs, Burton-on-Trent	735 0 0

Contract No. 6:—Backmaker's work:—	
Colyer, J. and Co., London	569 0 0
Bennett, J.	542 0 0
Church and Co., Frome	373 0 0
Oxley and Co., Frome	360 0 0
Wilson and Co., Frome	359 0 0

Contract No. 7:—Slate Backs.	
Brindley, J. and Co., London	145 0 0
Sharp, J. and J.	140 0 0
Brady	134 0 0
Stirling	130 0 0
Ashton and Green	102 0 0

Contract No. 8:—Pipe Connections, &c.	
Wilson and Co., Frome	1,196 0 0
Morton and Co., Burton-on-Trent	972 0 0
Blundell Bros., London	955 0 0
Smith, J., Derby	925 0 0
Thornhill and Warham, Burton and Derby	910 0 0
Bindley & Briggs, Burton and Derby	900 0 0

Contract No. 9:—Refrigerator.	
Lawrence and Co., London	166 5 6

GUILDFORD.—For works in re-making and draining roads, for the Guildford Urban Sanitary Authority. Mr. H. Peak, surveyor:—

Bright-hill:—	
Martin, Wells & Co., Aldershot (accepted)	£167 0 0
Addison-road:—	
Pimm, W., Guildford	£323 0 0
Martin, Wells & Co., Aldershot (accepted)	199 0 0

Cooper-road:—	
Pimm, W., Guildford	£760 0 0
Martin, Wells & Co., Aldershot (accepted)	303 0 0
Cline-road:—	
Pimm, W., Guildford	£230 0 0
Martin, Wells & Co., Aldershot (accepted)	165 0 0

Alexandra place:—	
Pimm, W., Guildford	£123 13 0
Martin, Wells & Co., Aldershot (accepted)	88 16 0

IPSWICH.—For restoring the tower of St. Lawrence parish church:—
Bennett, J. B. and F., Ipswich ... £725 0 0
Gladwell, H., Ipswich ... 720 0 0
Dobson, G., Colchester ... 685 0 0
Tooley, R., Bury St. Edmund's ... 620 10 0
Borrett, C., Ipswich ... 570 0 0

JARROW.—For new premises, for the North-Eastern Banking Co. Mr. W. L. Newcombe, F.R.I.B.A., Newcastle-upon-Tyne, architect. Accepted tenders:—

Mason work:—Storax, J., Jarrow.
Carpenter, joiner, slater, and plumber:—Murray and Adam, Jarrow.

LIVERPOOL.—For alterations to premises, 315, Park-road, for Mr. J. Pratt. Mr. W. W. Thomas, Stephenson Chambers, 25, Lord-street, architect:—
Nicholson and Ayre ... £559 0 0

LIVERPOOL.—For the erection of a hotel, &c., in St. Domingo-road and Everton Valley, for Mr. J. Tarbuck. Mr. W. W. Thomas, Stephenson Chambers, 25, Lord-street, architect:—

Carpenter and joiner's work:—	
Nicholson and Ayre	£730 0 0
Excavating, draining, and brickwork:—	
Tyson, W. and Sons	592 10 0
Masons work:—	
Thornton, W. and Sons	313 0 0
Slater's and plasterer's work:—	
Tanner, J. and Son	344 0 0
Plumber's, painter's, and glazier's work:—	
Burrows, J.	298 0 0
Smith and ironfounder's work:—	
Rankin, R. and J., and Co.	80 0 0

£2,366 10 0

LIVERPOOL.—For the erection of a villa residence in Sefton Park, for Mr. E. L. Wigan. Mr. W. W. Thomas, Stephenson Chambers, 25, Lord-street, Liverpool, architect:—
Morton, G. ... £5,500 0 0

LIVERPOOL.—For additions to Shaftesbury Hotel, Mount Pleasant, for Mr. J. W. Lloyd. Mr. W. W. Thomas, 25, Lord-street, Liverpool, and Aberystwith, architect and surveyor:—
Brown and Backhouse ... £1,151 0 0

THE BUILDING NEWS.

LONDON, FRIDAY, AUGUST 12, 1881.

PROVINCIAL ART MUSEUMS.

WE are disposed to agree with Mr. Storey Maskelyne that it is to Mr. Slagg's speech in the discussion in the House of Commons on Monday last, rather than to that of Mr. Collings, that we are to look for the true index to a solution of the question started. We do not like the apparent attempt to institute unpleasant comparisons between the facilities enjoyed by the metropolis and the great provincial towns, and we cannot see where else than in the capital the principal art examples gathered together at the British Museum and South Kensington are to be placed with half as much chance of being seen by the bulk of the nation. Nobody, we suppose, proposes to send the Elgin Marbles travelling about the kingdom like an itinerant waxworks exhibition, and few provincials, whether they are art-workmen or mere sightseers, will decline to admit that it is better that the highest and best specimens of art and art-workmanship should be safely housed in some accessible centre, than that they should be distributed in fifty provincial museums, each requiring to be visited in their turn if the whole of the objects are to be seen. If it is simply proposed to aid provincial towns to make a fresh start in founding local museums filled with objects selected by local authorities, some people who are rude enough to believe that a considerable amount of rubbish is to be found at South Kensington itself, may ask for some reasonable guarantee against a useless waste of State money by uninformed persons. It is not so long since a correspondent expressed, in these columns, his astonishment, mingled with pardonable pride, at finding a chair of his own make gravely labelled as the work of a manufacturer dead many decades. What has happened at South Kensington may happen more frequently elsewhere, but less frequently, we should imagine, where sufficient love for art or a perception of the need for developing local industries has existed to induce local self-help. There are some advocates of local museums who point with confidence to the existence of similar institutions in Flanders and Germany and France; but these people forget that in Germany, where such museums exist, the towns were capitals not so very long since, and that the local museums in France, though doubtless now subsidised by the central Government, were not founded by it—at least, they were not founded by it in any such way as would command approval in this country. If Mr. Mundella could lay his hands to-morrow on Hampton Court Palace, Chatsworth, Hatfield, and a dozen more royal and noble seats, where for years the owners have gathered together priceless accumulations of art-treasures, and roughly divide them between Birmingham, Manchester, Leeds, Newcastle, and a score of smaller provincial towns, he would be able to found local museums as cheaply and as readily as the National Convention did at the instance of Roland in 1792. If in a year or two Mr. Gladstone quarrelled with France, invaded her successfully, and directed the British generals to follow the example of the First Napoleon and send home as many pictures and other art-objects as they could tear down from the churches and public buildings, we might soon accumulate a collection as the French did in 1800, wherewith still further to endow our local museums. We are, however, reasonably

sure no such cheap means of making a beginning is before us. Anything wanted must be bought and paid for, and whether bought by the central authorities, or with money entrusted to local men, the cost will be considerable, and it is questionable, after all, whether the people generally will consent, through their representatives, to incur it for the benefit of a few favoured towns. The people of Ipswich or Exeter may care little about paying their insignificant quota towards the enrichment of the Metropolitan museums, which most of them are almost certain to see at least once in their lifetime; but they may reasonably object to be more heavily taxed for the sake of benefiting other towns which they are scarcely likely to visit, and with which they have no sort of connection. There are other champions of provincial art who admit that it is impossible to reproduce pictures and some other art objects, but that there are works in stone and metal, casts of which may be taken at nominal cost and scattered through the country. We have not yet noted any such marked influence on native art from the study of these reproductions as to make us very enthusiastic about the benefits likely to be derived from their indefinite multiplication. Such facilities may develop and improve art-workmanship, but for art itself we are not sure that they do very much—they certainly fill up vacant space and sometimes mystify the ordinary visitor after a rather ludicrous manner.

If State subventions to the provinces are to be the rule at any future time, we should like an instance, now in progress at Limoges, to form the example for all parties concerned. Limoges, one of the great French pottery and porcelain centres, acquired a museum of her own in 1869 by the liberality of one of her citizens, which has since been considerably added to and improved. The State is now about to take over this museum and the school of design attached to it, to extend both of them, and to make them national institutions. The town gives all the present buildings, the land on which they stand, and collections, and further engages to pay down a lump sum of £9,600, and a yearly subvention of £1,400. The State engages to spend £22,400, which will make up the sum required to start both school and museum on the most liberal scale. Let our own provincial towns form their own museums and galleries—as indeed several of them have already done—and then when the subject can be fairly and thoroughly discussed, they may perhaps with some prospect of success call on the State for further aid. The matter had really no chance of adequate discussion on Monday night, for, as the *Times* truly enough said on Tuesday, "the subject is one that has an interest of its own, and that deserves to be separately discussed in the House and separately considered outside. It is one of the misfortunes of this extraordinary Session that motions which are not strangled in the birth are huddled together to die of over-crowding. In ordinary times the question of reorganising the national museums for the benefit of the great towns would have had an evening to itself. This year it comes at the tail of a Ministerial statement with which it has only the remotest connection."

COMPETITIVE DESIGNS FOR CHRISTMAS AND NEW YEAR CARDS.

OF the many purposes to which the talent of the artist is now applied, the most recent probably is that of the decoration of Christmas and New Year cards, a branch of art manufacture which has grown to considerable proportions. Messrs. Hildesheimer and Faulkner, publishers, of Jewin-street,

are enterprising enough to have recently offered £3,500 in prizes for the best designs submitted in competition for cards, and these are now on view at the Suffolk-street Galleries, Pall Mall. Thirty prizes, amounting in all to £2,000, have probably by this time been awarded by the judges, Messrs. J. E. Millais, R.A., Marcus Stone, A.R.A., and G. A. Storey, A.R.A., to whom the designs have been referred. In addition to these prizes, Messrs. Hildesheimer and Faulkner have guaranteed to select seventy sets of designs, for which prizes of £25 and £20 will be given, making altogether the sum above mentioned. The sums offered have probably induced even artists of repute to enter the list. The prize-list will be published on Monday next. All the designs have been sent in under motto, and the large galleries in Suffolk-street, Pall Mall, are crowded with them.

It is not surprising to find these designs vary very much in their composition, and, in fact, reflect the very different tastes of the public. They may roughly be divided into the pictorial, sentimental, emblematic, and decorative. In the former of these classes we find the natural landscape, or the quaintly-drawn figure subjects and pictorial nursery rhymes suitable for the young; in the sentimental class we may put those compositions in which the valentine element is largely introduced; in the emblematic, the bouquet and the language of flowers are common, while the decorative class includes designs in which the artist has attempted to weave in a conventional manner the appropriate emblems into a texture of his own fancy. It would be an endless task to give an idea of even the principal designs in these classes, and we may therefore dismiss at once from consideration those designs for souvenir cards in which natural landscapes, types of female beauty, and bouquets of flowers have been introduced. These subjects are, as may be expected, overwhelmingly present in the collection, and we hope the judges, who are, by the way, more painters than decorative artists, will give a preference to those designs in which the emblematic and decorative treatment of a complimentary card has been kept in view. It is needless to say many of the landscapes, figure-subjects, and flowers are drawn with consummate care and finish, and several of them are worthy of being placed in an exhibition of cabinet pictures. Some of the portraits of feminine beauty show the work of the artist also, while the flower-subjects are finished with a delicacy of handling and execution highly creditable to their authors. We consider, however, such highly-finished pictures as "Aspiro," "Farmer," Nos. 40, 44, and others, out of place on a Christmas or complimentary card, and such themes appear to us less suitable the greater their literal fidelity to nature. "Veni vidi" is the motto of a pretty device, in which ferns and butterflies are arranged on light pea-green cards, though a thorough natural rendering is apparent. The designs, showing farmyards in winter-time, and landscapes with figures are well drawn, but singularly unmeaning, and floral devices with butterflies, cherubs, cupids, and pictures of Cinderella, can only be looked at as copies of the picture-cards and valentines we have been wont to see in ladies' albums. No. 30 is a more honest attempt to amuse the young, the droll outlined figures dilly tiuted, with the lines, "At Christmas time ye waites doe playe with many a merrie roundelaye," are artistically drawn, and put us in mind of the excellent series of nursery-rhyme picture-books lately published. "Esperance," another quaintly-drawn series of figure-subjects, with flat washes of tint, represents Christmas in the olden time. No. 42 is a folding card with three carefully-drawn figures of Faith, Hope and Charity, the latter being the centre one,

the outer cover is adorned by a vesica-shaped panel having a figure in it. The lines are from Spenser's "Faerie Queen." "Ye days of old" represent Christmas scenes, with a clever black and white border. Amongst a variety of several commonplace subjects we meet with a rather chimerical design—a kind of phantasmagorical idea in colour, in which figures and peacocks' feathers are combined. Flowers in vases, with motto, "Hodie mihi, Cras tibi," is pretty; and near it (No. 65) a clever conventionalised idea, Japanese in design, with foliage and birds upon a dark blue reticulated ground, may be seen. There are four designs for Christmas, New Year, and two for birthday cards. "Nunc aut Nunquam" represents four girls in differently-coloured gowns emblematic of the seasons. The flowers (No. 83) are cleverly painted in oil on dark grey grounds, and the nursery rhymes in "Light" are quaintly conceived in an artistic spirit, and the figures representing Jack and Jill, &c., are well drawn. The figures of the seasons in "Fac et spera" show a conventional treatment pleasingly coloured and somewhat Burne-Jonesian in style; and a great many of the competing artists show allegorical representations of the seasons. In 105 the artist has worked out a pretty idea in a Japanese fashion, and the colours green, gold, and brown are tasteful and emblematic. The motif is purely decorative, and a conventional rendering predominates. Children's cards are a leading feature in the exhibition, and many of these are very pleasing souvenirs, as in "Forward," where the seasons are represented by figures of romping juveniles; "Light Hearts," "Spero," a very poetical and decorative treatment, "Res quam," in which fairy-scenes are introduced. "Fide et Amore" are studies of female heads, rather too much of portraits. "Dresden China" is rather a comical conceit; we may also notice "Isca," emblematic figures, Autumn and Winter (142), "Aspire and Rise," and a decorative design with borders and mottoes (153). One of the cleverest decorative designs, "Godspeed" (171) shows a conventionalised arrangement of ferns and leaves on coloured grounds representing the seasons. The designs are in a Japanese spirit, and the colours are well blended and harmonised. No. 172, roses in china bowls, is too naturalistic. We pick out of many commonplace conceptions "Valentine Writing" (181); "Sun, Wind, and Rain," prettily coloured; a decorative design with flowers upon ornamental background (199). A quaint sepia group of figures, with an Ode to Winter, a Shakespearean fancy is "Cor ne edito"; winter scenes (218) highly finished; framed landscapes and marine subjects introduced on a background of trees (212), and a variety of floral devices, wild flowers, and grasses, show fertility of fancy. "Never Despair" (257), with flowers in borders, is a little out of the beaten track; and we might mention "Faith," in which wild flowers have been cleverly drawn. Among the naturalistic flower devices is "Labore sine favore" (287); "Work and Live" (303), with birds and flowers, has some originality; and in the corner of room we find four clever water-colour sketches of towers at Rouen, Ghent, Bruges, and Calais, the appropriateness of which for cards seems rather questionable. Some of the artists have introduced rather out-of-the-way and puerile fancies. What, for instance, can Shetland ponies, cats, and dogs, suggest as suitable decoration for Christmas cards? but we pass on to notice some prettily-grouped roses on grey paper, "Always Ready" (331), and a long decorative design for folding cards (332), more suited for a panel. The clouds, with wide borders, having flowers, is rather a good idea, and artistically carried out; the seasons are suggestive,

and the execution is highly finished. On the end wall we find also a few pleasing designs treated decoratively. "Deo juvante" (342), "Try" (344), and "Creta" (347), are all prettily conceived and drawn. No. 409 is another clever Japanese treatment, in which the setting sun is introduced amid folial devices. It is decorative, but stiff in the drawing of shrubs. Flowers in vases have been taken by a great many designers, but in "Juste Judicio" (440), they have been prettily grouped, and relieved by backgrounds of various colours, emblematic of the seasons. For a folding card, No. 454, flowers in front, with shades of colouring in the backs, is well adapted; the arrangement is decorative in feeling, and the flowers well drawn and coloured. Nos. 461 and 467 are also flower devices, and No. 474 is rather fresh, but unmeaning in its Japanese jumble; it looks like a puzzle. The flowers and grasses in 483, upon grey-tinted cards, are drawn with masterly skill.

A panel arrangement in which the hexagon is introduced, but rather formally, is shown in No. 485; fans and flowers have been combined in No. 499 with some suggestion, but many of the arrangements affect the aesthetic rather purposelessly. A rather remarkable idea is covering the memento card with pictures of church porches. "Audito libenter" (250) has done this, and has taken real Norman and Gothic porches to illustrate or symbolise the meaning.

The other rooms are full of designs, but of less interest, to which we have no space to refer; several of these are in black and white, and represent landscapes, figures, animals, rustic scenes, Japanese and decorative subjects, in sepia and India ink. One of the best is "Trust" (669) a clever mingling of colour, figures, and fans on gold and blue grounds. No. 785, designs in gold and silver, is also a fanciful idea. We also note 810, a pleasing floral design, 903, 935, 936, and on the screen, Nos. 1, 102, No. 1, 126, a cleverly-disposed Japanese design well coloured. Those who can spare the time to visit this exhibition will find much to interest and amuse. Every conceivable image which can be suggested by nature, art, and the most capricious imagination, has been laid under contribution, and applied with more or less artistic sense. Allegories, fables, nursery-rhymes, comic representations, riddles, grotesqueries, sports, and charades, have supplied suggestions in such an abundance, that it is difficult to imagine any fancy that has not been turned to account. Leaves, flowers, and fruit, birds, and classical or decorative figures and emblems, supply material for the most exquisite artistic memento cards; and the exhibition, which has been so well arranged under the management of Mr. Edward Freeman, affords the visitor means of comparing the powers and capabilities of the artists. The judges will have no difficulty in selecting those in which ingenuity and decorative fancy are most displayed, having reference more particularly to the requirements of this form of souvenir, and keeping in view the principle of emblematic, tasteful, and appropriate decoration, rather than picture-cards.

COMPETITION DESIGNS FOR THE PROPOSED EXCHANGE STATION, LIVERPOOL.

IN another part of our issue we publish the award in the above competition. The first premiated design submitted under the motto "Mai," by Mr. John West, of 4, South Parade, Manchester, utilises the present booking-offices and station-buildings, and preserves as much as possible the existing levels and approaches. In his report the author says, "At first sight it seems natural

that both the approach to and the debouch from the station should be together in actual practice; however, it is not the case, but there are certain advantages in keeping them separate, especially where there is a large emigrant traffic." The present western approach is not altered materially; but the exit from the debouch on the arrival platforms is moved further up Tithebarn-street to a central position, opposite Moorfield-street. Blocks of shops and offices are contemplated along part of the present debouch, and the new one is planned to leave room for a similar block on the eastern side. The plan provides for a new 10-ft. covered-in staircase in connection with the booking-offices, and another 6ft. stair is placed half-way up the incline to communicate with Pall Mall. The new debouch has a gradient of 1 in 16.

Referring to the booking-offices and station-buildings, the author proposes to clear away the east wing block, retaining the front and west blocks, and adapting them to the new circumstances. A new block of buildings, in rear of and parallel to the existing front block, is shown for the additional requirements. The author directs attention to a special feature of the design—namely, the unbroken transverse platform, 85 yards by 15 yards, communicating with the principal longitudinal platform, and having round it and abutting thereon, the whole of the offices, waiting-rooms, and conveniences. By this plan the several departments are rendered easy of access as well as separate and distinct. Provision is made for emigrants in connection with the new debouch. Other minor alterations are suggested. The floor of new buildings and transverse platform are to be kept at the same level as the present floor of booking-office, and inclines will be made to 3ft. above rail-level, or that of the new longitudinal platforms.

The roof over the transverse platform is intended to be entirely of glass, on the ridge and furrow principle, supported by lattice girders, and the main station-roof is in three spans, supported on cast-iron pillars 35ft. apart.

The design which has obtained the second premium, "Omega," by Mr. H. J. Percival, Newchurch, near Manchester, also preserves the existing buildings, and therefore minimises the cost. In this plan there is an entrance-tower to subway to booking-office, and a semi-subway and steps to same; an entrance to excursion-platform and another for carts. Shops and basements are proposed along the frontage to Tithebarn-street. The present building is altered for waiting-rooms with dining-rooms above. The roof is in two spans, of about 164ft. each, supported on columns 50ft. apart, and lattice or Warren girders 14ft. deep transversely to the run of metals—on these are the ordinary iron roofs hipped at both sides.

The third premiated design, "O. C. S.," by Mr. Thos. Mitchell, F.R.I.B.A., which we shall illustrate next week, was, we understand, placed first on the list by the directors and their traffic-manager and engineers in the first instance. The main objects proposed by this plan are (1) convenience of traffic, (2) simplicity of arrangement, (3) utilisation of sub-structure. The author raises the gradient of existing road adjoining Toxteth-street to 1 in 24, and provides a corresponding road on the Pall Mall side. The heavy parcels, which at present cost a large sum for haulage, are taken charge of at the lower or street parcel-office, and lifted by a hoist to the platform-level. The new buildings are placed partly on the site of the old ones, and are 66ft. back from Tithebarn-street, and the author has symmetrically disposed his elevation to this street. In the centre is the booking-hall, and adjoining are the left-luggage office, with a hoist, and the waiting-rooms, and abutting on these are the

refreshment-rooms. Half of the Tithebarn frontage has been utilised for a restaurant, from which it is expected a rental of £1,000 may be obtained; the other portion is appropriated to shops and stores. The sub-structure is extended under the permanent way by arches like the present. The style adopted is Gothic, and the estimated cost is £227,000. The quantities were taken by Mr. J. H. Andrews, St. Mary's Gate, Manchester.

"Rectus," the descriptive report of which we have received, is a very able design. The general arrangement at the rail-level follows the plan supplied by the company; the main block, 380ft. in length, fronts Tithebarn-street, but is kept back from it by a raised terrace, beneath which 12 shops are obtained in the arches between the cab approaches. The other waiting-rooms and offices are arranged in two wings attached to the principal block, one being carried over the approach-road to the station, 212ft. in length, and the other facing Pall Mall, 185ft. in length. Ample accommodation has been provided, and the cab approach is arranged on an easy gradient. The main roof is in two crescent-shaped spans. The elevation shows a central clock tower, surmounted by a small peristyle; and the booking-office front is adorned with an order of Ionic columns, standing upon an arched entrance. The extreme wings are emphasised by columns of the same order, surmounted by pediments. The details of these portions are refined, and carried out in a Greco-Italian style, dignified in the main lines, and avoiding anything commonplace or costly. The competition designs are on view in the Skating Rink, Devonshire-street, Higher Broughton, Manchester.

THE FURNITURE TRADES EXHIBITION.—II.

IN our last issue we directed attention to the Furniture Trades Exhibition, opened last Thursday week at the Agricultural Hall, and we now have to review more in detail the various manufactures and goods, useful and decorative, which have been brought together. As an experimental exhibition, it must be confessed, the promoters have to be congratulated, for although some manufacturers are conspicuous by their absence, a few of the bays and stands contain furniture and other articles which would do credit to any exhibition. So thorough a revolution has been wrought in the taste for furniture and decoration during the last twenty years, that it is not surprising to find cabinet-makers and upholsterers anxious to compete with one another in the production of what is called "art furniture." The four rows of avenues are filled with every class of manufacture, from that of the furniture dealer who caters for a general public to the class of the special maker, whose designs are prepared by well-known artists.

Messrs. Ashton and Green, of Bury-street and St. Mary Axe, occupy a prominent place in the main avenue near the entrance. Their suites of chimney-pieces in Brocatella, black, Sienna and statuary marbles, are intended to show every modern style and degree of finish. Among the collection we notice a carved black chimney-piece, with ornamental shafts of Brocatella supporting a shaped shelf. The carved foliage in the mantel and caps are of black marble, left dull, as a contrast to the polished parts: another was richly decorated with Sienna panels suitable for a drawing-room, and one or two had arched mantels and black members. These are fitted with dog-grates, or registers, in Renaissance and the Adams' style, and we notice in one instance a black marble hearth inlaid, which has a very rich effect. The statuary chimney-piece with Ionic columns is a very elaborate design, and richly carved. The registers are well

finished, and are fitted with painted tiles; the baluster-bar grates are novel, and the assortment gives a good choice from an inexpensive grate, costing about £2, to the highly-decorated brass-finished grate of £30. Close and open ranges, and especially the "Birmingham range," which can be made into a close or open fire, and is constructed so as to carry away the effluvia from frying, call for particular commendation.

Mr. James Loder, Cheltenham, is the exhibitor of some excellent sideboards, in which design and workmanship have been considered. An American walnut sideboard, with nickel-plated hinge, Jacobean, has some spirited carving to the front drawers; another in Renaissance with oxidised handles, from a design by Mr. Jouquet, has a broken pediment, with carved panels in cupboard-doors and mirrors at the back. A fumigated-oak Elizabethan sideboard, and a very rich genuine Dutch marqueterie table-top, inlaid with woods, mother-o'-pearl, and ivory, and in capital preservation, are among the exhibits. Near this, the Austrian Bent-Wood Furniture Company have a large stall stocked with chairs, of various kinds, settees, lounges, sofas, toilet-stands, jardinières, tables, and rocking-chairs, manufactured of their bent-wood. Every sort of easy and portable chair is made by this firm, and being light, the furniture is well adapted for bedroom use, boudoirs, &c.

Messrs. Jackson and Graham, Oxford-street, whose collection we glanced at last week, occupy a large central stand in the main avenue. Among the exhibits of this firm, chiefly of furniture produced by machinery at small cost, we notice a simply-treated buffet, from a design by Mr. R. W. Edis, F.S.A. The framing is exceedingly simple, the upper part having glazed lockers and shelves for china. Last week we mentioned a very effective style of wall-paneling in Late 18th-century, or after Sheraton, of painted deal, showing chimney-piece and door, the main relief consisting of panels and fluted enrichments with mouldings, the colour a greyish green. We now notice a set of bedroom furniture, painted, and of simple design. The wardrobe has mirrors and a bookshelf, the toilet-table has side lockers and drawers, supporting a toilet-glass of elongated-octagon shape, and below the table are drawers for toilet requisites. Another suite of bedroom furniture of pine, stained green, inexpensive in design, is exhibited, fitted with some very effectively-designed ware of Japanese taste. We notice also a cream-painted deal chimney-piece, with dove-marble architraves of an inexpensive kind; a drawing-room cabinet and bookcase combined; and a sideboard of eboussé wood, from a design by Mr. Edis.

Mr. M. F. C. Turpin, of Bayswater, whose parquetry we have already referred to, exhibits several well-made specimens of wood-work. We notice a carved oak chimney-piece with stove in an Italian Renaissance style, oak cabinets carved, and various specimens of parquet flooring, lin. and 5-16th in. thick, dados, carved chairs, &c. A very rich floor, the pattern being Italian in design, with foliated scrollwork, in walnut on an oak ground, may be seen; the pattern is fret-cut, and the border of walnut and oak. Other designs in walnut, oak, sycamore and mahogany, of plain geometrical patterns with appropriate borders, are exhibited. The inch fillings vary from 1s. to 4s. per square foot, and the borders are about the same. Turpin's thin parquet, specimens of which may be seen, is of course a cheaper substitute, which can be applied to any floor. It is 5-16th in. thick, the backing being in three deal laminations, laid crosswise of the grain, which renders it as strong as the inch solid, and less liable to fracture than the canvas backing. Designs for chimney-pieces and

chair-seats are among the articles to be found in this stand. Billiard-tables of various styles and sizes are exhibited by Mr. G. Edwards; we notice especially a 6ft. by 3ft. billiard and dining-table combined, which can be converted easily.

Mr. W. H. Davies, of Liverpool, exhibits an Upright Grand Pianoforte with reverberating soundboard and guitar pedal, well worth the attention of all pianists and purchasers of high-class instruments of this class. For wall decoration, one of the most interesting stands is that of Messrs. Frederick Walton and Company, Berners-street, who show their admirable "Lincrusta-Walton" in several designs and colours. A delicate salmon-pink tinted sample, relieved by an impressed pattern in the Adams' or 18th century style, gilded, and the apple-green specimen with dado of a chocolate colour, richly embossed, afford a good idea of the rich carved-like relief, which this washable and impermeable wall material is capable of receiving. Other designs are to be seen here, but we direct attention chiefly to the pleasing tints of the green and chocolate, which are the natural colours of the material, and which may be made to harmonise with any furniture. As we have said before, it can be obtained to suit any style of architecture.

In conjunction with Messrs. Walton, Messrs. Conrath and Son, of Audley-street, exhibit a very artistically-designed brass hat and umbrella stand, which is worth inspection. The patent hat-stand has no hooks for the hats, but horizontal bars of brass, a few inches apart, which catch the brim of the hat in the easiest possible manner. The hat by this means does not stick out, but assumes its normal vertical position. There is an umbrella-stand underneath, and brackets at the sides with hooks for coats.

Messrs. Steel and Garland, Holborn Viaduct, have a large display of chimney-pieces and grates, with hand-painted tiles, brass dog-grates, fenders, fire-irons. We may call attention to the tapestry-tiles for the cheeks of grates, and the mosaic imitation tile-hearth. The "Burmantofts tile covings" and the hearths in one piece, in which the tiles are embedded on a flat layer of concrete, are effective and not liable to fracture, and ashes do not get in the joints. Some of the dog-grates are made with open bars at the side, to facilitate the draught. We notice also a coal-cabinet and what-not combined; a nursery-grate, relieved with tiles representing the days of week; a hob-stove, with inlaid brass, brass fire-irons, &c. Mr. Hy. Bassant, Well-street, has a very large assortment on view of parquetry and dados in a variety of plain geometrical patterns, suitable for halls, rooms, dados, &c.; and in art-metal manufacture we draw attention to the collection of brass-work exhibited by Messrs. Jones and Willis, of Great Russell-street, &c., who have some highly-wrought lecterns and gasaliers. Their patent "Hesperus lamp" we have mentioned on previous occasions, and there is no doubt its illuminating power makes it one of the most economical lamps in the market. Some well-designed walnut cabinets and sideboards in Chippendale and other styles, are to be seen in Mr. J. A. Deintje's stand. In Bay 20 Messrs. Clark, Bunnett, and Co., Queen-street, &c., show their well-known patent revolving shutters in steel, iron, or wood; some excellent metallic Venetian blinds, a dinner-lift, and a safety-lift for invalids, a smokeless grate (Ingram's patent Kaio-Kapnos) which burns anthracite or any fuel. Spiral staircases, and other castings, stable-fittings, &c., are among the objects to which professional attention may be drawn.

As an architectural and decorative material, concrete is too important a material to pass over, and we find Mr. W. H. Lascelles, of Bunhill-row, the only repre-

material of this manufacture. Mr. Laidlaw's stove contains only three or four calibrations to which we direct special attention, indicating the degree of workmanship and high finish to which he has attained. The red concrete chimney-pipe designed by Mr. Norman Shaw, R.A., in a Queen Anne style, is an excellent specimen; the material is enriched by a bas-relief of a vine and festoons equal to carved work. Another of green colour has a bas-relief of a plant of Dickens in the centre, and a white concrete chimney-pipe, from a design by Mr. Timerson, shows some bold relief in the mould. The red hearth-tiles, with brass inlay, make a capital hearth, and we have referred to other manufactures on the occasion of a recent visit to Mr. Laidlaw's manufactory. Messrs. Ross, Fox and Co. exhibit a suite of bedroom furniture, a chest of drawers, what-not, in Canadian basswood of a wood having a pleasing grain, and another suite in Canadian white and cedar, the style being the Adams. The walnut mouldings well repay the colour. The "Otto" silent gas-engine, by Messrs. Crossley, Bros., Manchester and Poulter, is too well known to need a lengthened notice. For pumping, lifting, lifting, lathes, swing machines, &c., the "Otto" gas-engine is the most economical motor, the cost being about 1d. per h.p. per horse-power. The gas is ignited in the cylinder with air. The inexpensive oak and walnut furniture shown by Mr. H. Hermann is worth notice.

In the gallery and fittings are shown at a new stall. We notice the Yale Lock Manufacturing Company, Stamford, U.S.A., and Adams Street, Strand, which has a large display of locks, latches, and door-furniture, making their principle. The chief feature of these locks is the flat keys, made of steel or metal, which are common in the United States, and more portable than the ordinary key. The rim night-latches are of a new construction for the common kind; the door is not locked, and other locks are of a new and compact. An automatic time lock is shown also, which can be easily set to open at any hour. Mr. R. Adams, of Great Dover Street, has one or two models, showing improved methods of hanging shutters. In the safety window, the vertical sash fasteners can be made to turn on pivots without the need of a hinge. They are hung on a pivot at the right centre, and are fitted with a patent adjustable sash-fasteners, by which they are rendered air and dust-tight. The fastener can convert any ordinary sash window by taking off the inner bead and removing the parting bead. The "patent" fastening and sash-check" is an ingenious arrangement for doors. We may say a word for a patent sash-light opener, and the "patent" sash-light holder, both clever appliances. Messrs. Bell and Co. have an improved fastening kitchener worth attention. Messrs. Carter and Aynsley exhibit a large collection of brasswork and builders' ironmongery, including a patent sash appliance. Mr. Mayfield. We have already mentioned Messrs. Haldison and Clark's stall, in which we have not seen the "patent" window-blind, revolving-ironmongery, and a combination, will be found in the arrangement. It is extremely strong, and a good specimen of the art. A new blind, the "patent" window-blind, is made of iron, and is extremely strong, with a large display of choice tapestry curtains, silk, rep, and damask upholstery. The wool and silk cushioners are in excellent designs and colours. Messrs. M. J. B. Burnard and Co. are the manufacturers. Messrs. S. and H. Levi have a stall filled with terra-cotta and Devon art-pottery; the hand-etched vases are artistically executed. Last week we referred to the stand of the Papyrotile Company. We may now draw attention to the warmth and tone of this

material or leatherette, its value as an inlay and decorative material for furniture as well as walls, and its comparative cheapness as a relief. It is applied in tiles 4in. by 4in., and 4in. by 8in. They are capable of receiving any colours, though those of two shades and with gold relief are highly pleasing and artistic. The papyrotile can be cleaned, but its surface being of a glossy nature, it is far preferable to paper.

Of the many other exhibitors, we have only space to notice Messrs. Vaughan, who have a variety of suites of furniture in the latest styles; Mr. M. W. Ovens, exhibitor of side-board, of oak and walnut; Messrs. Drew and Cadman (plate glass and mirrors), C. and R. Light, Laverton and Co., Wright and Son, Chorlton and Dugdale, Brangwin and Co., and W. North and Sons; the Wilton Engineering Co. (ranges); the Eagle Range and Foundry Co.; the Art Tile Painting Co. There is little connected with the trades of furnishing and decoration which is not represented, and the number of exhibitors in each class is an augury of greater success in the future.

PORTLAND CEMENT FOR USERS.*

MR. HENRY FAIJA, C.E., is the author of a little book intended to furnish those who occasionally use cement with the practical results of experiments, without entering into elaborate researches and theories. The literature of limes and cements is already formidable enough, and the treatises which have been written on the subject, together with the more fugitive sort of papers to be found in the transactions of professional societies, are certainly beyond the practical requirements of those who daily use cement. The author's experiments and researches, instead of being minutely described, have been given in a classified form, as deductions, and several tables have been added, which will be found useful for reference. In the introductory chapter, Mr. Faija refers to the variations in manufacture, owing to differing proportions of the same raw materials, and their composition; and he speaks with some authority on the advantages that would accrue by the adoption in this country of a uniform means of testing cement, as well as of a standard of quality, such as the Governments of Germany and Austria have adopted. It is very true that such qualities as weight, specific gravity, colour, and fineness, are problematical properties, and are of no use in determining the actual qualities of cement, such as tensile strength and setting power; but when these "absolute" properties, as they are called, are known, the other criteria may be taken in determining, with some degree of accuracy, the behaviour of certain cements, just as, from certain physical signs, the physician can diagnose pretty accurately the real condition of a patient, and the probabilities of recovery.

Chapter II. discusses "weight," and shows the fallacy of making weight (by itself) a criterion of quality, when it is now known that the cements which weigh little are often superior to the heavier cements. So much for the 112lb. bushel test. To require that a bushel measure must be filled as "lightly as possible," is no test of uniformity, as everyone will have a different idea of performing that duty.

Fineness is a matter of more importance, and since the finer a cement is ground the less is its weight per struck bushel, we cannot put much faith in weight merely. The author describes a method of filling the measure to secure uniform results. The cement is placed in a hopper with a fixed spout, at an angle so that the cement will run quietly into the measure at a certain

* Portland Cement for Users. By HENRY FAIJA, C.E., Assoc. M.I.C.E., &c. London: Crosby Lockwood and Co.

height. After it is well piled up above the rim, the cement is struck to a level. The author uses a smooth iron hopper with zinc spout, fixed at an angle of 55° , the mouth of the spout being 5in. above top of measure. Weight and fineness should go together. Fine-grinding is essential to surround each particle of the aggregate, and the value of fineness in cement can hardly be overstated. Chapter IV. deals with "gauging," or the addition of water to the sample; also the form of briquette, and the amount of water used. The briquettes ought to be of a form to insure tensile strain only, and the amount of water to gauge varies much; generally from 16 per cent. to 20 per cent. is necessary. The cement must be brought into a "pasty, tenacious mass," and this condition should be attained with the minimum of water and in the shortest possible time. The directions given for filling the moulds are thoroughly practical, after which the process of "setting" is described—a word often used in a rather ambiguous sense. Some cements are quick, others slow-setting; but both kinds are advantageous—the first where strength is required speedily, and the slow-setting kind in foundations and hydraulic work. "Set" has nothing to do with hardness, but is the return to the normal temperature of a pat or briquette.

On tensile strength the author makes a few useful observations. Formerly, seven days after gauging was considered sufficient time to test a cement; but lately it has been found necessary to give a longer time, and an expiration of 28 days has been allowed in some cases. A seven-days test, however, may be applied after the longer test has been made. Regarding sectional area of briquette, 2in. is that usually adopted; but a briquette of lin. square has been found to give more uniform results from the same gauging. The variations which occur in the results are not satisfactorily explained, though by using the lin. section and having five moulds in a nest, all filled at once, the author finds the limits of deviation need not exceed 10 per cent. A uniform rate of strain is, however, essential, as the experiments recorded in the appendix show. As all cement is used with sand or ballast, it is necessary to know something of the effects it has when gauged with sand. The sand test is used in Germany, where a standard size of grain is insured; and if satisfactory evidence is wanted, the sand used for testing ought to be the same as that on the works. The sand test enables the adhesive power of a cement to be determined, but the sand should be of a uniform size and cleanliness, or the results will differ widely. Chapter VIII. discusses the chemistry of manufacture, and in the following chapter the author quotes from a paper he read before the Institute of British Architects last year to the effect that "the greater the increase in strength per cent. is between the seven and twenty-eight days tests, the stronger and harder is the cement likely to become, and that increase should be at least 25 per cent."

A light colour and light weight characterize quick-setting cements, and a heavy weight and dark colour a slow-setting cement. If properly ground the weight per bushel, according to the author, is from 108 to 116lb. "A cement that will pass through a sieve with 625 holes to the square inch, and will leave a residue of not more than 15 per cent. when sifted through a sieve having 2,500 holes to the inch, will be found to give good results, combined with a due regard to economy of production." The summary of results gives a tensile strength for a good cement briquette of 400lb. per square inch after the expiration of seven days, the briquette having been placed in water 16 or 17 hours after

gauging. Slow setting is to be desired. The colour of a true good cement is a cold grey, of a quick-setting cement, a light brown or "foxy" tint. This and the concluding chapter will give the general user all that is requisite to specify or test accurately a good cement. The author condemns, and with a good reason, the custom of tipping concrete into a foundation from a certain height. Instead of solidifying, it tends to separate the larger masses from the smaller of the aggregate, and thus the matrix is displaced. In making concrete, the dry material should be well mixed before the water is added, and this should be gradually done. We commend the reader to the remarks on the application of cement concrete, and on cement mortar, and the author shows that greater strength may be secured by using cement concrete instead of lime concrete, as a less proportion of cement would be necessary to insure equal strength. The appendices illustrate in detail the remarks, and are intended to support the conclusions, of the author. Many of the tables are from experiments made by Mr. Henry Faija, in his cement-testing room and laboratory at Westminster. Diagrams of various forms of briquette and hopper-and-shoot apparatus for filling bushel measures, testing-machines on the steel-yard and lever principle, are given; and Mr. Faija's little treatise will be found a useful compendium of results for the practical builder and architect.

THE KNOWLEDGE NECESSARY FOR THE TRUE ARTIST.

MR. J. B. MITCHELL-WITHERS delivered a very sensible address to the students of the Sheffield School of Art on the occasion of the distribution of prizes on Monday night at which he presided. He said: It is my duty to-night to address you for a few moments on the subject of art; and if I felt that I was expected to say anything novel bearing on its history or technical practice, I should hesitate to speak at all before an assembly like this, embracing, as it does, not only those who have shown their attention to it by carrying off the prizes we are about to hand them, but also some whose brows have long been adorned with the laurels of painting, sculpture, and architecture, and to whose words I should be no unwilling listener. I shall confine myself then to a rapid glance at the opportunities afforded in this Sheffield of ours to acquire the knowledge necessary to form a true artist. I do not restrict this term to any one branch of art, and I feel I shall be pardoned when I say that although it is to be hoped that some true painters may be the outcome of this school, it certainly is not its primary object to produce them. We seek to gather within its walls not only the sculptor but the stonemason; the joiner as well as the wood carver; the chaser, the engraver, the iron-worker; in fact, all on whose daily avocations art can be brought to bear. Nor do we wish to stop here. We would desire to have a firm hold on those who will have the opportunity of employing the art workman, to give them a true interest in art, which can only be truly acquired by definite and systematic study. There is little doubt that in these days art is not neglected. We have "art pottery," "art colours," "art furniture," a series of papers devoted to "art at home," and many volumes to art abroad; but to use the words of our late art director, Mr. Poynter, "It cannot be denied that in spite of all that is talked and written in sincerity and cant on the subject, we are hardly better off now than formerly. A satisfactory knowledge of art will still be found only among those who practise it, and with a few earnest lovers of it, such as have at all times assisted by their enthusiasm." Turning over the pages of Sir John Tyrwhitt's "Christian Art," I find the following:—"If we took a man out of Sheffield and educated him for years as an artist at Florence, he probably would not like Sheffield when he had to go back. But we want to teach art in Sheffield. What we are desirous of is that there should be good schools of design, and models of

beautiful work and flowers, and still-life, and even means of study from nature in all the great grimy towns on the coal-field." I am aware that one who described himself first as Mr. Tyrwhitt's master and afterwards his pupil, has stated that in the carboniferous formation on which our town is situated there is no home for the artist, no soil in which the delicate root of art can be induced to grow. But I think there is no difficulty in showing that what the author of "Christian Art" is desirous of doing can be done, and done well, if only some of the sons of Sheffield can be induced to give themselves up to steadily using such means as are at their disposal. We all know the importance to the students of science of an accurate and comprehensive knowledge of all that has been done by its pioneers and professors, as a foundation on which to build his own superstructure. This knowledge is equally necessary in art. Many an able man, whose eye had all the feeling, and whose mind the enthusiasm necessary to form an artist, has miserably failed because he knew not the elementary principles of drawing, or was too proud to learn from his predecessors. Reynolds, in his masterly discourse on painting, strongly enforces the necessity of this course. He says—"Study, therefore, the great works of the great artists for ever in the order, in the manner, and on the principles which they studied. Study nature attentively, but always with these masters in your company, and consider them as models which you are to imitate, and as rivals with whom you are to contend." There is no difficulty in carrying out this study in the building in which we are assembled, so far at least as form is concerned. Would you kneel at the highest shrine in lowly admiration of the name which Sir Joshua desired should be the last he should pronounce in his discourse—Michael Angelo—you have in the rooms around you most accurate casts of many of his greatest works. We have the Torso, which he so much admired that it is said when he became blind he used to be led close to it that he might pass his feeble hands over its form. We have the panels by Ghiberti of those gates which he praised so highly that he considered they might well be used as the gates of Paradise. Step into the library and you find that photography has produced with marvellous exactitude the roll of the master's brush as it passed with lightning rapidity over the ceiling of the Sistine Chapel, and engraving the great architectural monuments with which he adorned Italy's ancient capital. The ornamentation of the Renaissance period has not been neglected, and the Medieval sculptors who decorated the glorious cathedrals of our own and other lands are now fairly represented. On the hill which overlooks the beautiful valley of the Rivelin and the wooded slopes of Wharfedale the author of "Modern Painters" has deigned to pitch his tent and provide for those who wish to study them, examples of the art of Dürer, the early Italians, and the studies of our own great landscape painter, Turner. Should we desire to bend the ductile iron to our will and to fashion it into these forms of quaint and beautiful flower or foliage which ancient and modern artists delighted to produce, we have a rich collection in Mr. Bragg's gift to our Weston Park Museum. Why should not this art be added to our town's productions? Could not the Hallamshire man be taught to wield his hammer as well as the silk weaver of Coventry or the gunsmith of Birmingham? Do we desire to apply Sir Joshua's advice, "Study nature attentively?" Have we not the Ribblesdale and Wyming Brook, on whose banks Elmczer Elliott composed his choicest poetry? The grandeur of our moorlands, with their fine escarpments of millstone grit, the medieval remains of Conisborough, or Roche Abbey, are all subjects which are surely not mean ones for the landscape painter. The brilliant effects of light and shade with some of our manufacturing processes are not beneath the pursuit of an artist; and we can fancy that had that king of shadows (Rembrandt) lived at Sheffield he would have been a frequent visitor at the "Cyclops," or the "Atlas," and have etched many a record of their mighty fires. To those of you who are only commencing to tread the paths of art, I would say, Work, embrace every opportunity of study that presents itself, and though you may never win a prize, never have your name enrolled among the great ones, you will have a rich reward in the trained eye and mind, with which you can drink in the beauties

of the Greek Theseus or the Moses of the great Michael Angelo, you will learn to understand the grandeur of Turner; and last, but certainly not least, you will gaze on the flowers of the garden, the grass of the field, the gem of the mine, with fresh interest; and as you see the setting sun paint the clouds with crimson and gold, you will be fain to exclaim with the great word-painter of Israel, "How manifold are Thy works. In wisdom hast Thou made them all; the earth is full of Thy goodness."

PRACTICAL NOTES ON PLUMBING.*

IX.

By P. J. DAVIES, H.M.A.S.P., &c.

BENDING BY SPLITTING OR SPLIT-MADE BENDS.

THIS method of bending is much practised in the provinces, and, for anything I know to the contrary, is one of the best methods in use, as by it you are likely to get a good substance of metal on the back of the bend whether the plumber be a good or a bad workman. Proceed as follows:—Cut the pipe down the centre to suit the length of your bend, as shown at A B,

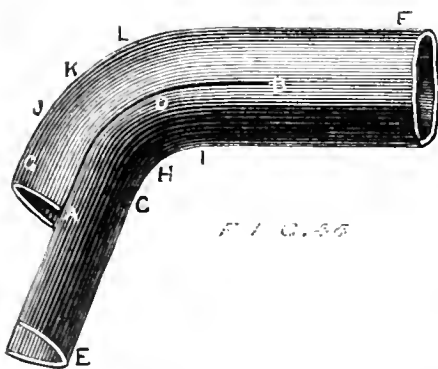
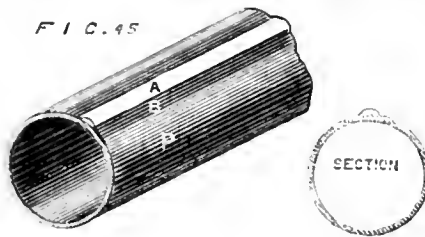


Fig. 44. It will be quite as well if you first set out this bend on the bench, then you may measure round the back, as from C to L, to obtain the distance of the cut, which should always be three or four inches longer than the bend. You may also in this way obtain the correct length for the throat, GHI; here you will see that you have a quantity of lead to spare, i.e., from A to E, all of which has to be got rid of in uncut bends—some plumbers shift from front to back, but how many? Not one in twenty. After you have cut the pipe, open the throat part, bend out the sides and pull this part round a little at a time, then with a dummy, Fig. 38, work the internal part of the throat outward to as nearly the shape as you can. Go carefully to work, and do not attempt to work up the sides, ADB, until your throat is nearly to the proper shape, after which you may do so with a small boxwood dresser or bossing-stick. (It is not necessary to explain minutely what a boss or dressing-stick is, as they can be bought at almost any lead-merchants—the dresser is shown at E, Fig. 1, the bossing-stick is somewhat similar, the only difference being that it has a rounded face instead of flat.) Keep the dummy up against the sides when trueing it. If you have proceeded properly with this throat part, you will not require to work up the sides or edges, as in working the throat back, the sides will come up by themselves. Next take the back, pull it round a little at a time, the dummy being held inside, with your dresser work the two edges and sides slowly round, and the back will follow. Never strike the back from the underside with the dummy. After you have made a dozen or two you will be able to make them as fast as you please, but do not hurry them at first, as the greater part of this work is only to be learned by patient application, perseverance, and practice.

After you have made the bend it will require to be soldered, but before you can do this you must have the joint quite perfect and the edges true one with the other. A good bender will not require to touch his edges at all, but a novice will have to rasp and trim them up so that they come together. Having your edges true, soil them, take a gauge-hook to be obtained at Back the tool-maker's, which may be

described as a shave-hook with a gauge attached, and shave it about $\frac{1}{16}$ in. each side, now solder it to look like the solder A, Fig. 45, which

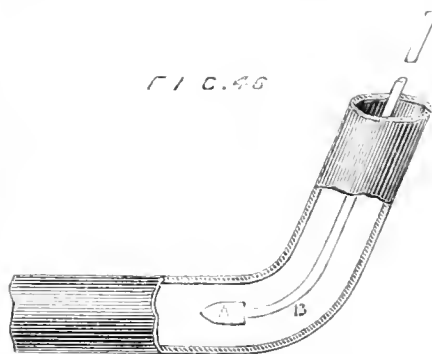


is done as follows:—With some fine solder tack the joint at ADE, Fig. 44, put on some resin, and with a well-heated copper-bit drop some solder roughly on the point from B to A, then draw the bit over it again to float the solder, being especially careful not to let the joint open when coming off at A. Some plumbers think fit to begin here, but that is a matter of no importance. Do not forget that if your joint is not properly prepared, that is to say true and even, it is sure to be a failure, and will have a "higgledy-piggledy" appearance. Some difference of opinion exists as to the best method of making these joints: one workman will make a good joint by drawing it, while, on the other hand, another one will do it equally well by wiping it. Drawing will be fully explained in a chapter on pipe-making. It may, however, be here mentioned that it is a method of making the joint by floating the solder along the joint with the hide and plumbing-iron.

It is not uncommon for plumbers to make their bends with only one joint on the back.

PULLING UP BENDS.

In London, it is the favourite plan to make bends without cutting them. Fig. 46. It is

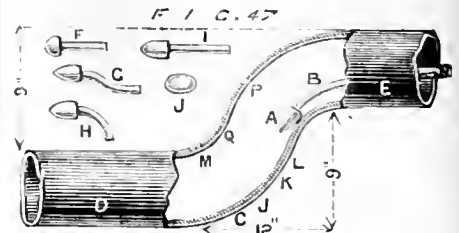


done by taking a length of pipe and, just where you require the bend, lay it (with the seam at the side) upon a pillow, made by tightly filling a sack with sand, wood-shavings, or sawdust; have some shavings ready to hand and a good bath, also a short length of mandrel about 3ft. long and about $\frac{1}{16}$ in. smaller than the pipe, and a dummy as shown at A B, Fig. 56. Now, all being ready, put a few burning shavings into the throat of the bend, just to get heat enough to make it fizz, which you can judge by spitting on it. When this heat is acquired withdraw the fire, and let the labourer quickly place the end of the mandrel into the pipe, and pull the pipe up while you place a sack or anything else convenient across the throat of the bend, then pull the pipe up a little, just sufficient to dent it across the throat. Now, with a hot dummy, dummy out the dent, until it is round like the other part of the pipe. Keep at this until your bend is made, occasionally turning the pipe on its side and giving it a sharp blow on the side with the soft or hornbeam dresser; this is when the sides run out as in Fig. 37. Never strike the back part of the bend from inside with the dummy, but work the lead from the throat to the back with a view to thickening the back.

SET-OFFS.

A set-off is nothing more than a double bend, as shown at Fig. 47, and made in much the same manner. D is the long end of the pipe. Always make this bend first and pull it up quite

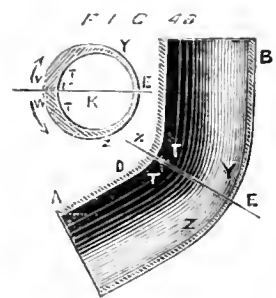
square, as it will be found to go a little back when pulling up the other bend; if you can make the two together so much the better, as you can then work the stuff from the throat of



one bend into the back of the other. The different-shaped dummies are also here shown: F a round-nosed dummy, G a double bent dummy, H a single bent, I straight, J hand-dummy, A B N a long bent dummy shown at Fig. 38.

BAD BENDS.

These can always be detected by examining them in their backs, as at Fig. 48; take a small

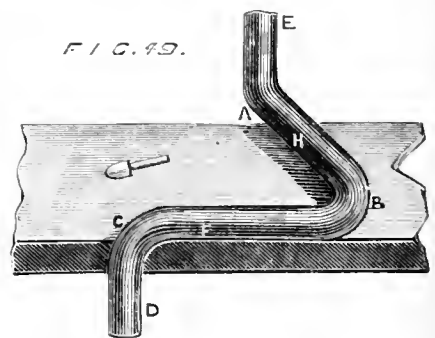


dresser and tap the pipe a few times round A B D to test for the thickness. Strike it hard enough to just dent it; next strike the back part of the pipe E with the same force, and if it dents much more it is not an equally-made bend. I have seen some of these much-praised London-made bends that could be easily squeezed together by the pressure of the thumb and finger. N.B.—Care must be taken not to reduce or enlarge the size of the bore at the bend.

BAD FALLS IN BENDS.

The fall given in bending lead pipes should be considered of quite as much importance as making the bends of equal thickness, especially for pipes, as shown in Fig. 49.

In this Fig. you have a drawing of a bad bend.



From A to B there is no fall whatever, as also from B to C; such bending is frequently done and fixed in and about London, which is not only more work for the plumber, but next to useless for soil-pipes. Fig. 50 shows how this bend should be made with a good fall from A to J, also from M to N; the method of making these bends requires no further explanation. R, P, and K are the turnpins for opening the ends, the method of which will be explained in future paragraph on "Preparing for Fixing."

BENDS MADE INTO TRAPS OR RETARDERS.

It will sometimes be found requisite to retard the flow of water when running through soil or other pipes, or to direct it to another course.

or even to form a trap in the length of pipe. This has been done in many ways, but Figs. 51 and 52 represent the method that I, after mature

working the dummy is also taken advantage of in working up embossed vases, &c.

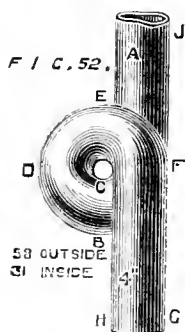
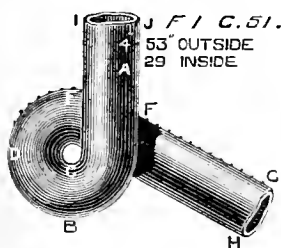
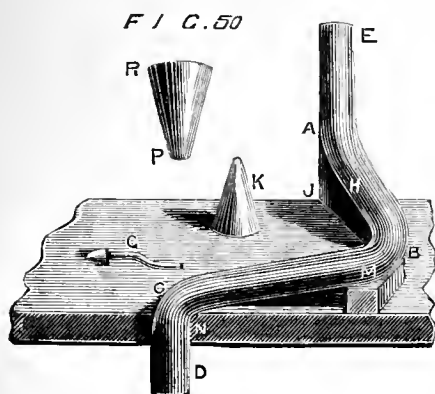
(To be continued.)

THE ARCHITECTURAL ASSOCIATION AT WORCESTER.—I.

WE give to-day, among our illustrations, a selection of drawings which may add to or awaken some interest with regard to the excursion of the Architectural Association, which takes place next week, embracing Worcester and the neighbourhood. Our plates include a view from the south-east, showing a sketch, not before published, of Tewkesbury Abbey, giving a near drawing of the apsidal chapels and central tower, by Mr. A. J. Style, architect. Below will be found a plan illustrating the restored arrangement of the choir, transepts, and nave, in course of progress, from the designs of the late Sir Gilbert Scott, R.A., by his son Mr. John Oldrid Scott, to whom we are indebted for the plan. The two tints of the drawing indicate the two chief periods of work remaining, the Norman work of the nave and transepts being shown by the black sections, while the 14th-century "Chapterhouse," with chapels round the sanctuary, are shown by the lightly-hatched-in walls, and a reference too is added explaining the details of the plan. The nave was commenced by Robert Fitz-Hamon, the first Norman Lord of Gloucester, and nephew, by marriage, of the Conqueror, and it is, no doubt, to him and his successors that the mass of the present existing structure is due. In 1178 the monastic buildings were burnt, and traces of this fire are said to be still distinctly visible on the adjoining walls of the church. No remains of any buildings, such as would have been re-erected at this date (Henry II.) now exist. In 1219 Abbot Peter built the dormitory and back offices, which work has also been destroyed. Prior Sipton rebuilt the chapel of St. Nicholas in 1237, on the site of the present chapter-house (A) and original east apsidal chapel of the north transept, which latter corresponded with that on the south still remaining. The most important work, however, erected during the time of the Clares in the thirteenth century, was the supposed Lady-chapel of that date, extending beyond the north face of the north transept, and held by some to have been used rather as two chapels dedicated either to St. James or St. Nicholas and to St. Eustace. This building was somewhat singular on plan, resembling, in fact, a small church with nave and chancel. The first Lady-chapel of Norman date was of very small dimensions, forming one of three little apsidal chapels ranging round the original apse of the contemporary sanctuary. During the twelfth century the vastly-increased interest of all classes in the worship and public services of the Church was in every way conducive to the popular enthusiasm in honour of the Blessed Virgin Mary. The increased demands for such a manner of worship soon rendered the earlier Lady-chapel quite inadequate, and a second for general use was erected, the old eastern Lady-chapel being retained for the services of the monks. Some five years ago Mr. Blashill, assisted by Messrs. Collins and Cullis, the contractors working under Sir Gilbert Scott, made a series of excavations, and several doubtful points were then cleared up as to the size and character of this much-disputed building. Lady-chapels in monastic buildings have, in several instances, been used by the laity, and in these the difficulty occasioned by so public a use and want of easy access has been partly overcome; but there are others in which an eastern position for the general Lady-chapel was, no doubt, abandoned for this reason. Durham has been quoted, the Galilee built at the western end of the Cathedral being used as a Lady-chapel. The Lady-chapels at Worsop Priory and the Abbey of Bury St. Edmund's, are instances, too, worthy of remark, being placed on the easternmost sides of the transepts farthest from the monastic buildings. The 14th-century Lady-chapel at Ely is also a good case in point of such a plan. An existing chapel at Tewkesbury prevented such an arrangement there, and so it has been argued that the remains now seen of thirteenth-century date, already referred to, show the second and more important Chapel of Our Lady. The "Annals of Tewkesbury" record: "The Church of Tewkesbury was dedicated (in 1233) with the major altar, in honour of the

glorious Virgin Mary," referring evidently to the work then erected, and so like a separate church on plan.

The authority above referred to thinks that the Chapel of St. Eustatius, built by Prior Henry de Banbury in 1246, was placed between the eastern part of the new Lady-chapel, and the north side of the choir, and extending over the site of the old apsidal chapel, being entered by the ancient archway of that chapel now blocked up, and so shown on our accompanying plan. The sanctuary, with ambulatory round, and the three chapels already spoken of, at the commencement of the 14th century remained very much as originally built, the chief additions being on the north side, as just described. The period of the Clares terminated in 1314, when the last male of the line of De Clare was buried. His eldest sister Eleanor was married seven years later to Hugh de Despenser, Earl of Gloucester, and favourite of Edward II. During this period of the Despensers, several extensive works were carried out, chiefly by Sir Guy de Brien, who died in 1490. The increased wealth of the community and benefactions of the time sufficiently account for the considerable enlargements to the ambulatory, and the number of altars in the choir. The north wall of the transept failing, caused the destruction of the "Lady-chapel," and that which was not so destroyed was taken down at this time to the springing of the vaulted roof, and this is the building known as A on our plan, said to have been the chapter-house. However this may have been, this building was for some time appropriated for secular purposes after the Dissolution, and at one period was used as a free school. Sessions were held here, and Archbishop Laud, in his "Defence," complains of this. The form taken of a chevette with chapels radiating, as at Westminster, round the sanctuary, is a most uncommon arrangement in the county; indeed, these are perhaps the only two instances remaining where such a plan was adopted. The old choir does not seem to have been removed till after the chapels now seen were completed, and hence their low elevation. When the clerestory was built, the old circular columns were raised by two courses of stones, and 14th-century arches erected upon them, the upper portion of the present choir with its large traceried windows bearing the impress of a rather later period of 14th century work. The nave, tower, and transepts were vaulted at this time, the bosses of the former containing some beautiful carvings illustrative of the life of our Lord from the Nativity to the Majesty. That representing the Crucifixion is remarkable, for it showed the Crucifixion without a cross. This deficiency Mr. Gambier Parry has supplied in colour at the time he decorated the roof. The arcades and windows, originally visible from the crossing in the tower, are now hidden by the present ceiling, which is of the above date. The large eastern Lady-chapel, erected beyond the site of the original Lady-chapel, was a most elaborate and beautiful building of Early Perpendicular character, contemporary with the new work of the cloisters, traces of which exist on the south wall of nave. It was destroyed after the Dissolution of the Establishment, but enough remains to give evidence of its date and connection with other pages in the history of this noble abbey church. Trinity Chapel, shown by Fig. P, on our plan, was built by the widow of Edward, nephew of Hugh Despenser, who succeeded De Brien, already named. It is a small elegant structure for the celebration of the Mass. The figure of Edward kneels under a rich canopy, the fragments of a sculptured representation of the Holy Trinity still forming part of its considerable remains of carved work. In 1397, Abbot Parker built a similar chapel over the tomb of Fitz-Hamon, the founder (see Fig. K,) on the north side of the sanctuary. The remarkably fine, though much mutilated, tomb and chantry-chapel, Fig. I, is the last of the more elaborate memorials in the church. It is to the memory of Richard, Earl of Bergavenny and of Worcester, who died in 1411. The memorial was erected by Isabel, his widow, who became Countess of Warwick by her marriage with Richard Beauchamp, and hence the chapel has obtained the misleading name of the "Warwick Chantry." Several other more or less perfect tombs of abbots and other memorials remain of historical rather than architectural interest. The great gateway forms the most important

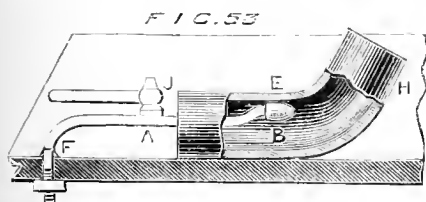


consideration, think most preferable. There is nothing new about this style of bending, as it has been long in vogue with provincial plumbers, but more especially in Kent. For many years it has had a run as a sink and slop closet-trap. Mr. Baldwin Latham, in his "Sanitary Engineering," says it was introduced and has been used for the Surrey and Kent sewers from about 1848.

I have also noticed many of these traps in the Sanitary Exhibition at South Kensington, made by Graham and Fleming, plumbers, who deserve a medal for their perseverance and skill, not only for the excellence of their bends, but also for some other branches of the trade, such as joint-wiping, &c., which is unquestionably the best work sent into this exhibition—in fact, quite equal to that which was shown at the exhibition of 1862. I shall treat further of these bends in an article on fixing, in a future chapter.

BENDS MADE WITH THE "SNARLING DUMMY."

This is an American method of making lead bends. Fig. 53 shows a dummy made upon a



bent steel rod, fixed into the bench. The method of working it is by first pulling up the bend, and to get out the dents, strike the rod of the snarling dummy, as shown at A, and the reaction gives a blow within the bend, throwing out the bend to any shape required. This method of

remains of the monastic buildings. Architecturally considered, the Abbey of Tewkesbury ranks with the great conventual churches of Gloucester and Pershore, the most striking characteristic of these three sister-churches being the use of very lofty and large round columns in the nave-arcades, surmounted by a low and inconspicuous triforium, while in the choir the reverse of such an arrangement is the rule, the columns of the arcade being remarkably low, and the triforium particularly lofty and distinctively important. The now conspicuous evidence of later works greatly obscure this curious arrangement, more particularly at Pershore. At Gloucester, the original proportions are still in existence, and they are still clearly discernible at Tewkesbury. The very unique west front of the nave will be remarked by the visitors next week, being occupied externally by one enormous arch recessed in seven orders of shafts, and reaching from the ground-line to the top of the church. The seventh order was discovered by Sir Gilbert Scott bedded in the wall. The present window, which doubtless occupies the position of several small windows of Norman date, was put up in 1636. The Norman pinnacles and turrets which terminate the angles of this west front are worthy of note, and they are also of peculiar design. The building is larger than Hereford Cathedral, and only just smaller than Gloucester. The few stalls, apparently of Late 11th-century date, remaining are among the present fittings, as also are the sedilia and remnants of the reredos, while the clerestory windows retain much of their beautiful and old stained glass. About £5,000 has recently been spent, under the direction of Sir Gilbert Scott, £3,000 in extensive reparation having been spent during the years 1824 and '30 chiefly in strengthening the Norman tower and transept walls. About £6,000 is estimated to be the required sum for the finishing of the necessary restorations.*

Our other sketches illustrate the Hall of Community and the Deanery, formerly the bishop's palace.

The Community, or Hospital of St. Walstan, retains in its hall, shown by Mr. Aston Webb's sketch, a very interesting remnant of Late Gothic woodwork, with its balustrade of still later date. It is situated in Sidbury, which leads from the Elgar tower over the canal. Originally the hospital staff consisted of a master, chaplain, and four poor brethren. Founded and endowed with considerable possessions in the 11th century, it was seized by Henry VIII. in 1515, and sold to a Worcester clothier, one Thomas Wyld, for £498! The large handsome Perpendicular window, with the repetition of "Emmanuel" on its "glass windowe quarrelles," is to be noted in the Hall, which is the principal apartment now remaining. It is, at present, used as a college for blind sons of gentlemen. The plans of the old bishop's palace, now part of the Deanery, and which commands a fine view of the Severn, are given on our other sheet. They were made by Mr. Sydney Vacher for Lord Alwyn Compton, the Dean, who has kindly placed them at our disposal. The carvings of some of the corbels and bosses in the crypts are very good, and these we shall illustrate in another number. The principal front of the Deanery was built by Bishop Hough in 1723, and bears his arms impaled with those of the See. George III., during his visit to Worcester in 1788, resided here. Mr. Vacher's sketches include some half-timbered bits from Worcester, which are numerous in Friar and Lich-streets, and the old Hostelry near the Old County Goal. The Bay from Tewkesbury is a good example of its kind. Eckington Church, the tower of which is given, is not far from Wellis Hall, ten miles south of Worcester, which building will be visited on Wednesday, when Mr. Thomas Drew, R.H.A., will act as guide.

MORTAR.

VERY different are the views held by architects on this subject. By many it is said the mortar ought to be used immediately after it is

made; other authorities assert that it cannot be kept too long if it is kept moist, and worked up with water. Fresh mortar cracks, but by keeping it for some time this property disappears, and better work is insured. Sir Edmund Beckett gives some practical advice on mortar, and refers to the value of adding brick-dust, which gives it almost the strength of cement, as it then contains the burnt clay found in cement. The bricks are best ground in a pug-mill, and Vitruvius advises that about one-third of the sand should be the proportion introduced. Much of the mortar used about London is nothing but a mixture of road-scrappings and asphalt refuse, with lime of a very inferior quality. One sanitary authority who has written on the subject of defects discovered in houses of large towns, cites a case in which 60 new houses were erected without a single load of clean lime the mortar and plaster being made of lime which had done duty in tan-pits and was full of animal refuse. Ashpits furnish too often the material which ought to be supplied by clean sand or mill-cinders. There is surely enough sharp road-dust to be obtained for mortar-making, though it ought to be well cleaned. Sharp clean road-drift makes excellent mortar, and is superior to most sand for stucco-work. Another valuable material entirely overlooked which is found to increase the strength of mortar is the ashes from smith's forges, and these ashes introduced in red brickwork jointing, have the effect not only of adding to the hardness of the mortar, but to the appearance also. Substances of these kinds are as easily to get as the ash cleanings and earthy matter with which half our houses are now built in large towns.

HYDRAULIC WORKS.

SOME very useful information will be found in Mr. Matheson's Aid-book in reference to pile-drivers, air-lock bells, cylinders of brickwork, &c., which may be of service to contractors and engineers. We therefore give the gist of some of the remarks on these heads, referring the reader to more comprehensive treatises for other details. The portability of pile-driving machines ought to be one of the chief considerations for those who are preparing for new works. They should be light and capable of easy adjustment—as they have to be pushed forward on an overhanging stage—but strong enough to lift piles into position. For very small works "ringing machines" are chiefly used, the weight being lifted by a hand-rope and worked by single power, that is, there is only one multiplication of power. For every multiplication the speed of course is reduced. The "telescope pile-driver" combines portability with strength, and drives diagonal as well as vertical piles. A "ringing machine" is often sufficient for driving the advance piles of a work, and it can be worked from a barge. On these piles a staging for a heavier machine can be constructed. In driving piles, accuracy is insured by attention to the pointing of the pile. Gauge piles for staging should have diamond-shaped points, that is, the pile should be tapered truly on all the four sides, so that the point should be true with the centre line of the pile. An unevenly-pointed pile can never be driven vertically. For sheet-piling the points are bevelled on one side so as to make them drive against the previous pile and make a close wall.

Pile-driving machines are generally from 35 to 10ft. high, and a manual machine has a base of about 8ft. square. With a 15cwt. ram such a machine cost about £50 to £60. Steam machines cost, Mr. Matheson says, from £250 to £350, or about £10 less if the woodwork be omitted for export. These are usually 40ft. high, with a base of 8 to 10ft. square, and weigh 6 to 7 tons. "A heavy ram and moderate fall will often do more effective work than the same aggregate force with a lighter ram and greater fall. On the other hand, the energy of a heavy ram may be expended in crushing the pile instead of forcing it downwards"—a remark which the engineer will appreciate. To determine the weight and fall of ram, for a certain purpose, the size of pile and the timber it is made of, no less than the hardness of ground, must be considered. In contract for pile-driving it is better to specify a price per pile, and then a rate per foot of depth, as the staging is generally costly, and every foot driven adds to the expense. Air-lock bells are now frequently used in laying

subaqueous structures, preparing foundations, &c. They are a kind of diving-bell having a working chamber at the bottom, but open, and filled with compressed air, of force sufficient to hold back the water. From this open air-chamber a large cylinder ascends to above the surface of water, which also gives access to and means of exit from the air-chamber. In this tube, at a certain position, is the air-lock, with a door and air-cock at top and bottom, by means of which communication is made with either the air above or the compressed-air chamber below. The natural buoyancy of the air-lock bell enables it to be adjusted easily. The air-cylinder differs only from the air-lock bell inasmuch as it can be converted into a bridge pier and permanently retained. There is a working chamber, protected by an air-lock, in which the excavation is carried on to a good foundation. After this is accomplished, the chamber and cylinder above are filled with concrete, the air-lock is removed, and the cylinder remains as an iron column or pier. The cylinder is weighted down by iron or stone, or better, by filling up a portion of it internally all round with concrete or brickwork. The air-caisson is on a similar principle; the bed is excavated by means of an air-chamber, it is then filled up with concrete, and a solid pier of concrete or masonry is built upon it, the tube and air-lock being removed. One of the largest air-caissons was constructed for the foundations of the St. Louis bridge over the Mississippi, where the air-chamber was 82ft. long and 62ft. wide. It was found that the air-pressure at a depth of 120ft. proved fatal to the workmen; that at a depth of 80ft., healthy men could work for an hour at a time, and this depth is considered as great as can be borne. Sand has been removed by air-pressure through a pipe without any difficulty, and we may refer the reader to detailed particulars of air-lock bells and cylinders sunk upon this plan, which have been described in this journal.

GREENOCK NEW DOCK AND MUNICIPAL BUILDINGS.

THE ceremony of laying the foundation-stone of a large new dock and of extensive new municipal buildings for the borough of Greenock, took place on Saturday last. The works at Garvel-park, which are at present in course of construction, will, when completed, have a frontage to the River Clyde of about one and a quarter miles, and comprise the Western Tidal Harbour, the "James Watt" Dock, the Northern Tidal Harbour, four graving docks, and the Eastern or great Tidal Harbour. The Garvel Graving Dock was commenced in 1870, and opened in April, 1874. The water area of the Western Tidal Harbour will amount to seven acres when completed. At present a portion only of this harbour is being constructed, having a length of quays of 1,150ft., with a depth of water of 35ft. at high water, or 25ft. at low water. The "James Watt" Dock will be 2,000ft. in length, 300ft. in breadth for about one-half of its length, the other half being increased to 350ft. where a jetty 800ft. in length and 90ft. in width will be constructed. The depth of water in the dock will be 32ft.—a depth, it is anticipated, sufficient to accommodate the largest class of vessels ever likely to be built. Its area is 14½ acres. There will be two entrances to the dock—one from the Western Tidal Harbour, and the other from the great harbour.

The municipal buildings are situated in the neighbourhood of Cathcart-square and Dalrymple-street, and include a new town-hall and all other rooms required. A tower will rise from the hall 245ft. above street-level, and while space and comfort required for business have been provided for, the furnishings of the hall and suite will be artistic and elaborate. The police department on the east side of the town-hall will have every accommodation. The block of the buildings facing Hamilton-street will have a handsome suite of apartments for all municipal meetings, besides many other rooms and offices. These will be on the upper floors, and the ground-floor will be occupied by handsome shops. There will be a piazza running along in front of the shops, with pillars of polished red granite. In the portion of the buildings facing Taylor's-close and Wallace-square, there will be the Chamberlain's office and other offices in connection with the Rates-hall. The buildings are being contracted for in three sections. The principal works of two of these have been let,

* A double page view, drawn by J. McDaniel, and exhibited at the Royal Academy, showing the Gilbert Scott restorations in interior view of Tewkesbury Abbey, was given in the BUILDING NEWS, May 14, 1877. A plan of Worcester Cathedral and its precincts was published in the same paper, March 2nd, 1876.

but the third section, which will comprise the Rates-hall and Harbour Trust offices, is not so far advanced.

CAMBRIAN ARCHEOLOGICAL ASSOCIATION.

THE 36th annual meeting of this association was held last week at Church Stretton, Salop, a town just outside the limitation implied by the title of the association, but the centre of a district rich in archaeological treasures, unrivalled in its class of hill scenery, and well served by railways. The proceedings on Monday week, the 1st inst., when an inaugural meeting was held at the town-hall, Church Stretton, under the chairmanship of the President-elect, Prof. Babington, M.A., F.R.S., F.S.A., who delivered an address upon the camps and other primeval fortifications which abound in Wales and other hilly parts of Britain. These works differed very materially, not only in strength, but in plan, from one another, and a superficial examination would show that it was not probable that they were all formed by tribes having the same degree of civilisation and advancement in constructive skill. Their names, too, were either legendary or merely descriptive—a proof that those who bestowed them were unacquainted with their origin. We could form no idea of how long a time had elapsed during which these rude fortifications of earth and stone were being made, but the marked differences in modes of construction seemed to show that each successive race of men which inhabited the country had its own mode of entrenchment, and that each successive race was more advanced in civilisation than that which preceded it. This accorded with what was learned from the study of the weapons, tools, ornaments, and fettle vessels obtained by excavations. They had the rude stone weapons of the palæolithic age; the more finished ones of the neolithic; the stone tools of a more recent age, some of which remained in use until shortly before the appearance of the Romans in Britain, notwithstanding the possession by the people of bronze and iron. There was evidence that the country was inhabited before the disappearance of the reindeer and other animals requiring the climate which existed when the mountain valleys had their glaciers. Several successive races might, and, indeed, must have lived in Britain before the arrival of the first wave of the Celtic people, the second wave of which still inhabited the country. Probably the existence of a Turanian race here would be generally admitted, and, doubtless, Theric tribes of Turanian race occupied nearly, if not the whole, of the west and south of Europe, until the arrival of the Celts drove the remnants of them into the extreme western parts, bordering on the Atlantic Ocean, where they were still represented by the Basques, and perhaps others. But even that was not enough; the west of Europe must have been inhabited long before the arrival of the Turanians by a race living in natural caverns and subsisting solely by the produce of the chase. Professor Babington proceeded to classify the several groups of remains, premising that very few were the work of the existing Welsh race. The older works he should arrange under four heads—1st, simple earthworks; 2nd, earthworks with simple stone supports and revetments; 3rd, drystone walls; and 4th, simple earthworks again. The earthworks were exceedingly common, and consisted of one or more banks of earth or stones, according to the nature of the ground, and external ditches. It was often impossible to distinguish their date or character. The second class were much more elaborate, and were intended for permanent occupation of a site, as they usually protected the water-supply, and had outworks for inclosing flocks in time of danger. Unfortunately these were often denuded of their stones for building purposes. A very accessible example of this class was Dinas Dinorwig, near the lower lake of Llanberis, and others might be seen at Din Slywy and Lligwy, both in Anglesea. The third class was composed of large ranges of drystone walls, nearly all of which were greatly dilapidated. Works of this class were by far the grandest and most interesting forts of which any remains existed in Britain, anterior to the Roman period, and in many cases there associated with them round or rectangular huts. The fourth class were the enormous dykes, the remains of which still

crossed the country in North Wales, Norfolk, Cambridgeshire, and Wiltshire. The annual report was then read and adopted, especial mention being made of the death of Mrs. Stackhouse Acton, of Acton Scott; Dr. Guest, F.R.S.; and Mr. Breeze, F.S.A.

Tuesday was spent almost entirely in Shrewsbury. The Castle, at one time the residence of Telford, who added the tower on the embankment, was first seen, and then the Council-house, c. 1620, and the grammar-school, many of the fittings of which, including the carved oak desk, are to be removed to the new premises at Kingsland. The fine church of St. Mary was described by Canon Lloyd, who showed how the original Norman building had been altered and enlarged by Early English and Perpendicular builders, the raising of the north aisle being due to the Puritans. Draper's Hall, the Guildhouse in Butcher's-row, a fine specimen of unaltered domestic work, and Ireland's Mansion, in the High-street, were also seen. An inspection of the town wall, and a long stay at the mutilated abbey, closed the afternoon's work. In the evening a meeting was held at Church Stretton at which Professor Babington gave a running commentary on the buildings seen during the day. The Rev. J. D. la Touche read a paper on "Stokesay Castle," and Mr. J. G. Dyke another on "Ancient Plough Marks on the Hills."

On Wednesday the members began work at the Church of Chureb Stretton, the principal feature of interest being the carved-oak reredos, a panel of which bears the date, 1667, but which, from the diversity of subjects, was declared by several speakers to have been "made up." On the way to Stokesay Castle the site of Norton Camp was seen, the castle being described by Mr. la Touche. The church, built in 1654, having been seen, the members proceeded to Ludlow, where the Rev. E. F. Clayton escorted the party over the great parish-church, which, although chiefly Perpendicular, exhibits remains of Early English and Decorated work and some traces of Norman. At the Castle Mr. G. Cocking acted as guide, and showed the principal rooms.

On Thursday the members proceeded by carriages to Much Wenlock, where, the museum and library having been seen, the Guildhall was visited, the records and charters, the carved panels, and old stocks being hastily glanced at before the members went to the Abbey. Mr. Gaskell, the owner of the house, showed the ruins, and also a holy well, which he has recently brought to light in the grounds. Train was taken to Buildwas, where the Abbey was seen under Mr. Leighton's guidance, and the excursion closed at Acton Burnell Church.

On Friday the members proceeded by rail to Shrewsbury, and drove to Haughmond Abbey, afterwards visiting Atcham and Wroxeter Churches and the Roman remains at Uriconium, returning to Shrewsbury to inspect the museum, which is rich in finds from Uriconium.

THE FURNISHING AND DECORATING OF SUNDAY-SCHOOLS.

A PAPER on this subject was read a few days since by Mr. F. Sharp at a meeting of teachers from two circuits of the Methodist Free Church. Art, said the lecturer, had made such rapid strides of late, and had had so refining an influence on the people generally, that it was now absolutely necessary to lift the standard of Sunday-schools in order that they might be on a level with the times. Generally a congregation and the building in which it worshipped corresponded—where they had a well-appointed church decorated with taste, they had an intelligent congregation. But it was strange that the same principle was not usually carried out in the school, the latter place having been largely kept in the background. The fittings of certain schools were described, and in every case there was shown to be lack of taste and judgment in the style of furniture, and a want of harmony throughout. In furnishing a school four things ought to be distinctly observed—harmony, simplicity, permanency, and comfort. After suggesting various items of furniture which he considered best adapted for the purpose (in the course of which as much attention ought to be paid to the comfort of the infants as to the older scholars), Mr. Sharp recommended that the walls both of class-rooms and the large assembly-room should be covered

with varnished paper—say of some neat geometrical pattern, and that on them should be hung the portraits of veterans who had been the support of their respective schools. Attention ought also to be paid to the lighting. The present (in many instances) unsightly gas-brackets should be replaced by pendants of bronze, and the jets should be covered with white globes, so as to have a more tempered and even light. The general effect of a school fitted according to these ideas would be to elevate the tastes of the scholars, and would aid in attaching them to the school.

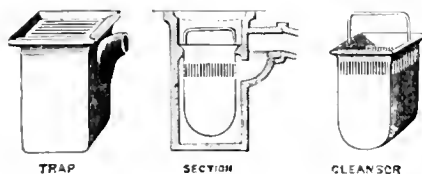
THE WALL-PAINTINGS IN CANTERBURY CATHEDRAL.

AT the recent annual meeting of the Kent Archaeological Society, held at Canterbury, a paper on the wall-paintings of the Cathedral, and the means that are being used for their preservation, was read by Mr. James Neale, F.S.A., F.R.I.B.A., of Bloomsbury. He mentioned that arrangements were now pending by which it was hoped to copy in fac-simile the whole of the decorative paintings of the Cathedral and outlying buildings. These fac-similes could then be reduced by photography so as to insure the minutest accuracy and be published in a large volume similar to, but on a grander scale than, his work on St. Alban's. It was intended to give all the important plates in colour, and the rest by photolithography. When he mentioned that in the estimate already obtained, it was stated that some illustrations required as many as thirty different tints and that a separate stone was necessary for each tint, some idea might be formed of the immense labour and expense the volume would involve. However, there was reason to hope that the volume, when completed, would be an exceptionally valuable work, and would be the means of handing down for the study of future ages accurate copies of paintings, the originals of which might have disappeared. Some three years ago he commenced to copy in fac-simile the wall-paintings in the dark chapel of the Cathedral. Previously to his commencing the paintings, the Dean and Chapter had consulted Sir Gilbert Scott as to the best means to be employed to preserve these treasures, for, owing to the dampness, large portions of the plaster on which the paintings were, at various periods fell to the ground. Sir Gilbert died before the works were commenced. He (Mr. Neale) was consulted, and made a report to the Chapter. An examination showed the state of the painted plaster to be most serious, and if immediate means were not taken there was a risk of the whole falling to the ground. It was a marvel that so much was spared. The paintings were on a thin coating of plaster, which was strong and in good condition; but at the back of this outside plaster was mortar of about three inches thick. Owing to the wet and damp this mortar had become disintegrated. He suggested that the outside painted plaster should be lowered from its place, the loose mortar at the back removed, new cement supplied, and the paintings refixed. This plan was successfully applied to the vaultings, but not to the paintings in the stonework. The stonework was not intended for painting. At a later period when it was decided to decorate the chapel the smooth surface of the stonework was roughed so as to cause to adhere to it the thin coating of plaster on which the subjects were painted. The damp had got between the coating of plaster (half an inch thick), and the stonework, and was forcing away the plaster. The central part of one figure bulged out three inches from the stonework and was only kept from falling by the strength of the thin plaster and slight adhesion at the edges. Boards were placed in front of the picture, a small hole was cut above the head, and a thin solution of shellac was injected. The painting was then moistened by a solution and forced back into its original place. For some months the original solution gave a darker tone to the colours of the figure, but now he found that it was resuming its original colours. It was intended to put a varnish over the whole of the paintings as a means of preserving the colours from fading; but, seeing the unfortunate action of varnishes applied to wall-paintings in the Chapter House of Westminster Abbey and elsewhere, it was deemed wiser to try only a small portion and leave the rest uncovered to test the action of the weather and air. He found the

rain and snow coming through the unglazed windows adjoining the chapel did injury to the paintings, and the Chapter had them glazed. A lamp had also been kept in the chapel on damp days to prevent the fungus again forming. It was now over three years since the paintings were refixed; and he was pleased in examining the chapel last week to find the paintings in such excellent condition. Mr. Neale gave interesting descriptions of several of the pictures in the crypt; and made special reference to the painting of the legend of St. Eustace which occupied the whole of the easternmost Norman windows of the north and choir aisle. A thin coating of plaster was laid on the stonework and on this ground the subject was painted in distemper tints. In later days this painting with others in the Cathedral was covered with whitewash; and each successive time the Cathedral was whitewashed this painting seemed to have received its share, for in parts no less than fifteen coats of whitening were removed. This was done carefully, and he was much indebted to one of the vergers (Mr. Pugh) for help, and not only for actually removing much of the whitewash but for deciphering many of the figures. Many hours' work would expose, as an instance, what was thought to be a small tree. Mr. Sheppard's acute eye took this for a moakney, and such eventually it turned out to be. Another two days' work seemed to expose drapery in the King's footstool, but eventually Mr. Sheppard found the footstool to be the court jester. Day after day was spent in removing the whitewash, but those engaged in the work considered themselves well repaid, in being the means of bringing to light such an interesting subject. There was still some whitewash on the lower part of the picture. This, as soon as he obtained a little leisure, he was longing to remove and then complete his drawing.

HAGEN'S PATENT DUPLEX CESSPOOL TRAP AND CLEANSER.

THIS simple sanitary invention effectually prevents the stoppage of house-drains which so frequently occur, owing to yard sweepings, pieces of house-cloth, hair, rags, pieces of paper, tea-leaves, wood-chips, and other kinds of refuse being emptied or swept into the ordinary cesspool and washed down into the drain-pipes, there to accumulate and stop the flow of house-slops, and eventually necessitate the expense and annoyance of having the drains taken up and relaid, only to be again and again topped up. As will readily be seen from our



illustration, the drains can be kept open and clear for the speedy conveyance of the house-sewage, and the cesspool can be cleansed periodically by simply lifting out the "Cleanser," and emptying its accumulated contents into the dust-cart, instead of allowing the accumulated matter to give off malarial vapours and fever-disseminating smells. There is more actual merit in this simple little contrivance than in many a pretentious patent which has been puffed into temporary notoriety.

THE OLD AQUEDUCTS OF PARIS.

THERE have been three aqueducts erected in succession at Arcueil, over the valley of the Bièvre: the first between the years 292 and 300, by Constantius Chlorus, to supply the baths of his palace of Thermes with spring-water; the second, between 1613 and 1624, by the architect Brosse, at the order of Queen Marie de Medici, chiefly for the needs of her new palace of Luxembourg; and the third, between 1868 and 1875, by the engineer Belgrand, to furnish Parisians with spring-water of wonderful purity, gathered up at Champagne and led forty leagues for the wellbeing of the citizens. The last one—the gigantic aqueduct of La

Vanne—follows so nearly the course of the old aqueducts of Arcueil that the digging necessary for its construction brought to light the subterranean ruins of the Roman aqueduct, which was destroyed in the ninth century by the Northmen. It extended farther than the present aqueduct, which has its source at Rungis, and it has been traced as far as Chilly-Mazarin; and between Wissous and Rungis it has been found that there existed a manhole at the place of union of the feeders from whence the principal aqueduct started. As for the Arcueil aqueduct, it is just as Brosse constructed it, and although the water furnished by it is to-day of small consequence in the immense consumption of Paris, it is none the less curious to visit. To examine it properly one should begin at its origin at Rungis; from whence it is possible to walk through its subterranean course as far as the arches of Arcueil or even up to the fortifications. A unique thing to be seen at Arcueil is the collection of remarkable edifices of six different epochs, situated at a few steps from each other. Here the aqueduct of Marie de Medici ceases to be subterranean and crosses the valley on arches, and this monument is the Arcueil aqueduct properly so called. Upon this old structure of large quarried stones, erected by Brosse, Belgrand superposed the aqueduct of La Vanne of gritstone and cement. Immediately in front of the two central arches of the aqueduct of Louis XIII. there is still standing the face of a wall of the Roman aqueduct made of small dressed stones and courses of bricks. Between these ancient structures is partially set, in a small facade of the time of Henri II., of which only a portion can be seen, an elegant gate opening under an arch of the seventeenth century structure. The general aspect is extraordinary. Brosse's aqueduct is 1,245 feet in length, and has twenty-four arches—ten of them open, and 60 feet in height above the Bièvre. Belgrand's aqueduct, which surmounts it, is 3,245 feet long and has seventy-seven arches, and its total height above the same stream is 120 feet.

Belgrand in building the arches of the La Vanne aqueduct over those of Arcueil, in 1869, made two curious discoveries. At about 70 feet beyond the last manhole of the aqueduct he found, under the foundations of the structure of Marie de Medici, the Roman culvert of béton, in a perfect state of preservation, crossing the aqueduct at a right angle, so that, at this point, three aqueducts—La Vanne, Arcueil, and Constantius Chlorus—are actually superposed perpendicularly. In 1788, the engineer De Fer undertook the construction of a canal which, wherever it crossed private property, became a covered aqueduct. This was to have led to Paris a portion of the waters of the Bièvre, which were stored up at Amblainvilliers; but the work on it was for ever suspended during the succeeding year. At some feet beyond manhole number 14, at the point where the Medici aqueduct enters the ground, Belgrand found, on private property, and in juxtaposition with the Medici conduit, De Fer's covered aqueduct, so that, including La Vanne, three aqueducts are still united, and within a space of less than one hundred and fifty feet four of them are found.

The waters of the La Vanne aqueduct are carried over the arede in an enormous cylindrical conduit of béton, having an inside diameter of 7 feet, and which, kept constantly full, discharges a hundred thousand cubic meters of water into Paris every day. The Arcueil aqueduct (the portion of which between the fortifications and the Observatory has been removed and replaced by a cast-iron conduit) is now of secondary importance, and discharges its waters into the Pantheon reservoir, where they mix with the waters of the Seine.

BATTERSEA BRIDGE.

IT is often enough said nowadays, writes Mr. C. Bruce Allen, in the *Engineer*, that this is emphatically the "age of iron"; and there certainly can be but small doubt about it. It is so. All materials are giving way more or less before it, and most certainly that material which once on a time, as in Gothic days, was in as much request—viz., timber. Examples there are all about us of this wooden or timber building, as it was in many ways; but in nothing is the change of material as a means of construction more notable than in the item of bridge-building. Old London Bridge, as at first, was of wood; and the present Battersea and

Putney Bridges, even to this year of grace, are of wood. They are both of them not a little picturesque; but they are doomed to pass away, and give place to the all but, in an engineering sense, ubiquitous iron. Battersea Bridge, which has so often figured in pictures, and in *libres studiorum*, and otherwise, is as all know, to give place to one of iron. These wooden structures over Thames River were, and are, very ingenious specimens of pure timber construction. There is certainly no attempt at architecture or ornamentation, of any style or kind; and yet, the simple constructional and engineering lines are singularly picturesque; and thus does a sort of kind of "timber architecture" grow out of it, and is seen in it. This is not a little noteworthy in these days of transition; for what a curious thing it would be to see an iron bridge worked out in the like way. For those now built over the Thames—as at Westminster, and the Blackfriars Railway Bridge—are imitations of stone constructions, and with ornamental details borrowed from a distant past. That the metal iron is taking the place of wood is certain, but when shall we see an iron architecture, as in a bridge, as we see in the past of things architectures of stone and wood?

PARKES MUSEUM INTERNATIONAL EXHIBITION AWARDS.

THE following are the awards made in those sections wherein our readers are more immediately interested:—

SECTION XIII.

DOMESTIC AND HOSPITAL ARCHITECTURE.

PLANNING, CONSTRUCTION, DECORATIVE MATERIALS.

JUDGES.—Sir Joseph Fayer, K.C.S.I., M.D., F.R.S.; George Atchison, A.R.A.; Fred. J. Mout, M.D., F.R.C.S.; Edward C. Robins, F.S.A., F.R.I.B.A.; P. Gordon Smith, F.R.I.B.A.; Professor Thomas Roger Smith, F.R.I.B.A.; Henry Saxon Snell, F.R.I.B.A.; Alfred Waterhouse, A.R.A.

FIRST CLASS.

Robert Adams, 335, reversible windows and adjustable door springs
Henry Boulton and Co., 253, art stoneware
Charles Drake and Co., 361, marble concrete
Capt. Douglas Galt, C.B., F.R.S., 54, hospital plans
Howard and Sons, 442, parquet flooring
Ibilee and Horn, 328, Balmain's luminous paint
Russell and Erwin Manufacturing Company, 394, locks and lock furniture
Mons. Tollett, 91, hospital plans
Wilecock and Co., 279, architectural glazed ware
T. Worthington, F.R.I.B.A., 54, hospital plans

AWARD OF MERIT.

Albissima Paint Company, 390, white paint
Artisans', Labourers', and General Dwellings Co., Limited (Rowland Plumb, architect), 60, plans of dwellings for artisans and labourers
Lawrence Booth, F.R.I.B.A., 65, plans for dwellings
M. Eordian, 89, plans for warming and ventilation of public buildings
Bryden and Sons, 393, bell-hanging apparatus
Candy and Co., 391, damp-proof bricks for building and paving
Coe and Robinson, architects, 67, hospital plans
J. Finch and Co., 302, Bisque glazed bricks and other building materials
Grantham, jun., and Denton, jun., 92, designs for abattoirs
Hobbs, Hart, and Co., 422, locks and safes
Maguire and Co., 282, oxidised iron (Barff's process)
G. E. Pritchett, F.S.A., 248, corrugated ventilating pipes, and system of construction
Silicate Paint Company, 257, washable distemper
Smith and Turner, 397, door-springs, water-bars, and bolts
A. Smith and Stevens, 425, sill bars and casement bolts, spring hinges, door knobs, and locks
Spence's Metal Manufacturing Company, 354, Spence's metal
James Stiff and Sons, 255, art stoneware vases, &c.
W. Tonks and Sons, 242, sash and lantern fasteners and openers, steel sash lines, bolts, chains, and other door furniture, and wedge casement stays
E. Turner, F.R.I.B.A., 64, hospital plans
Fredk. Walton and Co., 288, wall decorations (Lincrusta-Walton)
Alfred Walker, 362, concrete flooring
Wortley Fire Clay Company, 365, glazed bricks and other building materials
W. Woodlams and Co., 439, non-arsenical wall and ceiling papers.

The following exhibits in this section were not considered in competition for awards, the exhibitors being judges, or otherwise officially connected with the Exhibition:—
Mark H. Judge, architect, 61, plans of three-room dwellings for artisans and labourers. Drawing for fireplace trimmer
Dr. G. V. Poore and A. Waterhouse, A.R.A., 59, plan for the reconstruction of University College Hospital
Edward C. Robins, F.S.A., F.R.I.B.A., 62, designs for hospitals and schools
Professor T. Roger Smith, F.R.I.B.A., 55, designs for hospitals
H. Saxon Snell, F.R.I.B.A., 56, designs for charitable and parochial establishments.

SECTION XIV.

VENTILATING, LIGHTING AND WARMING.

JUDGES.—H. H. Collins, F.R.I.B.A.; Captain Douglas Galton, C.B., R.S.; George Godwin, F.R.S., F.S.A.; Ernest Hart, M.R.C.S.; Professor Kerr, F.R.I.B.A.; J. P. Seddon, F.R.I.B.A.

FIRST CLASS.

Benham and Sons, 410, general excellence
Robert Boyle and Son, 258, general excellence
Chorlton and Dugdale, 411, "The Sunlight" stove
T. J. Constantine, 366, cooking range
Crossley Bros., 357, "The Otto Silent Gas Engine"
Frederick Dyer, 307, hot water apparatus
R. Renton Gibbs, 415, general excellence
Robert H. Griffin, 373, improved register stove
W. H. Hopkinson, "Libra lamp and valve"
S. Leoni and Co., 376, general excellence
Longden and Co., 428, "The Leeds stove"
Musgrave and Co., 412, general excellence
T. Potter and Sons, 420, "The Thermohydric" grate
G. E. Pritchett, F.S.A., architect, 248, heating and ventilating apparatus
Radiator Range Co., 431, "Radiator cooking range"
Rosser and Russell, 427, general excellence
C. R. Stevens, 383, hot-water apparatus
Strode and Co., 426, general excellence
Verity Bros., 416, "air propeller" and for general excellence
T. Waller and Co., 219, general excellence
J. Weeks and Co., 414, general excellence
Wilson Engineering Co., 444, cooking ranges.

AWARD OF MERIT.

Robert Adams, 395, ventilating window apparatus
J. L. Bacon and Co., 423, general excellence
P. Hieckes Bird, F.R.C.S., 378, ventilators
Frank W. Clark, 355, gas-machine
Comyn, Ching, and Co., 391, general excellence
Joseph Constantine, 374, warming apparatus
John Drysdale, M.D., and J. W. Hayward, 357, system of ventilation
Fredk. Edwards and Son, 417, general excellence
J. E. Ellison, 278, conical ventilators
Faraday and Son, 377, gas appliances
J. F. Farwig, 418, calorifier
Gilmore and Clark, 385, ventilators
William Hellier, 367, water-heaters
Harry Hunt, 429, "crown jewel" stove.
C. Kite and Co., 389, chimney top
Charles Portway and Son, 421, "tortoise" stove
Mrs. Priestley, 353, window ventilator
Ritchie and Co., 382, "lux calor" apparatus
Sanitary Engineering and Ventilation Co., 286, general excellence
Steel and Garland, 346, general excellence
Steven Bros. and Co., 259, general excellence
Thames Bank Iron Co., 280, general excellence
Wm. Tonks and Son, 242, Curral's ventilators. The architect ventilator.

SECTION XV.

WATER CLOSETS, SINKS, BATHS, &c., SEWAGE AND DRAINAGE.

JUDGES.—Professor W. H. Corfield, M.D.; William Eassie, C.E.; Rogers Field, M.Inst.C.E.; P. Thorne Thorne, M.B.; Ernest Turner, F.R.I.B.A.

FIRST CLASS.

Beard, Dent, and Hellyer, 254, "Artisan" water-closet with flushing rim and improved joint between basin and trap; valve-closet with flushing rim and ventilation to valve-box; cast lead S and P traps
Birmingham Sanitary Association, 271, Potts's Edinburgh air-chambered disconnecting trap
John Bolding and Sons, 247, simplex valve-closet, with flushing rim and water supply to overflow; bath, with quick waste and air-vessel
H. Braithwaite and Co., 347, siphon action water-waste preventer
W. P. Buchan, 211, Buchan's disconnecting drain-trap
Joseph Cliff and Sons, 270, enamelled stoneware sinks and baths
Henry Doulton and Co., 253, Stanford's joint for drain pipes; "Kenon" air-chamber floor and trap; locking water-waste preventing bath fittings
P. Dyer, 307, tidal valve trap
A. Emanuel and Sons, 331, siphon action water-waste preventer, with after-flush
J. Finch and Co., 302, Buchan's disconnecting drain trap; "royal" porcelain bath
Hayward Tyler and Co., 329, hopper closet, with flushing rim and trap, fitted with regulator and Chandler's waste-preventing cistern
Ingham and Son, 266, Stanford's joint for drain-pipes
George Jennings, 257, automatic flushing jar; "Dubois" drawn lead traps
Walter Macfarlane and Co., 25, excellence of iron-work
Moule's Patent Earth Closet Co., 317, Moule's earth closet, No. 9
J. Parker, 313, dry earth closet, self-acting without separator
J. Purnell and Son, 342, hopper closet with flushing rim
Shanks and Co., 281, spray and douche baths
H. Sharp, Jones, and Co., 341, Stanford's joint for drain pipes
Thomas Smith and Co., 269, Herbert Jones's drain-pipe
J. Tylor and Sons, 256, valve closet, with flushing rim, and without overflow connected with valve box; flushing urinal trapped in basin; waste-not closet valve; locking water-waste preventing bath fittings
E. G. Underhay, 326, regulator for valve closets.

AWARD OF MERIT.

A. T. Angell, 304, air-tight covers for air chambers and inspection shafts
Beard, Dent, and Hellyer, 254, disconnecting trap for soil pipes; disconnecting gully trap, with side inlets for rain-water pipes and sink wastes; siphon action flushing cistern; "Artisan" water closet and siphon sink combined; square enamelled iron slop sink; lavatory basin, with quick waste
John Bolding and Sons, 247, "National" Wash-out closet, with flushing rim; siphon-action water waste preventer; "Champion" trap
H. Braithwaite and Co., 347, wash-out closet, with flushing rim; Claughton's trap

Edward Brooke and Sons, 259, stoneware ribbed pipes for sewers
W. P. Buchan, 261, drain pipes with rest and access lid
Capper, Son, and Co., 332, Brian Jones's patent joint
Henry Doulton and Co., 253, Doulton's joint for drain pipes; stoneware grease trap; Latham's balance-valve drain flap; disconnecting gully trap, with reversible top and side inlets; Lambeth flush-out closet, with flushing rim; lipped urinal, with constant flow; "vacuum" water-waste preventer
C. W. Durham, 351, rigid construction of house drainage
A. Emanuel and Sons, 331, chain action water-waste preventer, with after-flush
Eureka Concrete Company, 263, concrete sewers in segments
J. Finch and Co., 302, porcelain sinks for butlers
Gillow and Co., 381, lavatories for limited space
Hayward, Tyler and Co., 329, urinals, with treadle action; Chandler's water waste preventer; shower and douche bath valves
Edward Howard, 306, Saxon Snell's automatic flushing and ventilating arrangement for water closets, &c.
Ingham and Sons, 266, balance valve flap; Brown's accessible disconnecting trap
George Jennings, 257, lipped urinals; anti-percussion bath valves; shampooing apparatus
Washington Lyon, 364, model of fixed disinfecter, by steam
Maguire and Co., 282, method of jointing drain-pipes; clean water flush tank; disconnecting trap; Dr. Scott's disinfecting stove
Henry Owen, 330, water-waste preventer
J. Purnell and Son, 342, white stoneware channels; Woodward's wash-out closet with flushing rim; siphon-action water-waste preventer
Wm. Ramsey, 352, Claughton's trap
Sanitary Engineering Company, 286, Weaver's drain disconnecting trap
Shanks and Co., 281, Bramah valve closet, with ventilation to valve-box; wash-out closet with flushing rim; cast-iron enamelled bath; bath fittings
C. H. Sharp and Co., 327, water closet for ships; earth closet
H. Sharp, Jones, and Co., 341, rock concrete tubs
The Shone Drainage, Sewerage, and Water Supply Company, 284, pneumatic sewage ejector
Steven Brothers and Co., 250, cast-iron enamelled bath
James Stiff and Sons, 255, Weaver's drain disconnecting trap; Weatherley single-dip disconnecting trap for sinks and waste water
T. Pridgin Teale, 1424, diagrams of defective sanitary arrangements

J. Tylor and Sons, 256, slop sink, with galvanised top and regulator-valve
John Warner and Sons, 333, valve closet, with flushing rim and movable valve seating
Robert Weare, 311, inodorous carbon closet commode
Wilcock and Co., 279, disconnecting gully; trough closet
James Woodward, 323, wash-out closet-basin with flushing-rim, and trap; hopper closet-basin with flushing rim and trap; porcelain sinks for refreshment bars
The following exhibits were not considered in competition, being invented by one of the judges:—
Bowes Scott and Read, 349, Field's flush tank; Field's annular siphon for flushing sewers.

SECTION XVI.

WATER SUPPLY AND FILTRATION.

JUDGES.—Lieut. Col. Frank Bolton; Prof. Francois De Chaumont, M.D., F.R.S.; R. B. Graitham, M.Inst.C.E.; Professor Prestwich, F.R.S.

FIRST CLASS.

E. and J. Gardner, 398, various forms of filters on Major Crease's (now Lieut.-Col. Crease, C.B.) patterns. Also "cariferal" filtering material
Silicated Carbon Filter Co., 402, filtering medium and filters, with asbestos strainer
Spongy Iron Domestic Filter Company, 404, water filters; spongy iron and prepared sand; earthenware filter cases with late improvements
J. Tylor and Sons, 256, waste-not valve applied in various forms for cisterns, closets, courts, and alleys.

AWARD OF MERIT.

John Bolding and Sons, 247, workmanship of cocks and valves. Specimens of workmanship in lead pipes made by Graham and Fleming
Defries and Co., 433, blocks of pumice and granulated carbon
Henry Doulton and Co., 253, manganous carbon filter (Berny's patent). Automatic aerating cistern filter (Bailey Denton's)
A. Emanuel and Sons, 331, deep well pumps, valves and cocks
Hayward Tyler and Co., 329, valves and cocks
George Jennings, 257, drawn lead pipes by Dubois
P. A. Maignen, 401, "Filtre Rapide," with asbestos cloth, &c.
Maguire and Co., 282, patent renewable filter
Quirk, Barton and Co., 372, tin-lined ear pipes
Sanitary Engineering and Ventilation Company, 286, cistern filters, portable filters, and table filters
G. T. Tonks, 243, glass balls for ball valves and frictionless balance supply valve.

SECTION XVII.

SCHOOL FURNITURE, WINDOW BLINDS, CLOTHING, BOOKS, &c.

JUDGES.—Mrs. Garet Anderson, M.D.; J. C. Buckmaster, E. North Buxton (Chairman of the School Board for London), Alfred Carpenter, M.D., Dr. J. H. Gladstone, F.R.S., W. A. Meredith, M.D.

FIRST CLASS.

Thomas Bradford, 441, washing machines
Coleman and Glendinning, 235, school furniture and appliances.

AWARD OF MERIT.

Robert Adams, 395, universal Venetian blinds
Brydon and Sons, 393, window-blinds and roller actions for sun-blinds
Larmuth and Sidebotham, 1009, school furniture and appliances

William Tonks and Son, 242, patent bookcase fittings; Hookham's patent picture-line and adjusting fasteners; Allen's registered hat-holder
Henry Tylor and Son, 238, appliances connected with window-blinds.

The Exhibition, which was opened on July 16th by Earl Spencer, will finally close tomorrow. The amount of public interest which it has evoked has been very considerable indeed, particularly among the professional classes connected with medicine, architecture, and sanitary engineering. In addition to the members of the Medical Congress, the Exhibition has been visited by the officers of local boards and other authorities from all parts of the kingdom, and the Government of New South Wales have appointed a commission to obtain some of the more important exhibits for the new Sanitary Museum now being established in Sydney on the lines of the Parkes Museum of Hygiene. As some indication of the amount of interest which has been taken in this Exhibition—the first organised by the executive committee of the Parkes Museum, outside its permanent collection at University College, we give the following statement of the number of visitors up to last Wednesday evening:—

Opening day	4,349
Total daily admissions by payment	11,973
Total number of season-ticket holders	1,729
Estimated number of members of Medical Congress admitted free	1,500
Estimated number of Fellows and other ticket-holders of the Royal Horticultural Society admitted free	2,060
Total number of visitors from July 16th to August 10th, allowing only for one visit by each season-ticket holder	21,542

WHITWORTH SCHOLARSHIPS.

THE following awards have been made of Whitworth Scholarships and Whitworth Scholarship Prizes by the Science and Art Department:—

LIST OF CANDIDATES SUCCESSFUL IN THE COMPETITION FOR THE WHITWORTH SCHOLARSHIPS, 1881.

Name.	Age.	Occupation.	Address.	Value of Scholarship.
Lousley, E.	26	Engine fitter	Wallingford	£200
Sutton, A.	21	Engine fitter	Brighton	150
Grace, R. W.	20	Engineer apprentice	Liverpool	150
Sharp, A.	18	Engineer apprentice	Glasgow	150
Wild, A. E.	20	Engineer apprentice	Manchester	125
Jordan, H. G.	23	Engineer	Manchester	125
Murphy, E.	21	Engineer apprentice	Liverpool	100
Perry Jones, R.	23	Engineer apprentice	Carnarvon	100
Richardson, S.	22	Draughtsman	Greenwich	100
Barendt, A. H.	21	Engineer apprentice	Liverpool	100
Herbert, C.	19	Mechanic	Oldham	100
Davies, E. J. M.	20	Engineer student	Bristol	100
Platt, T.	21	Millwright	Manchester	100
Savage, W.	22	Engineer	Crewes	100
Tyson, J.	25	Engineer	Liverpool	100
Haddock, A. G.	20	Fitter	Woolwich	100
Martin, W.	20	Engine Fitter	Brighton	100
* Equal.				

EXAMINATION FOR WHITWORTH SCHOLARSHIP PRIZES, 1881.

SCHOLARS APPOINTED IN 1878.

Marks obtained.

Name.	Theory.	Practice.	Total.	Prize Awarded.
Groves, W.	1,700	1,185	2,885	First prize, £100
Mather, T.	1,940	873	2,813	Second .. 60
Tozer, W. H.	1,365	1,066	2,431	Third .. 50
Needham, J. E.	1,943	444	2,387	Fourth .. 40
Duckworth, T.	1,186	419	1,605	Fifth .. 30
Kingdon, Z. H.	897	—	—	Sixth .. 20

* Specially excused from the Examination in Theory.

FINAL COMPETITION.

Marks obtained.

Name.	1879	1880	1881	Total.	Prize awarded
Groves, W.	2,126	2,595	2,885	7,606	First £200
Needham, J. E.	2,264	2,250	2,387	6,910	Second 100

A new Congregational chapel was opened at Mevagissey, Cornwall, on Thursday week. It is Gothic in style, and measures 60ft. by 40ft.; the materials are local stone and granite dressings, all the internal fittings, including partially open roof, open seats, gallery, and rostrum, being of varnished pitch-pine. The chapel seats 400 persons and has cost £1,650, but some of the material of the previous chapel which occupied the same site has been reused. Mr. Sylvanus Trevel was the architect, and Mr. B. H. Roberts, of Mevagissey, the builder.

The rural sanitary authority of Whitehaven last week elected Mr. George Clark, of St. Bees, as surveyor in the stead of Mr. John Kenney, deceased. There were 29 applicants for the post.

CONTENTS.

Provincial Art Museums	180
Competitive Designs for Christmas and New Year Cards	189
Competition Designs for the Proposed Exchange Station, Liverpool	190
The Furniture Trades Exhibition.—Illustrations	191
Portland Cement for Users	192
The Knowledge Necessary for the True Artist	193
Practical Notes on Plumbing.—IX.	194
The Architectural Association at Worcester	195
Mortar	196
Hydraulic Works	196
Greenock New Dock and Municipal Buildings	196
Cambrarian Archaeological Association	197
The Furnishing and Decorating of Sunday-schools	197
The Wall-Paintings in Canterbury Cathedral	197
Hagen's Patent Duplex Cesspool Trap and Cleanser	198
The Old Aqueducts of Paris	198
Battersea Bridge	198
Parkes Museum International Exhibition Awards	198
Whitworth Scholarships	199
Our Lithographic Illustrations	200
Building Intelligence	213
Competitions	213
Critics	213
Ar. Historical and Archaeological Societies	213
To Correspondents	214
Correspondence	214
Intercommunication	215
Parliamentary Notes	216
Legal Intelligence	217
Stained Glass	217
Water Supply and Sanitary Matters	217
Our Office Table	218
Meetings for the Ensuing Week	219
Trade News	219
Tenders	220

ILLUSTRATIONS.

THREE HOUSES ON THE CHELSEA EMBANKMENT.—THE DUCHANAN COTTAGE HOSPITAL, ST. LEONARD'S-ON-SEA.—ENTRANCE HALL, ST. PETER'S HOSPITAL, COVENT-GARDEN.—THE BISHOP'S PALACE, WORCESTER, NOW USED AS A DEANERY.—THE COMMANDERY, WORCESTER.—THE ABBEY CHURCH OF ST. MARY, TEWKESBURY.

OUR LITHOGRAPHIC ILLUSTRATIONS.

THREE HOUSES ON THE CHELSEA EMBANKMENT.

THESE houses are of red brick, of very good work, built by Mr. W. H. Laseelles. The architect is Mr. R. Norman Shaw, R.A.

THE DUCHANAN COTTAGE HOSPITAL, ST. LEONARD'S-ON-SEA.

THIS hospital is about to be built on a site at the junction of Springfield-road with the London-road, kindly given by C. G. Eversfield, Esq. The plan given shows the arrangement of the ground-floor; on the first floor there will be a convalescent-room for the patients and bedrooms for the matron and attendants. Externally the building will be faced with red bricks and rough-cast panels; the roofs will be covered with dark brown tiles. The architect is Mr. W. Hay Murray.

ENTRANCE-HALL AND STAIRCASE, ST. PETER'S HOSPITAL, COVENT-GARDEN.

THIS illustration shows the entrance-hall and staircase of the new Hospital of St. Peter, now being erected in Henrietta-street, Covent-garden, from the designs of Mr. J. M. Brydon, F.R.I.B.A. We illustrated the exterior of the building, and fully described it in our Midsummer Double Number of June 21 last.

ABBAY CHURCH OF ST. MARY, TEWKESBURY.—THE HALL OF THE COMMANDERY, WORCESTER.—BISHOP'S PALACE AND OTHER BUILDINGS IN AND NEAR WORCESTER.

DESCRIPTIONS of these illustrations will be found in our preliminary notice of the Architectural Association's Excursion on p. 195.

SKETCHES OF OLD DOMESTIC WORK IN ESSEX AND SUFFOLK.

I SEND the following descriptions of my sketches which appeared last week:—Panfield Priory, now a farmhouse, is situated about two miles from Braintree, in Essex, and was founded in the reign of William the Conqueror as an alien house of Benedictine monks, subordinate to the Abbey of St. Stephen, at Caen. Under Henry V. it became parcel of the possessions of the convent at Canterbury, and at the Dissolution it was granted to Sir Giles Copel. The interior has been grievously modernised, and sashes have been inserted in all windows on the other side to that represented in the sketch. A fine open roof existed over what was doubtless the hall, but floors and partitions have been inserted to fit it to its present use, and the tracery spandrels

and carvings of the roof patched together to serve as a sort of what-not. Doreward's Hall at Bocking, a parish adjoining Braintree and Panfield, was built in 1512, as the inscription over a window on the principal remaining front testifies. The remainder of the building, in the rear of the group of chimneys, is for the most part of much later date, and the whole is now a farmhouse. The family whose name it bears was, however, of earlier settlement here, for John Doreward built and endowed an almshouse as a "Maison Dieu" in Bocking, by license of King Henry VI. The motto, "Soli Deo honor et gloria," is inscribed in the spandrel with the date. Horham Hall, near Thaxted, is well known as the residence of the Princess Elizabeth at times during the reign of Queen Mary. It has been gradually reduced in size to meet more limited requirements. So lately as 1840 or thereabout, the chapel and a whole wing were demolished, yet enough remains in very good repair to show it to have been a very noble and beautiful mansion of Late Perpendicular date. In common with those just described and almost all others in Essex, it is built of red brick, with stone dressings used sparingly. The sketch at Clare is from the summit of the mound on which the remains of the keep of the very extensive castle stand. There is much to interest the architect and antiquary in the church, priory, and remains of domestic work still left in this little decayed market-town, whose secluded position seems to have saved it from the modernisations which have rendered so many towns of its sort so stale, flat, and unprofitable. The chimneys at Newport now adorn a small roadside farmhouse: the four stacks at Waltham belong to a village-shop adjoining the churchyard, which is reputed to have been the "Priest's house," and is credited with the possession of the usual subterranean passage. The "Crown House," at Newport, ostensibly takes its name from the crown in relief in the panel over the entrance. The stucco foliage in the panels with which the front is adorned is much damaged, and on the ground-floor has quite disappeared. Whether the crown has any reference to Mistress Nell's connection with the "Merry Monarch," who on one occasion, at least, visited Audley End, not far from Newport, I cannot say. The house at Whittle, now converted into several cottages, needs no description. The village, once a market-town on the much-frequented main road from London to Bury St. Edmund's and Norwich, is picturesquely built round a large green, and close by is the site, occupied by an orchard, of a palace built by King John in 1211, of which the moat still remains, though no stone of the building is to be seen. Of the subject of the sketch at Sudbury I could glean no history or tradition. Part is now uninhabited, the rest is scarcely habitable, and is fast falling to decay through neglect alone. The mouldings of the window-mullions, &c., are good, and the whole effect particularly pleasing. It is much to be regretted that something is not done, at least to preserve it from further ravages of wind and weather. Beeleigh Abbey, near Maldon, was founded in 1180 by Robert Mantell for Premonstratensian Canons, and dedicated to St. Nicholas. To this date belong the chapter-house and refectory with some smaller portions. The former is in a fair state of preservation, and with the refectory has a groined ceiling springing from slender Purbeck marble columns, in each case dividing the apartment into two aisles. Perpendicular windows were inserted in the refectory, one bay of which has been cut off at the north end for a living-room for a labourer's family, and a half-bay at the south end for a passage-way, leaving two and a half bays untouched. In this apartment are the remains of a good carved stone chimney-piece of the date of the windows. Above it is a dormitory with a good open roof, which the visitor is informed is of cedar, the proof given being that spiders will not make their webs among its timbers. Certain it is that no webs are visible, though usually such a roof would be festooned from end to end when untouched, and indeed out of reach of brooms. The half-timbered building in the sketch faces west, and adjoins the south end of the refectory, the chapter-house lying east and west at the north end of the same. I cannot help remarking that in Essex a wide and little-touched field lies open to the student of domestic work, presenting not only every variety of work, from simple cottages to the most splendid mansions, but possessed,

too, of the great advantage of lying within easy reach of the metropolis, both by railway, and, what is as great a consideration in our bicycling days, by road as well. F. W. WOODHOUSE.

CHIPS.

The new school-buildings lately erected in connection with the Ilkley Congregational School were opened on Thursday week. The new buildings are in the Gothic style, corresponding with the outline of the church, which was erected some eleven years since. The contracts amount to £3,000, but the whole cost of carrying out the scheme, including the alteration and renovation of the church, will be more than that. Messrs. Hargreaves and Bailey, of Bradford, are the architects.

The rebuilding of nave and restoration of tower to West Lexham Church, Norfolk, has commenced, Messrs. Hooks, of Titchmarsh being the contractors. The architect is Mr. G. T. Pedder, Holkham.

On the authority of Sir Henry Hunt, consulting surveyor of Her Majesty's Office of Works, the value of the unoccupied land at the Blackfriars end of the Thames Embankment is stated to have risen since 1870 from £40,000 to £81,825 an acre.

St. Mary's Cathedral, Sydney, New South Wales, now presents an altered appearance, owing to the rapidity with which the works have been carried on during the past few months. All the masonry of the outer walls of the main building is finished, and the inner walls are up to contract height. The great window and gables at the north end of aisles, together with the beautiful circular side windows, are completed, and look remarkably fine. The northern window much resembles the great window in Lincoln Cathedral, England. Everything in connection with the building is being pushed on with energy, and every effort is being made to have the new cathedral ready for opening in January, 1882.

The tender of Messrs. Pearson and Son, of Bradford, who have just completed the main sewerage of Ipswich, has been accepted for the construction of a new dock at King's Lynn, to have a water-space of eight acres. The existing Alexandra Dock at Lynn is about six and a-half acres in extent.

The foundation-stone of the South Devon and East Cornwall Hospital was laid by Earl Mount Edgumbe, at the Seven Trees estate near Plymouth, on Friday week. Messrs. Coe and Robinson, of London, whose design was selected in competition from nine, and was illustrated in the BUILDING NEWS for Feb. 20, 1880, are the architects, and Mr. Jonathan Marshall, of Plymouth, is the contractor. The hospital will accommodate 102 patients, and will cost about £17,000.

The new grammar-school at Saffron Walden was opened by Lord Colchester last week. Mr. Edward Burgess is the architect.

A meeting of the Tamworth parish-church restoration committee was held on Friday week, when a balance of £937 being reported to be promised, in addition to the £1,273 necessary to meet existing contracts; it was resolved to instruct Mr. Basil Champneys, their architect, to prepare plans for restoring the clerestory windows on north side of nave, and the three tower windows.

In our description last week of the new Edinburgh Dock at Leith, we omitted the names of the engineers, Messrs. A. M. Rendel and George Robertson.

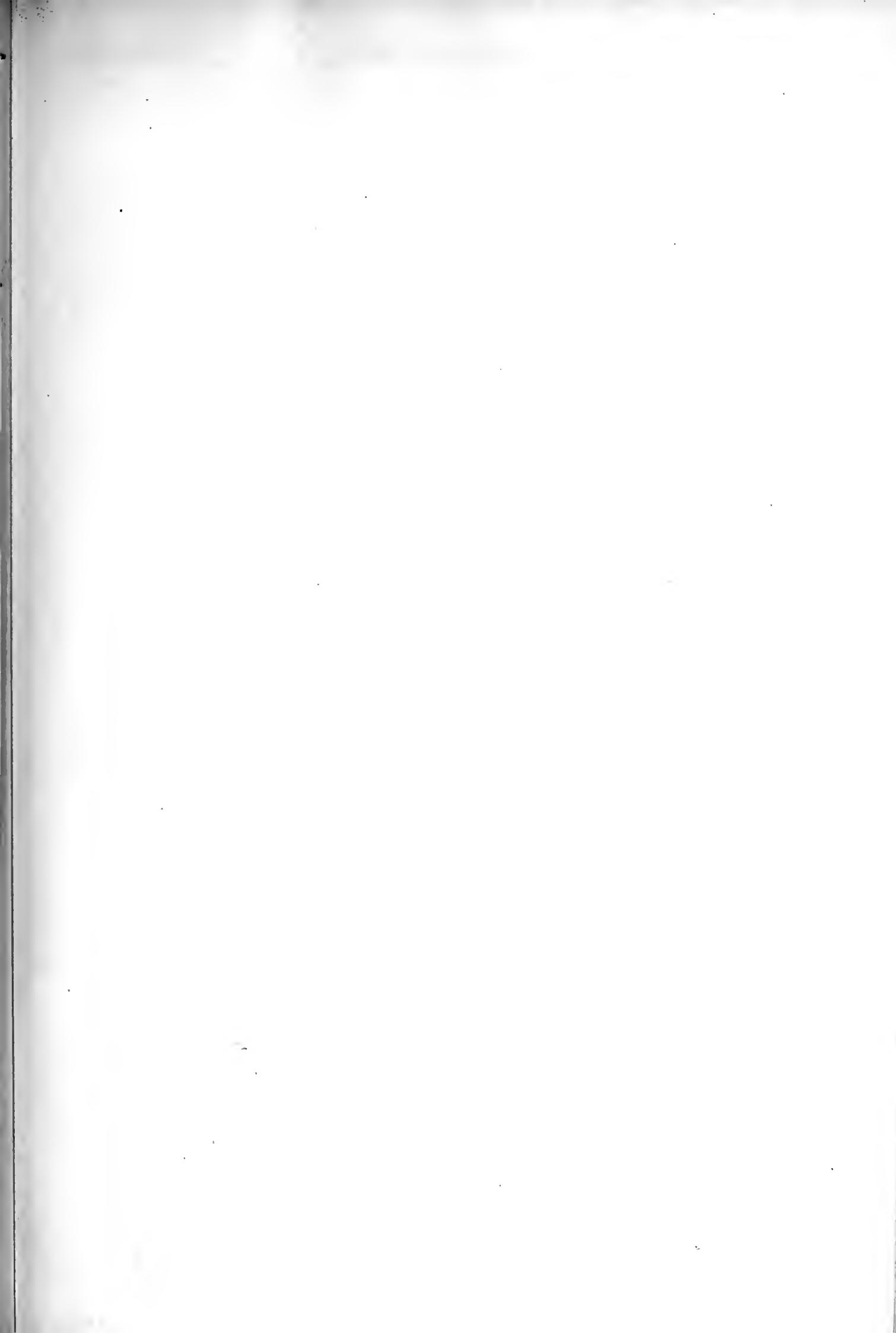
On August 1st the corner-stone of the extensions to Mauldeth Hall, Heaton Mersey, near Manchester, was laid by Mr. Richard Armistead. The hall and grounds were bought by the committee of the Northern Counties Hospital for Incurables for £15,000, and the hall is being altered and extended at an outlay of £6,800, to accommodate 100 patients. The architect is Mr. Charles Heathcote, and the contractors are Messrs. Wilson, Toft, and Huntley, of Manchester.

A new Baptist chapel was opened in Victoria-road, Deal, on the 4th inst. The builders were Messrs. Cottew and Sons, and the chapel seats 600 persons.

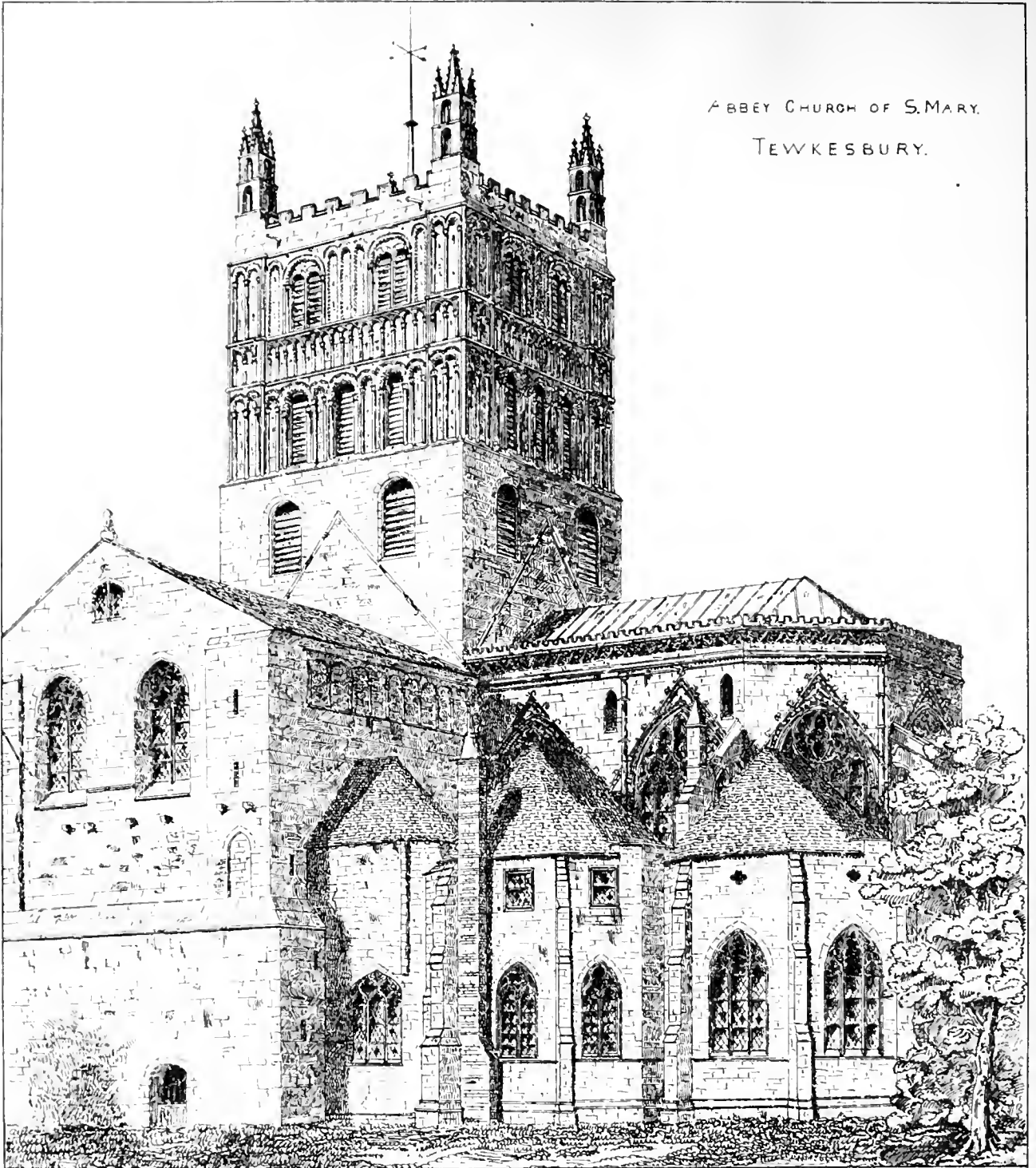
At the quarterly meeting of the Glasgow United Trades Council, held on Wednesday week, it was reported that they had just received an accession of strength by the joining of the Amalgamated Carpenters and Joiners of the Clyde district.

The Hackney board of guardians, at their meeting on the 3rd inst., instructed Messrs. Lee and Smith, of Queen Victoria-street, E.C., to prepare plans for new males' buildings at the workhouse.

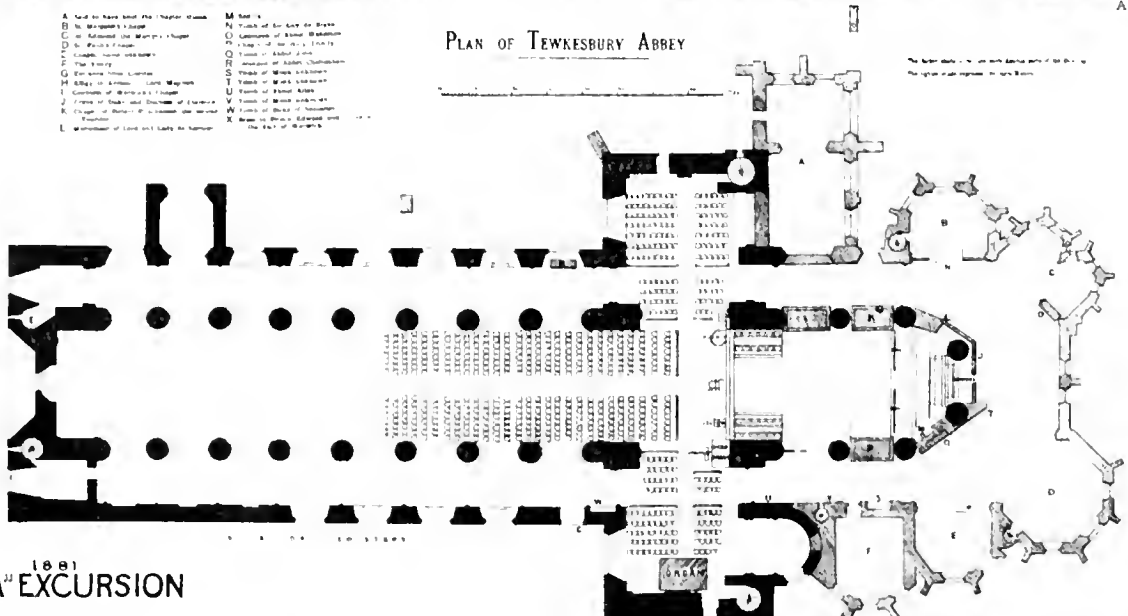
Willison Free Church, Dundee, was reopened on Sunday, after having been renovated and decorated in colours: a work carried out by Mr. William Norwell, of Dundee.



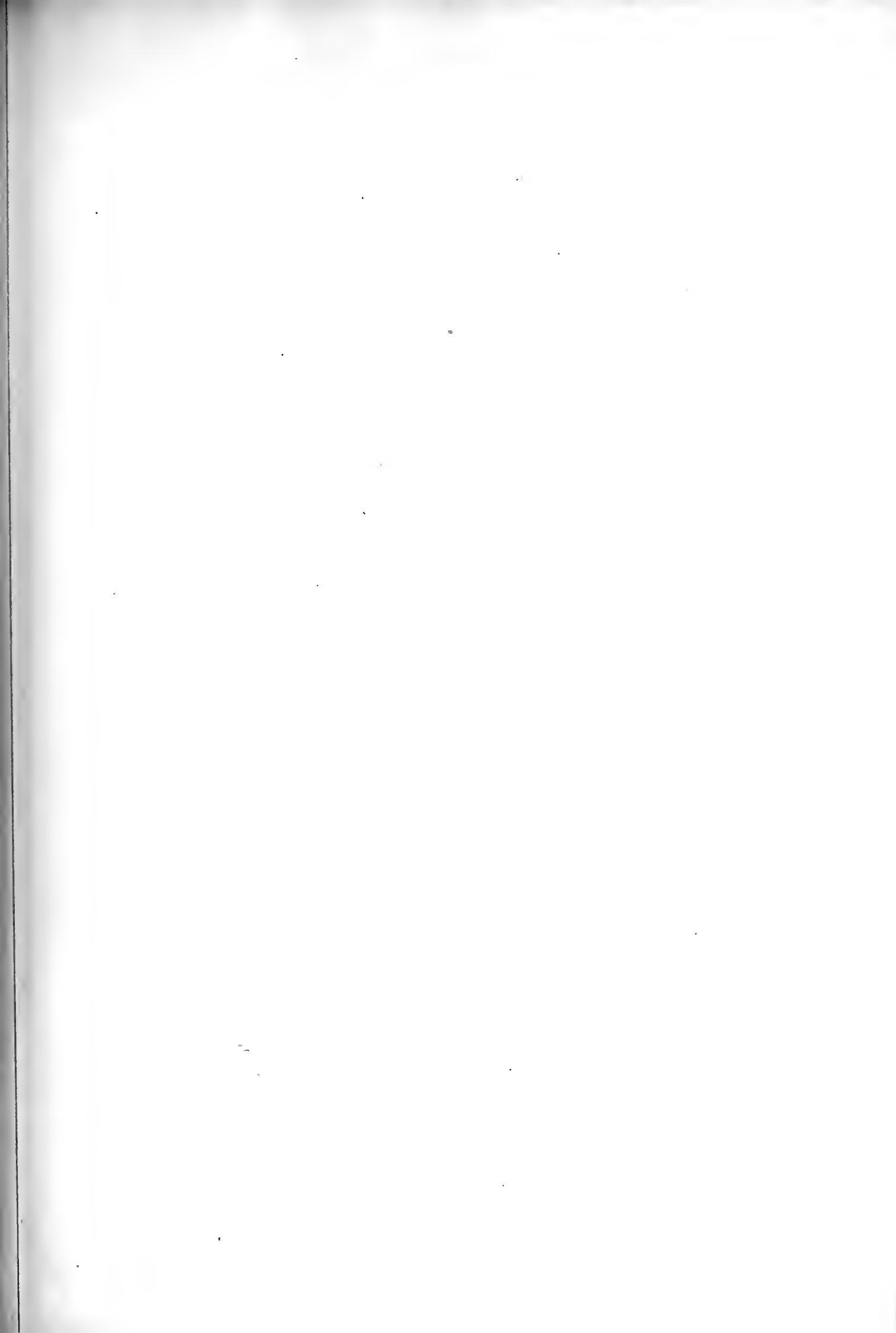
ABBAY CHURCH OF S. MARY.
TEWKESBURY.

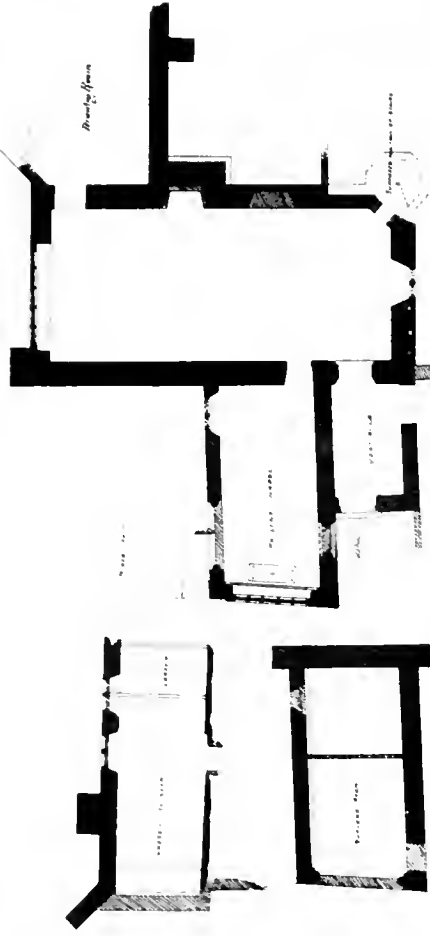
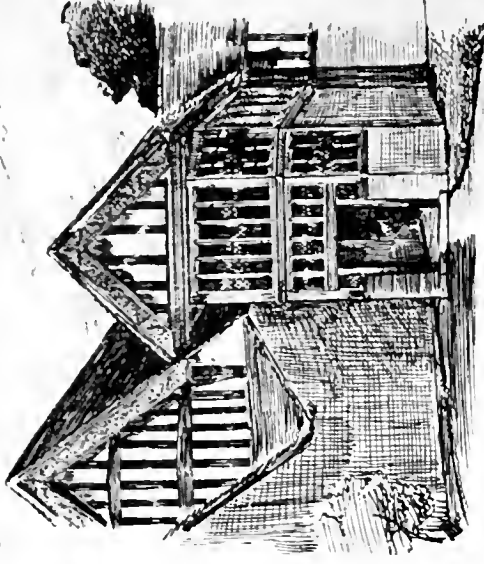
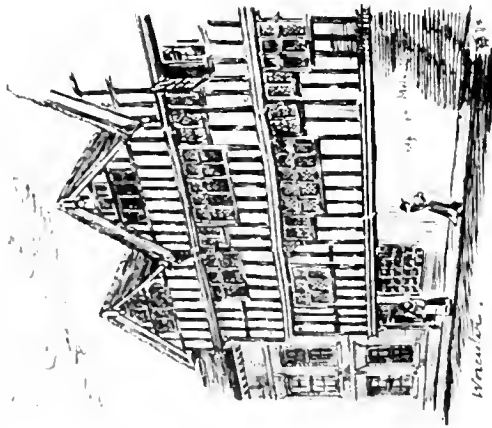


PLAN OF TEWKESBURY ABBEY

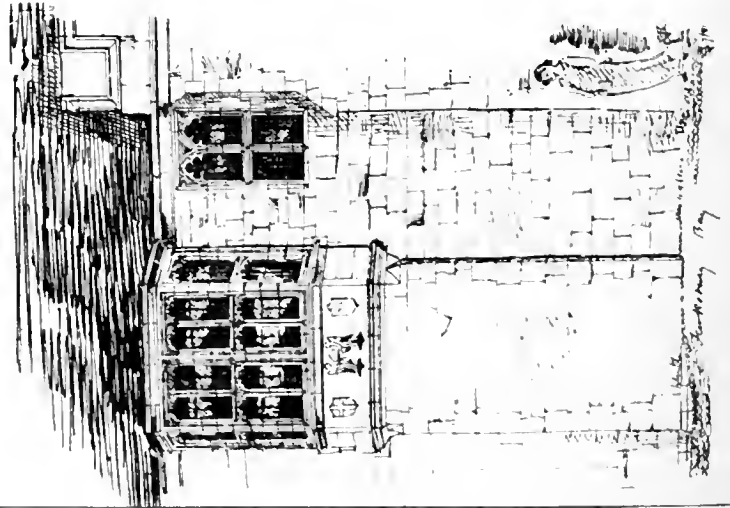


1881
"A" EXCURSION



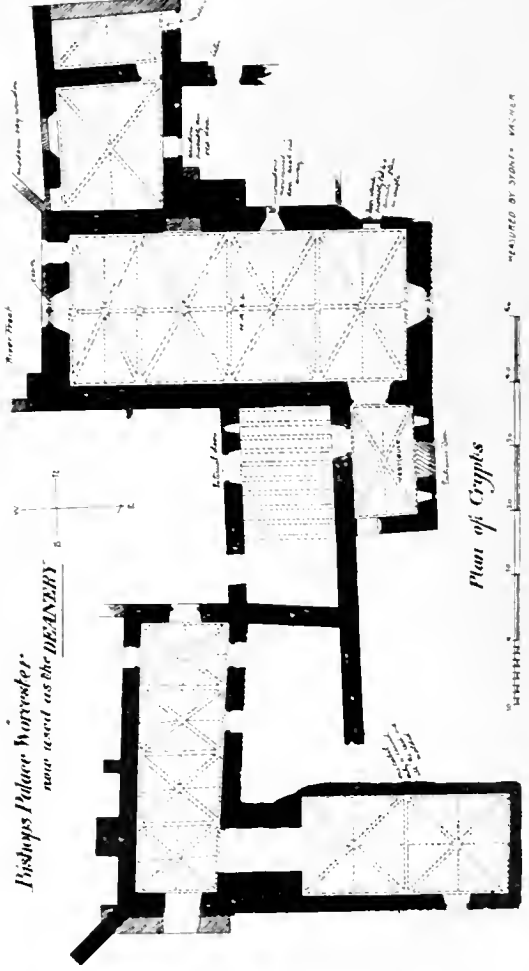


Plan of Principal Floor



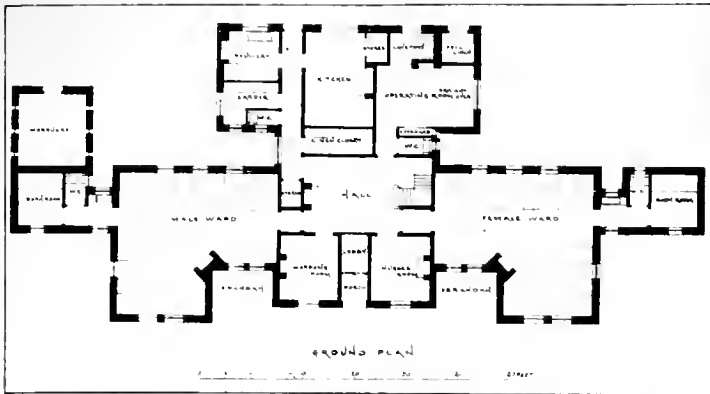
ARCHITECTURAL ASSOCIATION EXCURSION 1891

Bishops Palace Worcester
now used as the DEANERY



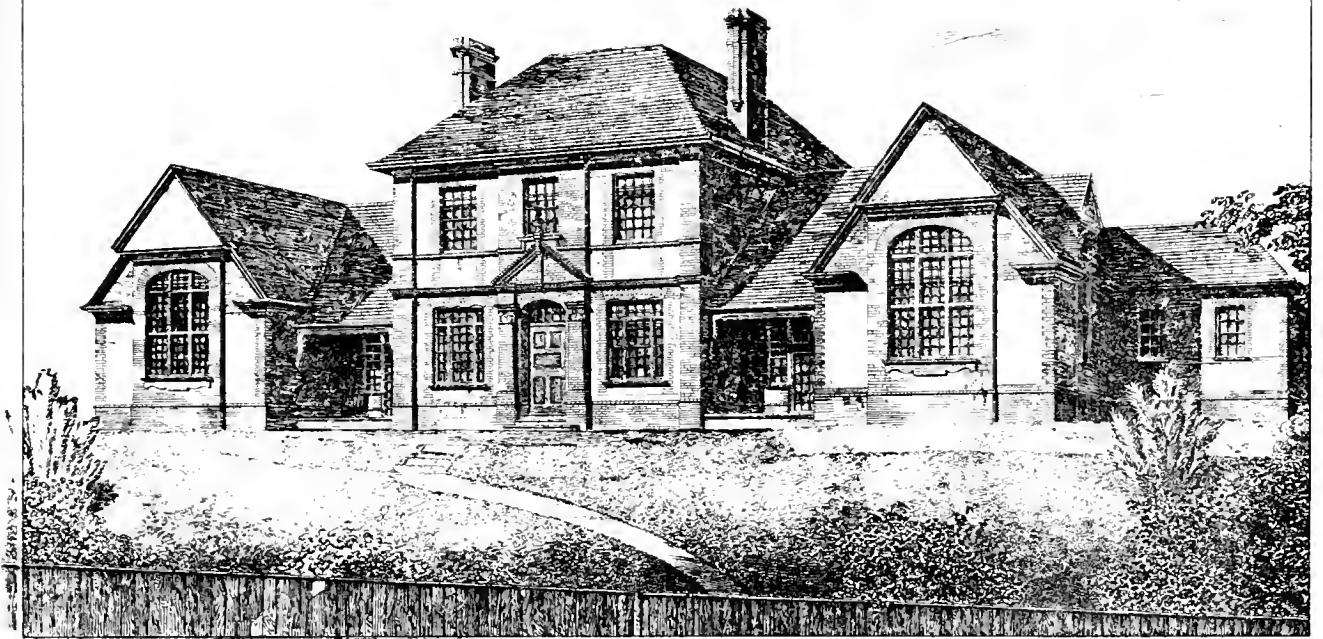
Plan of Crypts

Sydney Vacher del.

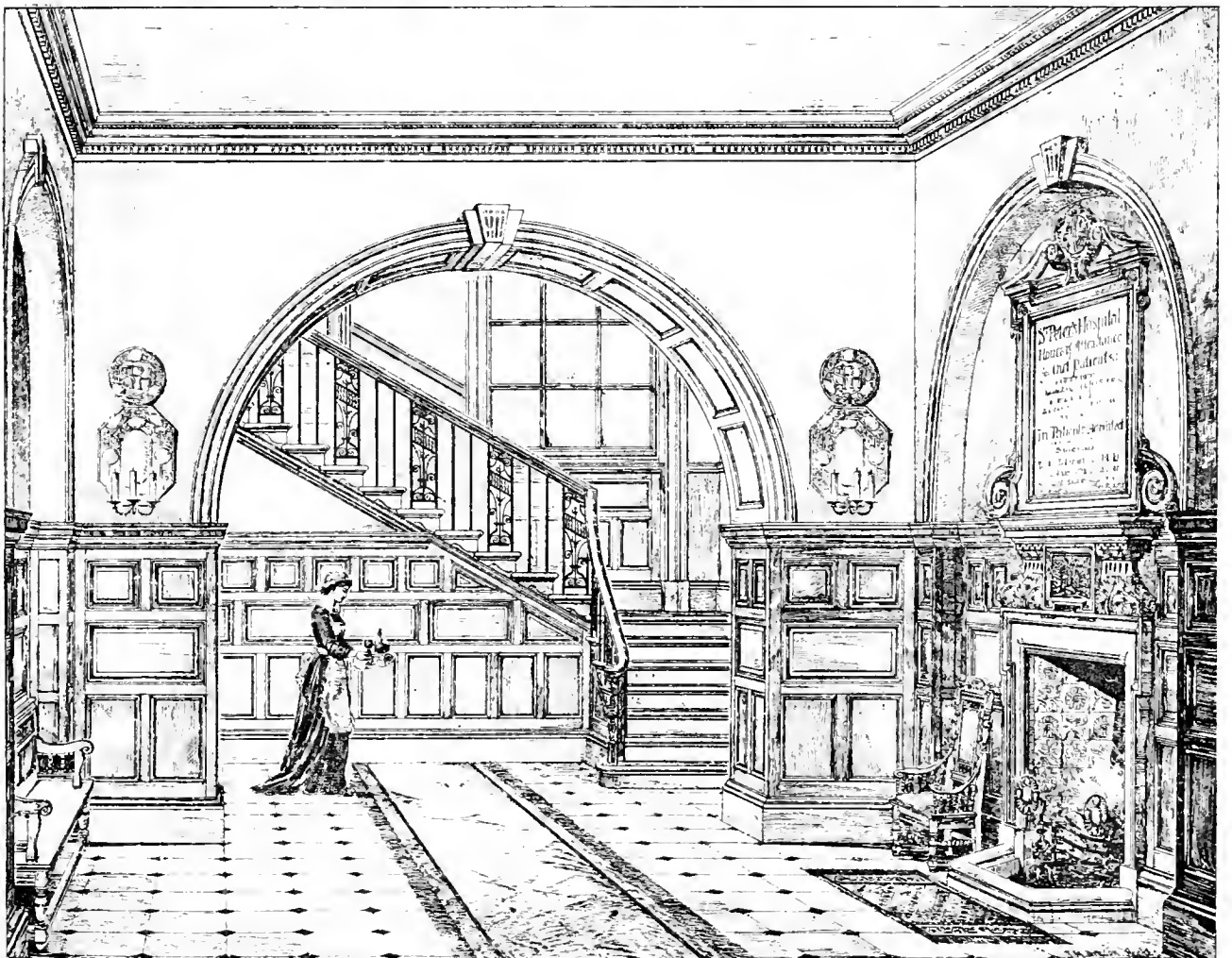


THE BUCHANAN COTTAGE HOSPITAL.

ST LEONARDS ON SEA.



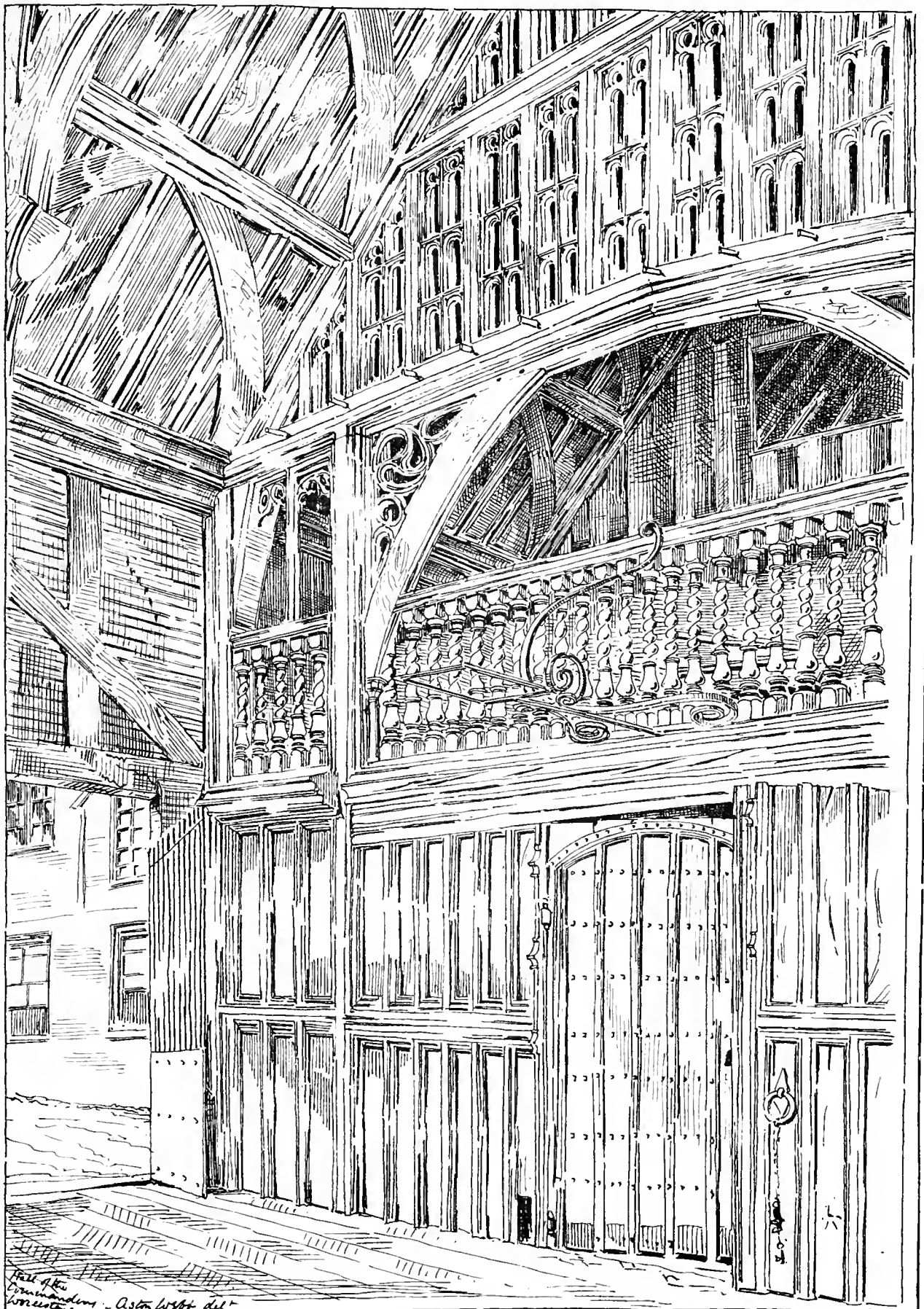
W HAY MURRAY ARCHT.



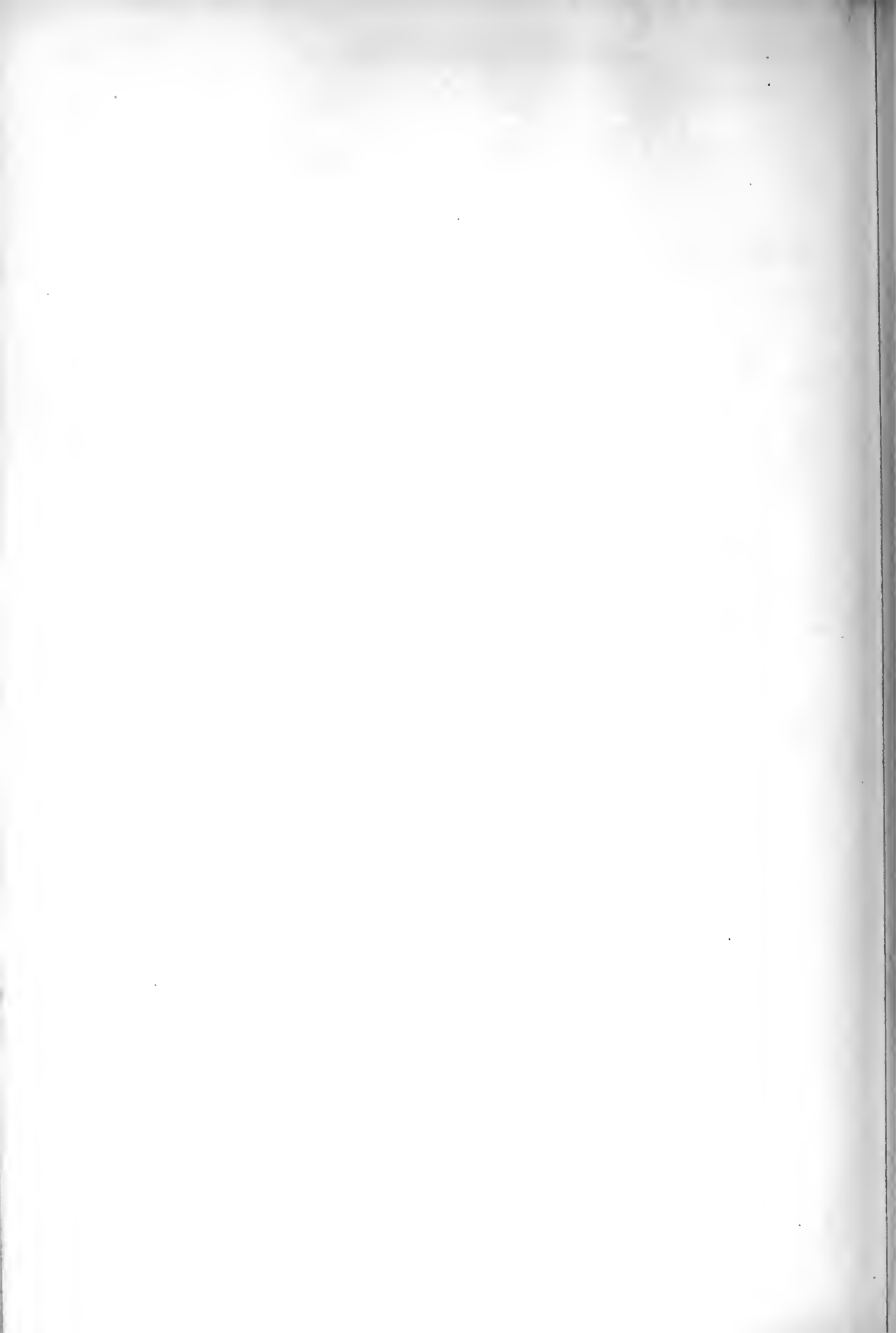
ENTRANCE HALL ST. PETERS HOSPITAL COVENT GARDEN.

Photo Lithographed & Printed by James Akerman 6 Queen Square W.C.





Hall of the Commandery Worcester. "A.A." EXCURSION ¹⁸⁸¹



Building Intelligence.

FRODSHAM.—The Church of St. Lawrence, Frods-ham, one of the most interesting ecclesiastical edifices in the north-west district of Cheshire, is now undergoing extensive restoration. The church is partly Norman in character, and, although the actual date of its foundation is unknown, is conjectured to belong to the early part of the 12th century. Additions, in later periods of architecture, have been made to it from time to time, and in the 18th century the whole of the south aisle was restored. The architects are Messrs. Bodley and Garner, of London; and the cost is estimated to amount to between £7,000 and £8,000. The work was begun about twelve months ago, when the building was entirely dismantled. The roofs of the south aisle, nave, and north aisle, and the low galleries and high square pews were entirely removed. The walls of the south aisle have now been partly made good, a string-course and three new windows fixed, and new priests' doorway and buttresses have been constructed. In the nave the old Norman pillars have been cleaned and partly restored. When completed, the church will accommodate about 600 persons. Mr. George Speechly is the clerk of works, and the major portion of the contract has been let to Mr. Richard Becket, of Hartford.

GAMLINGAY.—The parish-church of St. Mary was reopened by the Bishop of Ely on Wednesday week after restoration from the plans of Mr. J. Piers St. Aubyn, of London. The church is a cruciform building in the Early English and Decorated styles, and is built of pebbles, sandstone, and clunch. A new floor, partly tiled and partly boarded, has been laid, and new oaken seats and footboards have been provided in the nave and aisles. The walls have been replastered and all the windows reframed and reglazed, and the two small ones in chancel and a lancet in the north aisle, which were previously blocked up, have been opened out, the aisle-window being filled with stained glass. On the north side a new vestry and organ-chamber have been added. The south porch has been rebuilt, the piscina opened out in south transept. The oak chancel-screen has been restored and surmounted by a cross, new carved brattice-work placed above the choir-stalls, and a window on the south side of chancel filled with stained glass. The exterior of church has been repointed, and the battlements repaired. Mr. John Osborn, of St. Neot's, Hants, was the contractor, and Mr. Luff the clerk of works. The cost has been £2,450 for nave, and £750 for chancel.

GLOUCESTER.—The completion of the restoration of the Old Crypt School, Gloucester, a work which has been going on for the last four months, was completed on Thursday week. The building, which was erected some 350 years ago, is in the Late Perpendicular style. The finest feature in it is the gateway and oriel window over. The lower room, with its dark oak wainscoted walls and ceiling, was long used as the Crypt Grammar-school. The restoration works have been carried out by Mr. Tanner, of Gloucester, from plans prepared by Mr. C. G. Maylard, architect, of London, at a cost of £550.

SHIPBOURNE.—On Saturday last, the new church of St. Giles, Shipbourne, was consecrated. The building, which provides accommodation for 250 people, is in the Early English style of architecture, the plans having been prepared by Messrs. Mann and Saunders, of Great George-street, Westminster. The edifice is cruciform in shape, and a substantial tower rises over the intersection of the chancel, nave, and transepts. The material used is Kentish ragstone, with Bath stone dressings. Among features of the church which deserve notice is the crypt, with its stone-voined roof. It is built under the chancel, and is designed as a family burying-place. The builder was Mr. Allcorn, of Shipbourne, the masonry work having been entrusted to Mr. Hughes, of Maidstone. Messrs. Burke and Co. supplied the marble mosaic pavement, and Mr. Bromfield the carving in wood and stone.

WRELEY.—The parish-church of St. Andrew, Wreley, East Essex, was reopened on Tuesday, after rebuilding, the only portion of the fabric that is left being the tower, which is hereafter

to be heightened. The new church is Perpendicular in style, and consists of nave and north aisle, chancel, with vestry and robing-closet to south, and organ-chamber to north. The exterior of the building is of red brick, with Bath-stone dressings. The aisle and organ-chamber are separated from the church by arcades carried by light octagonal piers with moulded caps and bases. The nave windows and that at east end are of three lights, those to chancel being of two lights. The new pulpit is octagonal and open-pannelled; the choir stalls and nave seats are of stained and polished deal. The floor of nave is laid with wood-paving, and that of chancel with tessellated tiles. The old font has been restored and placed under the tower arch at west end of church. Accommodation has been provided in the church for 300 persons, at a total cost for rebuilding of £3,000. Mr. Edward C. Robins, F.S.A., of the Adelphi, London, was the architect; Mr. John Woodley, of London, the clerk of works; and Messrs. Saunders and Son, of Dedham, were the contractors.

COMPETITIONS.

LIVERPOOL.—The directors of the Lancashire and Yorkshire Railway have awarded the premiums for the designs for the proposed new Exchange Station, Liverpool, as under—viz., 1st, £750, Mr. John West, 4, South-parade, Manchester; 2nd, £500, Mr. H. J. Percival, Old Parsonage, Newchurch, near Manchester; 3rd, £250, Mr. Thos. Mitchell, 17, St. Anne's-square, Manchester.

HALIFAX SLAUGHTER-HOUSES.—At the meeting of the Halifax town council last week a report was received from the Markets Committee stating that they had examined, in committee, competitive designs sent in for the new slaughter-houses, and recommended that a premium of 50 guineas be awarded to the author of the design marked "H.R.H.," and one of 25 guineas to the authors of design under motto "Northern Light." The report was presented: but it seems doubtful whether the premiated plans will be executed, as by a majority of 18 to 17 the committee's further recommendation, that £10,000 be borrowed "for rebuilding and extending the slaughter-houses," was amended to "for re-erecting new slaughter-houses on a site at Ladyship already purchased"; and the minority have decided to memorialise the Local Government Board on the subject. On opening the sealed envelopes it transpired that the first premiated design, "H.R.H.," is by Mr. Edward Hughes, of Huddersfield; and the second, "Northern Light," by Messrs. W. and R. Mawson, of Bradford.

A special meeting of the Commissioners of Sewers for the City of London was held on Thursday week at the Guildhall to receive fresh proposals from the chairman of the Metropolitan and Metropolitan District Railway Companies with reference to the Inner Circle Railway Completion and the proposed street improvements. Sir Edward Watkin and Mr. Forbes were present, and it was explained that correspondence had taken place between those gentlemen as representing the railway companies and the chairman of the City Commissioners, which had resulted in an approximation of terms. After some discussion, it was resolved to increase the contribution from the Commissioners from £250,000 to £300,000 (making, with the Metropolitan Board of Works' contribution, £500,000), on condition that the railway companies make the proposed street improvements, including a new street 60ft. wide. It was also resolved to pay the sum by instalments as the work should be completed. This offer will be laid before the shareholders of the two companies.

The tercentenary memorial statue of Dr. William Harvey, the discoverer of the circulation of the blood, was unveiled at Folkestone, his native town, on Saturday. The statue has been erected on the Lees promenade, and is of bronze on a granite pedestal; it represents Dr. Harvey, in the garb of his own times, holding a heart in his left hand. The head and face are copied from the best portrait of Harvey now extant. The statue is by Mr. Bruce Joy, whose model was selected in a limited competition of three sculptors.

The members of the Wolverhampton Free Library Archaeological Department visited Evesham on Monday week. The Bell Tower, Abbey excavations, and Battlewell were visited, and a paper was read by Mr. Elliott on the Abbey and Battle of Evesham.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

WILTSHIRE ARCHÆOLOGICAL ASSOCIATION.—The annual meeting of the Wiltshire Archaeological and Natural History Association commenced on Tuesday at Bradford-on-Avon. The general meeting, at which about 100 were present, began at the Town Hall at 12 o'clock, when the hon. secretary (the Rev. A. C. Smith) read the report of the association. Sir Charles Hobbhouse then delivered an inaugural address, showing the great uses of archaeology in modern architecture. He said that archaeology was the history of any one of our rural villages, and indeed a miniature history of the whole country. The Rev. Canon Jackson, F.S.A., also made a few remarks, and the Rev. Canon Jones then gave an interesting descriptive account of the town of Bradford. The officers were all re-elected, with Mr. H. E. Medlicott as co-general secretary in the place of Mr. C. H. Talbot, who had resigned from ill-health. The members then separated, and at 3 o'clock reassembled at the parish-church, and visited all the principal objects of interest in the town and immediate vicinity, under the able guidance of Canon Jones. The old Saxon chapel, recently discovered, was an object of especial interest. In the evening the members sat down to a capital dinner at the Swan Hotel, under the presidency of Sir Charles Hobbhouse. Later in the evening, a conversazione was held at the Town-hall, when an interesting paper was read by Mr. Charles Moore, F.G.A., on "Notes on Wiltshire Palæontology," and one by the Rev. Canon Jackson on "The Eminent Ladies of Wiltshire History."

CHIPS.

Emmanuel Church, Putney, belonging to the Countess of Huntingdon Conuexion, was consecrated on Wednesday week. Mr. Loe was the architect, and Mr. W. R. Williams, of Putney, the builder.

Mr. Thornhill Harrison, C.E., one of the inspectors of the Local Government Board, held an inquiry at Goole, on Wednesday week, with reference to an application from the Goole local board for permission to borrow £20,000, for the purpose of taking £2,000 shares in the company recently formed to supply Goole and the district with water. The inspector said he should report favourably on the application.

The Improvement Commissioners of Milton-next-Sittingbourne have received a report from Mr. Henry Robison, C.E., their engineer, stating that the work of laying the water-mains is now practically completed, and that the sewerage works, also carried out under his supervision, will be finished in about six weeks.

At the quarterly meeting of the Salybridge town council, last week, Mr. Councillor Storrs took the opportunity of correcting some statements which had been made at the previous meeting as to the low rate of pay obtained by builders' men and their labourers near Manchester. Mr. Storrs said he had examined his wages-books for a quarter of a century past, and found that the wages of builders' men had considerably increased in that time. In 1856, men working 60 hours per week were paid 2s., a fraction over 4½d. per hour, while to-day they were getting 7d. per hour, which was an advance of exactly 50 per cent. Labourers at that time only got, the best of them, 1s. per week of 60 hours.

The School Board for Leeds have approved plans prepared by Mr. Hepper for new schools to be erected in Dewsbury-road. The schools will be a departure in plan from those already built, being provided with greater class-room accommodation.

The award in the arbitration case between the local board and the gas company at Ashford, Kent, was taken up on Thursday week, when it was found that the local board was ordered to pay the company £10,500 as the purchase-money for their works and undertaking.

At the East Riding petty sessions, held at Hull on Friday week, Mr. Henry Heron, builder, of Hull, was summoned for obstructing the footpath in Dock-avenue, Newington, by building materials placed thereon. It was proved the obstruction had existed, in spite of notices and complaints, for nearly two years, and defendant, who was till recently a member of the Newington local board, the prosecuting authority, was fined 40s. and costs.

Mr. Alexander G. Grubb, assistant master of the Dundee School of Art, has been appointed second master of the Manchester School of Art, at a salary of £250 per annum.

"To a practical man with a taste for mechanics, and the bumps of construction fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication *The English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion.—*The Brightonian*. Price Two-pence of all newsmen, or post free 2½d.—31, Tavistock-street, Covent-garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 5s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33f. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

MR. CHARLES WILSON, of 13 and 15, Lidgett-street, New York City, is authorised to receive American subscriptions at the rate of 6 dols. 40c. per annum.

MR. R. M. TUTTLE, of Titusville, Penn., U.S.A., is also authorised to receive subscriptions at the same rate.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL, Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—H. B.—H. and R.—L. and N.W. Ry. Co.—C. Bros.—D. W.—T. E.—E. F.—B. G.—H. D. P.—E. C.—C. H. and Co.—K. and Co.

C. E. M. (There are no other special examinations that we know of. We cannot insert queries as to prices of books. 1st query inserted.)

Correspondence.

THE ARCHEOLOGISTS AT ST. ALBAN'S.

To the Editor of the BUILDING NEWS.

SIR,—“The archaeologists wished for admission to the western portion of the nave, but were refused.” The above is a quotation from this week's BUILDING NEWS, referring to a visit of the Royal Archaeological Institute to St. Alban's Abbey; by which it appears that Sir Edmund Beckett, being already a self-constituted master of the restoration, by the fact of his possessing money, which the restoration committee do not, has now proved to be a custodian as despotic as Laud was with the Church in England, and as Wentworth was in Ireland, over two centuries ago.

Sir Edmund Beckett, by not throwing open the nave, or if that was beyond his power, by not exerting all his influence to induce the authorities to do so, has laid himself open to remarks which would certainly not tend to advance his fame and reputation with posterity. It might be said with some appearance of truth, that he was afraid to receive the criticism of a gentleman thoroughly qualified to give it; that he did not come forward to explain his reasons for destroying Abbot Whethamstead's fine work, because he had no arguments sufficiently cogent to combat those of his opponents; that he would not allow a society with unquestionable knowledge of the subject, to even look at his renovating operations, for fear that they would

raise such a storm of adverse criticism that would rouse even the slumbering activity of other Hertfordshire landowners to enthusiasm and liberality for the preservation of the finest relic in their county—nay more, in some respects, in their country. Whatever Sir Edward Beckett's present views may be upon the subject of restorations, I know not; but I hold the opinion that no man by himself should be intrusted with the alteration of any ancient building, unless he has shown by previous existing examples that he has the knowledge and feeling necessary for the attainment of such an object, and has not sullied his fame by any voluntary act, by which he has sacrificed the correct principles of truth in architecture. This latter, I maintain, Sir Edmund Beckett has done, and therefore, in my humble opinion, is disqualified from restoring solely by himself, without the intervention or receiving the advice of any one who is more competent than himself to give it. If Sir Edmund Beckett would only be as liberal in his opinions as he is with his money, we should never have seen an archaeological society turned away from a restoration without being met by the restorer or his deputy, or without even being allowed to view the way in which it is being carried out. Possibly now we shall live to see the doors of the western portals of St. Alban's Abbey grained oak, without being permitted to interfere or prevent such an act, because the author of the deed is in possession of wealth, and, what is more, has proved that he has the will to do it.—I am, &c.

LEWIN SHARP.

31, Cornwall-gardens, Queen's Gate, S.W.
August 8th.

VENTILATION OF SOIL-PIPES.

SIR,—Mr. Buchan's letter (p. 184) shows the angry spirit of one convinced against his will. Sarcasms and irrelevant comparisons are very feeble lines of argument, and are true signs of a weak cause. His figures, in crude criticism of my (avowedly rough) estimations, besides being unfairly valued, omit important items of the specification. I may mention in particular the “chamber” within which the trap is to be built, and which, I confess, I did not myself understand, and, therefore, could not value properly.

Mr. B. asks, “How the bad air generated in the soil-pipe, open only at the top, is to be prevented from accumulating?” in his letter, p. 153, he, in part, himself answers thus: “a 1½ in. ventilating pipe ‘helps to prevent concentration of the sewage-gas at the top of the pipe.’” My answer is, that “bad air” is the product of putrefaction; that putrefaction is a gradual process. That, therefore, “bad air” is primarily produced in minute particles which irresistibly and continuously rise, the same as all other gases lighter than air; that this upward tendency will carry it forcibly through any upward orifice or through any size of crack or pipe; that a downward bend in a pipe will stop progress until accumulation forces the obstruction; that a downward bend fortified by a water-seal, more effectually stops progress; that a pipe orifice at the trap apex of the water-seal is an ever-open gate by which the “bad air” can freely escape, immediately and continuously as it is generated; hence the evident impossibility of any accumulation of “bad air.”

In reply to Mr. Emptage's sensible letter, I must admit that I am “in earnest” in my advocacy of 1½ in. pipes as sufficient vents; nevertheless, I shall be glad to be convinced that a larger pipe is more effective. Granted that Mr. E.'s (once tried) experiment in pouring in a pail of water did virtually unseat the trap, yet the apex of trap being, as I maintain, free from accumulation, there would be little or no harm done. The mere act of pouring would, by concussion and pressure, thrust any small quantity of “bad air” which might be hanging about the water-seal into and through the vent-pipe. The experiment appears to me to be of an impetuous driving, rather than an insidious “sucking,” nature, such as characterises the action of a siphon.—I am, &c.

MICHAEL DREY.

SANITARY PLUMBING AND PLUMBERS' WORK.

SIR,—In reply to Mr. Davies' letter of the 5th inst., that gentleman must be aware that his friend, a manufacturer of the O-trap, in a

printed bill given away to the visitors at the Sanitary Exhibition, calls attention to his patent and asserts that “the advantages of the O-trap have been most fatally controverted in the BUILDING NEWS by Mr. Davies, in reply to some lectures by Mr. Hellyer,” &c., &c. And what I said in my last letter was only a part copy taken from this printed notice, as I stated at the time, and seeing Mr. Davies' name mentioned therein several times, I felt confident that he must be aware of its contents.

Now, where has Mr. D. so fatally dealt with this question? For all that can be said about the whole of Mr. D.'s letters on the above question is that they are only unjust criticism, and have certainly not yet proved that the O-trap is in any respect superior to the S-trap.

Now, was not Mr. Pullen the chief cause of the interruption during the proposed 10 minutes' discussion, by waving a miniature model of a O-trap, and saying that the “O-trap was the only trap that did not require a vent-pipe”? &c., &c.

As to Bramah's people fixing a O-trap under his closet, this, in some respects, appears doubtful; for it appears somewhat singular to fix an O-trap to his w.c. apparatus and a O-trap below it.

In future, your correspondent says he will not “answer any letters signed only with initials, &c., &c.” I am sorry to inform him that at present it would be most inconvenient for me to sign my name in full, and I cannot imagine why he should object to my initials, for it appears to me that, owing to Mr. D. failing to prove that the O-trap is the best, he wishes to dismiss the question now that he himself is criticised, for it is easy to prove that the half S-trap when properly made and fixed in an efficient manner, must of a necessity be one of the best traps out.

I am glad to see Mr. Pullen's improvement on the old square-cornered O-trap, namely, by rounding the bottom and contracting the width of the body. This is a step in the right direction. Then we have another improvement in Mr. Smeeton's “Ellipse”-trap, and Mr. Hellyer's V dip-drap, both of which are much superior to the old square-cornered O-trap with its filth-collecting angles; the use of which I understand Mr. D. to be still advocating in his letters.

Mr. Davies really deserves great praise for the able manner in which he gives us the articles, entitled “Practical Notes on Plumbing,” “Plumbers' Work and Lead Working,” which are, indeed, interesting; but his letters on Sanitary Plumbing and Plumbers' Work, he must own, are a failure.—I am, &c.,

Lambeth, August 9, 1881.

H. B.

SURBITON COTTAGE HOSPITAL COMPETITION.

SIR,—A few days after the appearance of our letter in your issue of the 29th ult., we received our drawings from the committee at a cost of 2s. for carriage.

After waiting a few more days we received a lithographed circular letter, of which the following is a copy:—

Eastfield, Surbiton, August 4, 1881.
DEAR SIRS,—I am requested by the Committee of the Surbiton Cottage Hospital to thank you for the plans which you were so good as to send to me in response to their advertisement, and which I have the pleasure to return as the Committee have been unable to adopt them.—Yours, &c., J. S. LOXLEY, Hon. Sec.

The cool effrontery of the above, in which you will observe no reference is made to the successful man (if any), is perhaps only what might be expected from a “committee.” We would, however, ask whether the time has not arrived when architects should band themselves together, and form a “defence association” insisting that in all competitions, whether large or small, the designs shall be publicly exhibited, a professional arbitrator employed, and rejected designs returned to the authors, carriage paid. We contend that if a committee publicly advertise their wants, the same publicity should be observed in all the subsequent transactions as being the only safeguard against the repetition of treatment as above.—We are, &c.,

E. AND G.

BAD MANNERS AT THE SANITARY EXHIBITION.

SIR,—I paid a visit to the Sanitary Exhibition at Kensington on Monday week, and beg permission to relate my experience.

A friend of mine, a provincial architect, while examining a w.c., accidentally dropped the lid, and, unless done before, chipped a few pieces off the pan. He was then most rudely accosted by the attendant, who demanded 6d., or his name and address. The lad's manner was so extremely insulting that I advised my friend to do neither until he had first given us his name, and thereby enabled us to complain to his employers. He thereupon said he was an apprentice, and we could do him no harm, and followed us with outspoken remarks to one of the barriers. Here my friend gave his card to a policeman; but as it bore the name of the town only, it was objected to, and on my remonstrating at such excessive care, he called a gentleman, who caught hold of me violently by the arm several times, and said that if I interfered he would have me put out of the building. My friend now added "—Chambers" to his card in pencil; but even now the officious individual required a number, and because there was none, my friend had to give an explanation.

The discussion was eventually terminated when I reminded the officious individual that he had rather roughly treated me, when he said that if I repeated the remark he would have me put out of the building. I wish this threat had been carried out. As it is, I have ascertained the name of the person, and hope to have the pleasure of teaching him, through my lawyer, the lesson on his duties and manners he is so badly in want of.

August 4th.

C. E.

CHIPS.

Calverton Church, near Nottingham, was reopened on Friday, after thorough restoration of the nave, carried out at a cost of £1,100. A new open roof of pitch-pine has been erected, the pews replaced by seats of pitch-pine, and new pulpit and tiled passages provided. The windows, which were modern, have been replaced by others on the lines of the original 14th-century structure. Mr. Townsend was the architect, and Mr. Pattinson the contractor.

The Newton-Abbot highway-board on Wednesday week elected as surveyor, Mr. Brown, formerly of the Teign Valley Railway, at a salary of £160 a year. There were 34 candidates for the appointment.

The Whitehaven board of trustees last week inaugurated the new upper reservoir just constructed on Harras Moor. The reservoir is a covered one dug out of the solid rock, the roof being supported by brick arches. It holds 150,000 gallons, and is 530ft. above the sea-level. The work has been carried out under the superintendence of Mr. Pickering, the town surveyor.

At a meeting held at Callington, Cornwall, on Friday week, it was resolved to enlarge the church by a new aisle on the north side. Mr. J. D. Sedding, of Bloomsbury, London, is the architect.

The rural sanitary authority of Bakewell have adopted plans prepared by Messrs. Fowler and Son, of Sheffield, for supplying Tansley with water, at an estimated cost of £650.

A cabman's shelter is about to be erected at Chesterfield, from the designs of Messrs. Rollinson and Son, of that town.

A very useful kind of varnish is made known by Léon Vidal, which is excellent for producing imitation of ground-glass, and will doubtless be found available for other purposes. The formula is: Sandarac, 18 parts; mastic, 4 parts; ether, 200 parts; benzol, 80 to 100 parts.

The town council of Portsmouth considered last week a recommendation from the sanitary committee to rescind a resolution recently passed, by which £500 was offered as premium for the best scheme of drainage for the borough, but after discussion, the proposition to rescind was rejected.

The parish-church of Bolton-le-Sands was reopened after restoration on the 4th inst. The old north aisle and transept have been replaced by a new aisle, 16ft. wide and 15ft. high to wall-plate, and at the eastern end of this a new vestry has been built. The floor of nave has been lowered 18in., and the tower arch opened out, and a new font and oak pulpit erected. The old windows in nave have been replaced by traceried four-light windows, a new doorway and oak porch added, and it is re-seated with open benches of pitch-pine, accommodating 450 persons. The chancel is re-tiled and rearranged, and new oak choir-benches have been fixed. Messrs. Paley and Austin, of Lancaster, were the architects; the mason's work has been done by Mr. Byrnes, the joiner's work by Mr. Hatch, and the slating and plastering by Messrs. Hall and Son, all of Lancaster.

The members of the archaeological section of the Birmingham and Midland Institute have paid a two days' visit to Gloucester. They inspected Avening Church, Beverstone Castle and Church, Malmesbury Abbey, and the church and Roman remains at Cirencester.

Intercommunication.

QUESTIONS.

[6608].—**Examination for District Surveyors under Metropolitan Building Act.**—Will one who has passed the above examination kindly state the kind of questions you are expected to answer, and the best works to read up for the same?—B. G.

[6609].—**Vaulting.**—Will any experienced reader kindly tell me which is the correct way to ink in vaulting, whether by freehand, by centres, or by French curves, or how?—SANDWICH.

[6610].—**Ovens.**—Could any of your readers inform me of a good practical and inexpensive book on bake-ovens more particularly relating to the hot-air system?—G. F. B.

[6611].—**Measuring.**—Will any of your numerous correspondents kindly answer the following query?—In taking measurement of existing buildings, how to obtain inaccessible heights otherwise than by employing algebra?—C. E. M.

[6612].—**Laying Large Concrete Blocks.**—I would feel greatly obliged to any reader for any account or description of the appliances adopted in laying the large 350 ton blocks of concrete in the construction of some harbour works near Dublin a few years ago. The members of the British Association assembled in that city witnessed the operation of laying, I believe, one or more of those large blocks.—J. K.

[6613].—**Setting Pencil Sketches.**—This year I set my sketches with diluted milk and water, having done it before with impunity. I feared nothing, but since they have dried large spots, size of half a crown, have appeared, which are creamy and wet; although the surface looks greasy, yet it has not penetrated the paper yet. Will some reader give the benefit of his advice as to a cure?—TOAD IN A HOLE.

[6614].—**Chalk in Concrete.**—I am desired by my client to utilise some chalk in the composition of concrete for a party-wall (3ft. by 6ft. high), and I should be much assisted by the expression of some competent opinion on the matter. The ingredients proposed are chalk, ballast with sand (as it rises from the pit), and Portland cement. Could some of your experienced readers give me the benefit of their advice and the correct proportions? The wall would have little other than its own weight to carry, and is protected from the weather.—CHALK.

[6615].—**Deadening Sound in and Keeping Cool Temporary Buildings.**—Can any of your readers inform me what is the best means of deadening sound in a temporary building, and also keeping off the heat of the sun?—M. H.

[6616].—**Order for Additions or Deductions.**—Will any of your readers kindly inform me what is the usual form of order for additions to or deductions from a building contract? Is there any small work in which I can find information on that and kindred subjects?—B. H.

[6617].—**Carlisle Cathedral.**—Will someone be kind enough to give me the exact height from the ground to the centre of the dial of the clock on the tower of Carlisle Cathedral? Also, the diameter of the first or inner girth ring of the dial, the size of the hour numbers, and the diameter of the outer girth ring of the dial, and the length of each pointer.—JOE BLAIN, Carlisle.

[6618].—**Painting and Gilding.**—Living at some distance from a town, and desiring to do a little oil-painting, I should be glad if someone will kindly inform me the process and materials necessary to make a good drab paint. Or, perhaps you can name a book which will give me the information I require. I should also be glad to learn how to transfer gold-leaf to tissue-paper in the manner now adopted by painters.—LEXAURUS.

[6619].—**Carpentering.**—I intend making a studio easel, and before starting, should like a few hints as to choosing the mahogany, especially as regards the seasoning. Also, what is the best glue to get, and whether, in melting the glue, any water ought to be poured in with the glue as well as in the pot underneath?—AMATEUR CARPENTER.

[6620].—**Building.**—What thrust, applied at the top edge in the centre of a well-dried brick and mortar wall, is necessary to overturn it? What is the rule applicable to any dimensions?—OWENS.

REPLIES.

[6611].—**Canada.**—Referring to the query relative to the demand for architects in this Dominion, I may say—writing from Kansas City, United States—that I have recently made a holiday tour through Canada, and within the last two months have visited most of its principal cities. At Quebec, I think an English architect would find little demand for his services, for the population is fully as French as is that of St. Heller's, in Jersey. The French element is pretty strong at Montreal also, but proportionately speaking, not quite so much as it is at Quebec. An English assistant would find everything vexatiously different at home. The public buildings in Montreal are, or many of them, particularly fine, and offer scope for numerous architects. West of that the English predominate. Toronto contains some imposing buildings, quite equal to some of the best at home. Of course, I refer entirely to street architecture. Church work throughout the colony is very much behindhand, and, as for mansions, the name almost is unknown. From one end of Canada to the other I did not meet with a single residence that had pretensions to be defined as anything more important than a villa. Montreal and Toronto are the two principal cities, and after these Quebec, then follow Ottawa, Kingston, Hamilton, and London. They may be taken in that rotation. Montreal is about the size of Hull, or St. Sheffield; Toronto may be of Leicester; Quebec is as big as Plymouth; Ottawa, as Peterborough; Kingston, Hamilton, and London each

are about as large as Inverness or Bedford. Quebec is an old town, all the others are new, and in these towns are concentrated the colonial architects. They exist in about the same proportions as they are at home, whilst no Canadian seems very wealthy. I did not see in the whole of Canada a single beggar, or a person that appeared to be poverty-stricken. At the same time, the professions are rather "mixed up." I was talking to a house-painter one day in Toronto, who told me he had been a lawyer for some years, and before that a veterinary surgeon. Outside the cities above-mentioned, an architect would not have the last chance, without, at least, he brought a saw, an axe, a big hammer, a bag of tennypenny nails, and a strong arm with him. Then he would be able to design a rail fence and a "lumber" built barn and farmhouse, and, having made the necessary plans, might turn to and cut the material from the neighbouring wood, and erect the lot himself. No doubt, a pushing man, whether architect or anything else, stands a good chance in Canada, but he should be young and vigorous. Half-played-out folks do not seem to get on in the colonies. They too often lack application, pine for home, and somehow or other fall hopelessly in behind. I honestly admit, however, that I never expected to find such fine streets in Canada as one sees over and over again in its best cities.—HARRY HEMS.

[6613].—**Reservoir.**—Build the walls and bottom of Portland cement concrete and line the interior with Portland cement. Have three chambers, one of say 12ft. by 10ft. by 4ft. deep to be used as a filtering-chamber, and two others of half the size for storage-chambers, one of which can contain water when the other is cleaned out. The water will be let in at top of filtering-chamber, then pass through the filtering material of gravel, sand, and charcoal downwards, the bottom of this to communicate with both storage-chambers, one of which can be shut off when not needed, the two storage chambers should communicate with one another at top, that each might act as an overflow to the other if necessary. Pipes of anti-corrodo iron. For further particulars, read BUILDING NEWS, Nov. 19, 1875, p. 576; Feb. 11, 1881, p. 159; and answers to Nos. 6429 and 6433, in March 25 and April 1, 1881—HUGH McLACHLAN.

[6617].—**A Difficulty.**—"Swan" was not wise when he declined to let the architect see a priced bill of quantities before his tender was accepted. It is well known that when a priced bill of quantities has to be given up on the signing of a contract, it is for the purpose of allowing for extras and deductions, pro rata, on those prices, and a condition to this effect is generally to be found in the contract. Now since it is on extras that many contractors hope to make a profit, and further that extras are as a rule to be found on certain items, whilst other items in the bill are pretty sure not to be exceeded, it would be possible for the contractor to put a high price on the former and a low one on the latter, having ascertained beforehand that matters would be equalised on the total amount of contract; and if the architect may not examine the bill before accepting the tender to ascertain if such be the case, then it follows that the giving up of a priced bill of quantities might at once be laid aside. In many contracts it is often as important to know pro rata the cost of extras as to know the amount of accepted tender. If the contractor has priced his bill fairly, I can see no reason why he should object to the architect seeing his prices.—HUGH McLACHLAN.

[6622].—**Diagrams.**—It is never advisable to have any folds in lecture diagrams, these should always be carried about in rolls. Cartridge paper mounted on union is perhaps the cheapest for the purpose, it can be had up to 35in. wide, and would have to be mounted to order. Whatman's paper can be bought ready mounted, 26, 33, and 52 inches wide, it is more expensive than the last but is much superior for colouring on though it has the objection of overlapping joints, the paper not being like the others continuous. A useful paper divided into inch squares and again subdivided to various scales may be had of Messrs. Bemrose and Sons, Old Bailey, London; it may be had mounted and is continuous and of German manufacture. Messrs. Lettis and Co. I believe manufacture something similar if not as good. The outlines should be drawn with a sable pencil and not with pen, the latter making too fine a line; the pencil or brush should even be boldly used, the line to be from 1-16 to 1-8 of an inch wide, and drawn with dull black Indian ink not thick enough to run. Colours as usual, but boldly laid on and of a deeper colour than for ordinary drawings.—HUGH McLACHLAN.

[6623].—**Damp Wall.**—The simplest and perhaps the best plan for "Librarian" to adopt, is to hack off the plaster at back of book-case during the dry season, replace by a layer of Portland cement about half an inch thick of one of cement to 1 of river or well-washed pit-sand. This when nearly dry might be finished with a coat of fine stuff and treated like the remainder of the plastering, or the cement worked to a smooth face and painted in oils the following year.—HUGH McLACHLAN.

[6624].—**Ventilating Drains and Cesspool.**—Neither plan would properly ventilate the cesspool, since both allow a large accumulation of foul gases to generate and remain between the surface of the deposit in cesspool and its cover. Both plans cut off the access of those gases from the house, but that recommended by the by-laws is superior. A ventilating shaft should certainly be run up the wall of the house above the eaves and roof or dormers where there are any and finished with one of Boyie's air-pump ventilators for soil-pipes, the shaft for a cesspool should be at least 4in. diameter. The position of air-chamber recommended by the surveyor is bad, since being so close to the house it would be possible for the escaping gases to enter by the nearest window, if any is to be found on the same side of wall, still unless very large, little gas would be able to escape without some other opening. The nearer the air-chamber is situated to the cesspool the better. To ventilate the cesspool itself, a shaft of large size should be built over its covering, reaching up from the ground at least seven feet, that the gas might escape above the level of the heads of those passing near. For drain-pipes up to 9in. diameter I consider a 4in. ventilating shaft is sufficient, though a 2in. one is too small for a 6in. drain. A surveyor cannot compel you to do anything at variance to plans of writings passed by the Board, he being only a servant of that body and responsible to them alone. Would "Country Subscri-

ber" oblige by naming the "rural sanitary board" that is so well advanced in sanitary matters?—HUGH Mc LACHLAN.

[6581].—**Timber Building Construction.**—Use a king post trussed roof with six trusses. For walls, braced timber framing six thick, tied together with iron rods. Feather-edged weather boarding will keep out the rain more effectively than vertical boarding, and is more sightly in appearance. It can be laid its way through towards the bottom of the vertical boarding, settle till it dries out, and cause the lower inside edges to rot.—HUGH Mc LACHLAN.

[6582].—**A Local Board Difficulty.**—According to the "Towns Improvement Clauses Act, 1847," the said authorities are acting strictly within their limits and I do not believe your correspondent would succeed in attempting to compel them to act as he would wish. The clauses which I believe justify the authorities read as follows:—"No house or building within the limits of the special Act shall be built upon a lower level than will allow of the drainage of the wash and refuse of such house or building into some sewer belonging to the Commissioners then existing." The same Act also requires notice of any intention to build or rebuild "with a plan showing the level at which the foundations of such house is proposed to be laid," and further, "within fourteen days after receiving such notice the Commissioners may signify their disapproval of the level at which it is proposed to lay the foundation of any such house, and in case of such disapproval may within the said fourteen days fix the level at which the same is to be laid, subject to such right of appeal as is hereinafter mentioned." "The special act" includes "any Act which shall be hereafter passed for the improvement or regulation of any town or district, or of any class of towns or districts defined or comprised therein, and with which this Act shall be incorporated." This information I have taken from Jenkins' and Raymond's "Legal Handbook for Architects." I can see nothing explaining to whom or how appeal can be made. It is better to give way, nor it would be unreasonable to expect the sewers to be altered for one only, and I agree with the authorities that the lowest floor should be drained; it must be washed at times, and if the water used for that purpose were not carried off by a drain, it would soak through the joints and paving, thereby damaging them.—HUGH Mc LACHLAN.

[6584].—**Party Wall.**—The method indicated in the question is the one to be resorted to in that area in which the "Metropolitan Building Act" is in force. Outside this area the law acts in different ways according to the question whether the ownership of the wall is divided or common. In Scotland there may be further variations of which I am ignorant. A very good explanatory reply on the subject appeared in the BUILDING NEWS, "Inter-communication," No. 5414, May 18, 1877.—HUGH Mc LACHLAN.

[6587].—**Plunge-Bath.**—Portland cement concrete is as good a material as any for building the walls and floor of a salt-water plunge-bath. Clay puddling would then be unnecessary. Brickwork in cement with glazed brick or tile lining has a better appearance, the water looking fresher and clearer; it is more expensive and would require puddling. Sections have been illustrated in the BUILDING NEWS—viz., Camden Turkish Baths, Nov. 29, 1878; and Chelsea Swimming Baths, June 29, 1877.—HUGH Mc LACHLAN.

[6588].—**Measuring Paintwork to Windows.**—Since all the books give the method indicated, they show there is such a custom; this, however, applies to the inside only. For the outside, numbering is resorted to, frames and sashes separately, squares at per dozen. It seems rather illogical that two methods should be applied for what is really the same thing. Some number both inside and out, which appears more sensible. "Paint" should, however, remember that the greatest expense in painting is the labour and not the materials, and that many a painter would prefer to cover a much larger surface for the same money to cutting down a few angles and edges. This question has cropped up in "Inter-communication" several times before.—HUGH Mc LACHLAN.

[6589].—**Sashes and Frames.**—I believe there is no standard size, nor can I find mention of it in Loxton or Hurst. Also in discussing a bill with the builder he has not urged it, though he has urged the larger amount of work in proportion to their size, for which allowance should certainly be made. There might well be two prices per foot-super for sashes and frames, say, for those under 15 square ft. and those over that dimension. It is a very difficult matter to price fairly in small work or alterations, and if the builder is reasonable much credit should be given to his word.—HUGH Mc LACHLAN.

[6590].—**Oak and Pitch Pine.**—In the case mentioned by correspondent nothing can beat paint. The grain of oak may be exhibited by rubbing in a mixture of turpentine, oil, and turpentine. I do not think it advisable to use pitch-pine externally. For internal work paint is decidedly ornamental.—HUGH Mc LACHLAN.

[6591].—**Cracks in Concrete Walls.**—These are said to be caused by expansion and contraction resulting from temperature in the case of long low walls. Examples may be seen of concrete walls between Earl's Court and West Kensington, on the District Railway a few years ago. Sometimes they are caused by the lime in the concrete not having been thoroughly slaked before being used. Or as mentioned by correspondent of cracks.—HUGH Mc LACHLAN.

[6592].—**Cistern.**—Deduct all angles and use three iron rods a foot apart, with a depth of two-thirds down, with nut and washer; let two of these be near the sides to strengthen the angles, and the third in the centre of its length. Polished iron cisterns would be better.—HUGH Mc LACHLAN.

[6593].—**Gas Tar Asphalt.**—In answer to the subject by "G. H. G." in question 355 in BUILDING NEWS, June 4, 1875.—HUGH Mc LACHLAN.

[6597].—**London Bridges.**—Most probably in the "Proceedings of the Institute of Civil Engineers," about the dates in which these works were carried out.—HUGH Mc LACHLAN.

[6598].—**Royal Engineers.**—Your correspondent "J. C." does not say whether it is of the officers of Royal Engineers or the ranks that he is anxious to know the duties, advantages, &c., of. I do not think the information would be of any interest to the general class of your readers, but if he will communicate with me direct I will gladly give him any information he requires.—F. W. E., 3, Lawn-terrace, Herbert-road, Plumstead, S.E.

CHIPS

The fine parish-church of North Walsham was reopened on Wednesday week, after the partial restoration of nave, including reconstruction of its roof. Mr. J. Bond Pearce, F.R.I.B.A., of Norwich, was the architect, and the contractors were Messrs. Cornish and Gaymer, of North Walsham. The cost has been about £2,210.

A drinking-fountain is about to be erected at Whitechurch, Salop, at the expense of Mr. Churton, of Rhyl, who has offered the local board £350 towards the cost of removing some old houses opposite the intended site. The design has been prepared by Mr. John Douglas, of Chester.

The Alexandra Hall, at Blackheath, is about to be rebuilt from the plans of Mr. Saville Tucker, and on a fresh site.

The parish-church of St. Mary Magdalen, at South Bersted, near Bognor, was reopened, after restoration, on Wednesday week by the Bishop of Chichester. The dormer windows, high pews, and galleries, have been swept away; a roof of open timber replaces the low plaster ceiling; the windows have been restored in accordance with the date of the edifice (1405); and the internal stonework has been cleansed from whitewash. Mr. Ewan Christian, of Whitehall, was the architect, and Mr. W. Pratt, the builder.

The town council of Hereford, at their quarterly meeting last week, adopted a scheme prepared by Mr. Samuel Harpur, C.E., of Merthyr Tydfil, for a scheme of sewerage on the separate system, the sewage to be utilised on a farm at Litley.

The Eltham local authority have elected Mr. Jeffrey Bennett, for six and a half years assistant surveyor to the local board of Tuahridge Wells, as their surveyor from amongst 29 candidates. The salary is £150 per annum.

The Dublin Artisans' Dwellings Company have this week been handed over by their contractor, the last of a series of houses for the working classes, known as Kirwan-street and Kirwan's-cottages. The largest block consist of 41 separate two-story dwellings, of four rooms each, the rent charged being 1s. 6d. per week. The medium cottages are each planned as a living-room, with kitchen range, two bedrooms, covered scullery, having Varry water laid on, and concreted back-yard, the rent charged being 4s. per week. The third range of cottages consist of 36 dwellings, with two large rooms in each, and these are let at 3s. 6d. per week. The erection of these dwellings is said to have supplied an urgent want in Dublin.

A new pavilion, accommodating 1,500 persons, was opened last week on the South Parade Pier, Southsea. The framework is wood and the roof of iron. Mr. G. Rake is the architect, and Mr. W. Ward, of Southsea, the builder.

The town council of Cheltenham have resolved to call in Mr. J. F. Bateman, C.E., to advise them as to the best means of increasing the water supply.

The foundation-stone of a new Mission Chapel-of-Ease was laid at Leedstown, West Cornwall, on Tuesday week. Mr. J. Piers St. Aubyn, of London, is the architect, Messrs. Carah and Edwards are the builders, and the cost will be about £500.

The Uxbridge Bench of Magistrates on Tuesday directed a bill of indictment to be preferred against Sir Charles Mills for the non-repair of certain roads on his estate at Ruislip, near Uxbridge. The case was brought by the Ruislip parish authorities. The counsel for the defendant argued that there had not been *prima facie* evidence shown that his client was liable. The roads were stated to be in a dangerous state, not having been repaired since 1873.

The parish-church of Llangood, near Beaumaris, which has been rebuilt from the designs of Mr. Kennedy, architect, Bangor, was reopened on Tuesday. Mr. W. Roberts was the contractor.

Foundation-stones of a new Wesleyan chapel at Walsall, Notts, were laid last Wednesday. The designs have been prepared by Mr. Arthur Marshall, architect, Nottingham.

A new organ, by Messrs. Sweetland, of Bristol, is being erected in the church of St. Erth, West Cornwall.

A Caen stone font, with marble columns, has recently been placed in St. George's Church, Newcastle, Staffs. It is the work of Messrs. Jones and Wallis, of Birmingham and London.

PARLIAMENTARY NOTES.

THE PLANE-TREE AT THE SOUTH KENSINGTON MUSEUM.—Mr. M. Henry asked the First Commissioner of Works on Friday last whether there was any intention to cut down the beautiful plane-tree which stands opposite the old entrance to the South Kensington Museum.—Mr. S. Lefevre: There is no such intention that I am aware of; but I have given directions that the tree shall not be subject to any maltreatment. I may observe, however, that if the plans for the extension of South Kensington Museum decided upon in 1876 be carried out, and if a frontage be added to the building erected there, it is difficult to see how the tree can be preserved. But at the rate at which money is being voted for the South Kensington Museum I think the tree will be safe for many years.

ANCIENT MONUMENTS.—Sir J. Lubbock asked the First Lord of the Treasury whether he proposed to take any, and if so, what, steps to provide for the better preservation of ancient monuments, in accordance with the resolution of the House on the 11th of March.—Mr. Gladstone said that any plan submitted to the Government with regard to the preservation of ancient monuments would be carefully considered, but none had been submitted. He must say, however, that he was not in a condition, nor did he know when he would be, to give his hon. friend the satisfaction he desired. But he hoped that some plan would be brought under the notice of the Government to which they might be able to give careful attention.

PROVINCIAL ART AND INDUSTRIAL MUSEUMS.—On Monday Mr. Collings moved as an amendment to the motion that the Speaker leave the chair, a resolution in favour of establishing art and industrial museums in the large provincial towns; and Mr. Slagg, who seconded the motion, advocated a system by which the works of art in our galleries might be reproduced and circulated through the provincial museums.—Mr. Eeroyd supported the motion, not only on account of the benefits it would confer on the industries of the country, but for the civilising and humanising influence it would exercise on the population of the country.—Mr. Cairne, Mr. Wiggins, Mr. Anderson, Mr. Guest, Mr. Storey Maskelyne, and Sir J. Lubbock spoke, and Mr. Mundella, in reply, contended, with regard to South Kensington, for which alone he was responsible, that it existed far more for the provinces than for the metropolis, and recounted in detail the steps taken by the department in the way of grants in aid to local schools, the loan of collections, &c., for the promotion of science and art in the provinces. A division was taken, and the motion was negatived by 85 to 48.

LONDON FIRES.—Mr. Firth on Monday asked the Secretary of State for the Home Department whether his attention had been called to the fact that on July 21 a fire broke out in Ludbrooke-grove-road, Notting-hill, but that no water could be obtained from the water company's main; whether it was the fact that in case of a London fire it was necessary to invoke five separate authorities having no unity of action:—(1) The police, controlled by the Home Secretary; (2) the water companies; (3) the Salvage Corps, controlled by the insurance companies; (4) the Fire Brigade, controlled by the Metropolitan Board of Works; and (5) the streets, controlled by the Vestries; and if he would consider whether those authorities might not be amalgamated for the purpose of fire-extinction.—Sir W. Harcourt had seen a report on the subject, from which it appeared, not that there was a scarcity of water, but that it was not at high pressure, owing to an accident to the main. With reference to the second part of the question, he had to say that the police were not directly concerned in extinguishing fires, having merely to keep order; that the Salvage Corps was employed in the private interests of the insurance companies; while the Vestries were not concerned at all. When the question came to be determined on when the duty of supplying water to the metropolis should devolve, it would certainly become necessary to consider whether the Fire Brigade should not also be placed under the same control as the water service.

The new banking premises of Messrs. Rowd, Green, and Co., in High-street, Colchester, were opened on Thursday week. The building is very lofty, and is Elizabethan in style. The whole of the chief facade, with the exception of the plinth, which is of granite, is of Westwood stone, carved and moulded in the principal features. In the basement are strong-rooms, built in brick and cement, with hoop-iron ties to every course, and over the bank are the manager's rooms, shut off by an 18in. layer of concrete between the girders and an iron door. Mr. Ernest C. Lee, F.R.I.B.A., of Great James-street, Bedford-row, W.C., is the architect, and Messrs. Saunders and Son, of Dedham, have been the builders. The bank was illustrated by a perspective drawing in the BUILDING NEWS for April 11, 1879.

LEGAL INTELLIGENCE.

DISQUALIFICATION OF CONTRACTORS AS MEMBERS OF LOCAL BOARDS.—**FLETCHER v. HUDSON.**—This appeal was heard at Westminster on the 28th of last month, before Lords Justices Bramwell, Brett, and Cotton, when judgment was reserved. The decision of the Court was given on Friday last. The case raised the question whether, if a member did an act—as taking a contract with his board—which was declared to vacate his seat, he was also liable to a penalty imposed on a member acting when disabled from acting. The action was brought against a member of the local board of Grassmere, in Westmoreland, to recover from him a penalty of £50 for acting as member when disabled by such a contract. There were several contracts between the member sued and the Board for work to be done by him in carting materials for roads, the contracts extending from March, 1877, to March, 1878, under which payment was made to him on March 6, 1879, and on that day he sat and voted as a member of the Board. He was sued at the Assizes at Appleby for the penalty, and at the trial the Judge (Mr. Justice Stephen) held him liable.—The defendant appealed from that decision.—Sir J. Holker, Q.C., and Mr. Crompton, for the defendant, the appellant, argued that he was only temporarily “disabled” during the continuance of the contract, and not afterwards, or at the time he sat and voted; that he was not disqualified, though his office was vacated, for he might be reinstated; and therefore was not liable to the penalty, not being “disabled” when he sat and voted, though, as his seat was vacated, he was not a member. The Statute contemplated the case of a member disabled from acting while still remaining a member, whereas here he had ceased to be a member, and was a mere stranger.—Mr. Charles, Q.C., and Mr. Addison, Q.C., for the plaintiff, contended that the action was maintainable, and that there never was a case more clearly within the mischief met by the Act, and that it would be a strange construction of the Act to hold the case was not within it.—Lord Justice Brett was of opinion that the judgment of the Court below must be upheld. He regretted extremely to have to say that the plaintiff was entitled to succeed in an action which he considered ought never to have been brought.—Lord Justice Cotton concurred.—Lord Justice Bramwell, whose judgment was in writing, differed.—If the Statute had said that any member of a board becoming a party to a contract with it should be liable to a penalty and vacate his seat, he could understand it. But he could not see why, if no penalty attached to the entering into a contract except the loss of the seat, there should be a penalty for acting without re-election any more than if the party had never been re-elected. The truth was, it was difficult to apply the principle of the Statute to a trifling case like this. He could not see any reason for implying a penalty applicable to such a case as the present—viz., a case where a non-member acted.—The majority of the Court being in favour of the plaintiff's contention, the appeal was dismissed.

BRIDGE-BUILDING DISPUTE.—At the Cheshire Summer Assizes, on Wednesday week, before Baron Pollock and a special jury, the action of Henry Barber v. Evan Williams and Others was tried. The plaintiff is the clerk of the peace for Carnarvonshire, and brought the action as representing the County against Mr. Evan Williams, contractor, of Bangor city, for damages caused by the fall of a newly-constructed bridge erected by him over the river Ogden at Taly-bont. The bridge in question was one which carried the turnpike from Chester to Holyhead, and in August, 1879, the old bridge was destroyed by floods. Defendants took a contract to erect a bridge in its stead, which had since given way, and the action was to recover damages from them on that account. The evidence was conflicting as to the causes which led to the breaking down of the bridge, and the jury not agreeing, they had to be discharged without coming to a verdict. The case was referred to the official referee, or, unless the parties agree to a verdict before the 2nd of November, to a special referee.

THE BUILDING ACT.—Mr. Charles Lavender, of The Ferns, Wimbledon, was summoned at Worship-street, 3rd August, for expenses incurred under the 47th section of the Building Act. The complainant was Mr. Meeson, district surveyor for East Hackney, North. It appeared that the premises in question were erected or begun by a builder named Parker for a merchant named Middleton. Mr. Meeson surveyed the premises from time to time, but in consequence of irregularities, and their being erected contrary to the demands of the Act, he served notices on the builder to amend them. The work not being done as required, summonses and various processes followed, fines being inflicted for non-compliance. Orders were obtained for the requisite work to be done, and after a certain lapse of time, the work not being done in the interim, the surveyor, in accordance with the Act, put the matter into the hands of a builder to see the works carried out as

required by the Act. Thereby he incurred expenses amounting to £124 4s. 10d.; his own fees, travelling expenses, &c., a further sum of £29 11s. 6d.; and a sum of £5 5s. was charged as solicitor's costs for advising him as to his position under the Act, the total, £159 1s. 4d., being sought to be recovered by these proceedings. The question raised by Mr. Mugliston was whether the right person had been summoned. The complainant proved that Mr. Lavender was trustee of Middleton's Estate under the bankruptcy of the latter, and it was argued that he was therefore the “owner” of the premises within the meaning of the Act. The magistrate (Mr. Barstow) decided that he had no power to make an order on the trustee in bankruptcy, and thought there had been a want of diligence on the part of the surveyor, who might earlier have sued Middleton. A summons previously taken out against the freeholder (Mr. Button) for these expenses had also been dismissed, Mr. Hosick considering he was not owner within the meaning of the Act.

THREATENING BUILDERS.—At Westminster, on Tuesday, John Davis, 64, labourer, of 31, Romney-street, Westminster, was charged before Mr. Partridge with demanding money with menaces from Mr. David Walker, at Johnson-street, Westminster. Mr. Walker, manager to the prosecutors, Messrs. M'Lachlan and Sons, builders, of Johnson-street, Westminster, said that morning the prisoner, who was a stranger to him, came to the office and asked to see one of the firm. He gave no name, and on being asked what his business was, he said he wanted to see Mr. M'Lachlan about the concrete work at the British Museum. It was not “put in” as specified, and unless it was made worth his while it would have to be taken out again. The prisoner also said that it would cost the firm £50 to take it up and alter it. The witness asked him who he was, and whether he had been working on the job. The prisoner said he had not, he was a Government Inspector, and had access to the place, and had been there eight or nine times. The witness asked him what he expected, and the prisoner said, “I will leave that to you; give me something and you shall hear no more about it.” In reply to a question from the witness as to what Governmental Department he represented, the prisoner said he came from Woolwich. In reply to the magistrate the witness said the firm were building a new gallery at the British Museum, and a great part of the site was concreted. The prisoner denied that he made any demand for money. Instead of the builders using concrete at the Museum, they had used old brick-rubbish, and covered it over with a thin layer of concrete. The contract stated that they should put in a layer of 7½ ft. of good concrete, but in some places they had not covered the old bricks and rubbish with more than 4 in. It was a disgraceful piece of work and ought to be looked into. Mr. Partridge remanded the prisoner, consenting to accept bail—one surety in £20.

ALLEGED NEGLIGENCE OF A CONTRACTOR.—At the Warwick Assizes, on Wednesday, before Mr. Justice Watkin Williams, a case was heard in which a Walsall saddler, named Gough, brought an action against Mr. Evans, contractor, to recover £450 compensation for personal injuries, and £86 16s. 6d. damage to goods, by reason of the negligence of the defendant in carrying out his contract. In the early part of last year, defendant was engaged in carrying out certain works on the railway near plaintiff's house, and, for the purpose of excavating the ground, it was necessary to fire charges of dynamite. The charges were fired constantly during the night, and the violent explosions which took place affected Mrs. Gough's health, and she was compelled to leave home, and seek change of air and scene for a month. Plaintiff alleged that by reason of the defendant manufacturing mortar near his house his stock-in-trade was damaged to the extent of £86 odd. Defendant paid £25 into Court, and the jury gave a verdict for £75.

STAINED GLASS.

MAIDSTONE.—The work of restoring the windows in All Saints' Church, damaged by the fatal boiler explosion in the road opposite, on the 3rd December last, has now been completed. The task was carried out by M. J. B. Capronnier, of Brussels, so far as the large east window was concerned, the work of repairing the three other coloured windows which were damaged being intrusted to Messrs. Wailes and Strang, of Newcastle-on-Tyne.

WOLVERHAMPTON.—A meeting of the Henry Rogers Memorial Fund Committee was held on Wednesday week, at the town-hall, Wolverhampton, to select designs for a stained-glass window to be placed in Heath Town Church. Designs and estimates were received from Mr. S. Evans and from Messrs. Camm, Brothers, both of West Smethwick, who had been selected for the final competition. The plans of Mr. Evans were unanimously chosen, and the work has since been put into Mr. Evans' hands.

WATER SUPPLY AND SANITARY MATTERS.

CLACTON-ON-SEA.—Works of water-supply, constructed by a private company, were formally inaugurated at this rising Essex watering-place on Tuesday week. The well is sunk to a depth of 120ft., below which a further boring of 25ft. is made into the chalk, and the water is pronounced by analysis to be of good quality. It is pumped up to, and stored in a tank reservoir, having a capacity of 30,000 gallons, and constructed of wrought iron. This is carried by wrought-iron girders upon a water-tower, which is built of red brick with Bath-stone dressings, and has a flag turret at one angle; the square of the tower is 27ft., and the total height 10½ ft. Mr. Jabez Church, M.Inst.C.E., F.G.S., has been engineer-in-chief, and the work has been carried out under the supervision of Mr. H. Caldicott, C.E. Messrs. Saunders and Sons, of Dedham, Essex, were the builders; Messrs. H. Young and Co., of Pimlico, supplied the machinery, boiler, and all ironwork; and Mr. Tilley, of Walbrook, E.C., excavated the well and boring.

CHIPS.

An adjourned inquest took place at Hull, on Friday, on a woman named Oliver, who was killed on the 4th ult. by the fall of a chimney in Gibson-street. Robert Wilkinson said he was a joiner, and prepared the plans and specifications for building the chimney which caused the accident for Messrs. Thacker, by whom he was employed as “architect.” The foundations were of concrete, but he did not measure them nor see them put in, depending on the contractor's word that they were of more than specified thickness. Alterations were afterwards made by Mr. Thomas Thacker, upon which witness exercised no further control over the work. The contractor, George Sergeant, deposed that he was ordered to remove some of the concrete by Mr. Thacker, and at first declined to do so, but ultimately complied, and he now attributed the fall of the chimney to the alteration. Several witnesses, including an assistant to the borough engineer, having deposed that the workmanship of the chimney and the materials were good, William Thompson, architect, said the chimney fell because it was placed on one corner of concrete, the insufficiency in thickness and bad quality of concrete, and bad arrangement of footings. The jury appended to their verdict of accidental death a rider that it was due to the fall of a chimney through insufficient foundation and the interference of Mr. T. Thacker.

The Chew Magea School Board have appointed Mr. E. Henry Edwards, of Bristol, architect for their new schools.

A new flour-mill has just been completed at St. Austell, East Cornwall, for Mr. Hitchens. It is built of local dressed granite, is five stories high, and covers an area of 70ft. by 40ft. There are eight pairs of stones, driven by Macadam's patent turbine. The building contract has been carried out by Messrs. Harvey and Saunders, and by Mr. Ede, all of St. Austell, and the milling work by Mr. Fisher. The workmen engaged in erecting and fitting the premises were entertained at supper by the proprietor on Thursday week.

A new Board-school at Barnardstown, Newport, Mon., was opened on Monday. It is Gothic in style, and is built of Pennant stone, with brick and Bath dressings, and consists of mixed and infants' departments and teacher's house. Mr. H. A. Goodman, of High-street, Newport, was the architect, and Mr. George Morgan, of Maundee, the builder; the cost of erection has been £2,100.

Berechurch Hall, near Colchester, is being reconstructed from the designs and under the superintendence of Mr. Ernest C. Lee, of London.

Mr. Selim Rothwell, a well-known Manchester artist, died suddenly in a Bolton tramcar on Wednesday night.

At a recent meeting, the life trustees of Sir John Soanes' Museum, 13, Lincoln's Inn-fields, elected as their colleague (in the terms of the Act of Parliament), Mr. George Godwin, F.R.S., F.R.I.B.A., to fill up the vacancy caused by the recent death of their late much-lamented co-trustee, Mr. Frederic Ouvry.

The local board of Torquay have received no fewer than 169 applications for the vacant surveyorship. A committee is at work wading through the voluminous testimonials.

Messrs. Clark, Bennett, and Co., Limited, we understand, have received instructions to fix their patent safety lifts to the Aston Public Library, Birmingham, and the St. Paul's Institute, Burton-on-Trent; they are also fixing their lifts to the National Hospital, Soho-street, and the Paralyzed and Epileptic Hospital, Powis-place, Great Ormond-street, Bloomsbury.

Our Office Table.

THE 36th half-yearly general meeting of the Improved Industrial Dwellings Company (Limited) was held on Friday. The capital expended up to the present time is £729,712. The gross revenue for the half-year has been £32,318, and there is a divisible profit of £12,451. The revenue would have been £1,000 more but for the interest payable on the capital invested in buildings not yet brought into occupation. Losses from empty tenements have been large, but not so large as in the previous half-year—£2,491 against £2,987. The whole charge of the buildings is placed against the revenue. The average death-rate in the buildings has been greatly below the general average.

SOME time since we described the method devised by Mr. A. C. Engert for destroying the echoes too frequently met with in public buildings. We then recorded the successful application of the system to the Chemical Lecture Theatre at the Science Schools, South Kensington. We have just heard of its successful application to the Chapel of Keble College, Oxford, the acoustic properties of which were very bad. In Keble College Chapel steel wires alone are used. The chapel is about 125ft. long, by about 40ft. wide and 60ft. high. It was noted for its loud and strong return-waves, producing an echo of from 6 to 15 seconds' duration. Most satisfactory results have been obtained by the use of Mr. Engert's apparatus. Every word spoken from the pulpit and properly articulated may now be distinctly heard, even when the chapel is empty.

THE Belgian Contractors' Congress, which was originated and organised by the *Chambre Syndicale des Entrepreneurs de Liège*, opened on the 24th ult. Few foreign contractors were present. The programme for discussion was very full, too full: many of the subjects were not touched upon at all. The question which received the greatest amount of consideration was the respective advantages and disadvantages of contracting at a fixed price for the whole work, or on a specified scale of charges. Although no absolute opinion was expressed, it is evident that the general feeling was in favour of tendering a lump-sum. Another point which was discussed was the form in which security should be given by the contractor for the fulfilment of his undertaking. On the Continent it is usual that a cash deposit should be made; and in addition, a certain proportion (sometimes as much as 10 per cent.) is deducted from each payment, as additional security, until the completion of the work. The congress came to the conclusion that personal security should be entirely abolished, that a deposit of 5 per cent. on the total amount of the contract should be made in cash, approved securities, bonds, &c., and 5 per cent. of each payment retained. In connection with the congress an exhibition was held at the Longloz Railway Station. Several English firms were represented, but by far the greater number of exhibits were Belgian.

A MATERIAL, called *carbolineum*, is being largely used in Germany, and to some extent in this country, as a preservative of woodwork, ropes, &c. It is an oil, apparently a petroleum, containing, among other things, about 10 per cent. of carbolic acid and other antiseptic ingredients, and being nearly as liquid as water, is easily applied. It sinks into the wood, and hardens it to some extent, but does not close the pores. It seems to be very effective as a preservative of wood for outdoor use, for wood buried in the ground as posts, or wood constantly wet, or wetted and dried. It is much used on German railways for sleepers, sheds, bridges, and fences, and would be useful to farmers for preserving the woodwork of agricultural implements, among other things.

A JOINT deputation from the Society of Medical Officers of Health and the British Medical Association has been bringing under the notice of the President of the Local Government Board what appears to us to be a very objectionable feature of the conditions on which certain medical officers of health in the provinces hold their appointment. In boroughs where a medical officer's appointment is permanent, the objection does not apply. But there are many districts in the provinces where the appointment is not permanent, and where the person holding the post

has to seek re-election at stated intervals. This gives rise to more than one serious evil. In the first place, the insecurity of the appointment deters many good men from accepting it, especially as it necessitates the surrender of private practice. In the next place, it has a tendency to destroy the independence of the medical officer, who is not likely to render himself disagreeable to persons who may be able to control his re-election. Mr. Dodson, though not wedded to the existing system, is not inclined to make any immediate alteration. He is evidently looking forward to the establishment of county boards as an effective way of dealing with many matters that are now left to the Local Government Board. For the present, therefore, the evils pointed out by the deputation must remain unredressed.

WE have received the following official statement with respect to the National Art Competition, South Kensington.—“The annual exhibition of the works entered for this competition will remain open to the public to the end of September in the Central-hall (first story) of the galleries on the south of the Royal Horticultural Society's Gardens, the entrance to which is on the west side of the Exhibition-road, South Kensington. The free days are Mondays, Tuesdays, and Saturdays. The exhibition this year consists of about 450 works, selected from 190,615 works sent up from 157 schools of art throughout the kingdom, for the annual examination at South Kensington. The subjects of the competition are figure-drawing and modelling, painting in oil and water-colours, and design especially as applied to manufactures. The prizes awarded are 13 gold medals, 52 silver medals, 116 bronze medals, and 179 prizes of books. The Princess of Wales's Scholarships are awarded to the two female students who take the highest prizes of the year in the national competition. Besides these distinctions, which are awarded by the Science and Art Department, prizes are given annually, in connection with the national competition, for specified subjects of design; by the Plasterers' Company for designs for plasterers' work, drawn in monochrome or modelled in plaster. The Owen Jones Memorial prizes are given by the Society of Arts.”

A MEETING was held at the hall of the Society of Arts on Monday night, under the presidency of the Earl of Rosebery, with the object of obtaining increased public support for the Trades' Guild of Learning, and reorganising it on a larger basis. Mr. Blanchard Jerrold suggested that it would be well if a statement of the method of French technical education were made out for the advantage of English working men and women. Professor Warr traced the work of the Guild, which had comprised several series of lectures; and it was now hoped that there would be formed a special Committee for industrial teaching; and that the Trade Unions would co-operate in supplying the machinery for technical education. Mr. T. Burt, M.P., proposed the following Resolution:—“That this meeting approves and pledges itself to support the objects proposed by the Trades' Guild of Learning, viz.: (1) To provide lectures on the history and principles of various industries, with a view to encourage the desire for improved technical education; and (2) to continue the general education which the Guild has carried on for some time by means of lectures and classes.” The resolution was seconded and carried. Another resolution, affirming that the trade societies should be asked to co-operate in organising the proposed lectures and classes, and asking the large employers of skilled labour in London to give the project their support, was agreed to.

ONCE again correspondents of the daily papers are calling attention to the condition of the well-known Water-gate—the work of Inigo Jones, and the only remaining portion of the magnificent abode of Villiers Duke of Buckingham. In contrast to the order and neatness which prevail in all its surroundings, this interesting monument of the past is left to become the receptacle, beneath its arches, for accumulations of rubbish, disgusting and disgraceful, and, besides being locked within a railing, is utterly uncleaned for. Much of the lower portion of the structure, which ought to appear above ground, is half-buried in the adjacent soil. All this must be owing to the fact of its guardianship being under the control of some authority other than that which is exerted

in keeping the adjoining turf, flower-beds, and borders in most exemplary order. Can anyone tell on whom the blame rests?

At the Kidderminster Town Council, on Wednesday, a discussion took place with reference to the recommendation of the Improvement Committee that Mr. E. Guest, the collector, who had lately commenced business as a valuer, should be asked to give up that profession, and that in the event of his declining, notice should be given him. It was contended by some members that Mr. Guest should be allowed to do work beyond that connected with the collection of the rates, and it was pointed out that the town clerk was not compelled to devote the whole of his time to the duties of the office. Ultimately the Council, by ten votes to seven, adopted the committee's recommendation.

IN the course of some quarry operations last year, in the neighbourhood of Beauvais, a large number of ancient-looking sculptures (comprising arms and various objects) were discovered. A committee of local archaeologists was appointed to collect and examine them. This committee did its work with great care, and one of its members lately presented a report to the *Société d'Anthropologie* with drawings and a selection of the finest pieces. There were over 1,000 objects, hatchets, knives, scrapers, arrow-heads, &c., and of unusual beauty. The enthusiasm aroused, however, was not universal, and certain skilled specialists expressed doubts, rousing natural indignation in the honourable archaeologist from Beauvais, who defended his treasure, and asked for a committee of the Society to go to the spot and judge for themselves. M. de Mortillet presided over this committee. Some new objects were discovered, but a better result of the committee's investigations was the finding of the man who had manufactured the whole, and who was by no means “prehistoric!” It was a certain sugar-refiner, Polydore by name, who employed his leisure in fabrication of those arms and utensils, part of which he seems to have put in the way of discovery by archaeologists, and part disposed of commercially!

THE recent experiments made in some of our large towns with the view of improving the quality of gaslight is a step in the right direction. Gas manufacture presents so many phases and separate operations that the struggle to produce the best gas in the most abundant manner, combined with economical working, is a very complicated one. The selection of a suitable coal is one of the most important features of the operation, and on this point we get some useful hints in a pamphlet from the pen of Mr. James Paterson, C.E., of the Warrington Gasworks, which has just been reprinted. The temperature of distillation is also one of the important points. As a general rule, the greater the amount of gas that is driven off, the poorer the quality of the gas will be; and it can be imagined that the struggle between the desire to obtain a good yield by increasing the temperature of the retorts, and the wish to obtain also a gas of good quality, is one that is often fatal to the consumer getting gas of a high illuminating power. Imperfect purification and too high pressure also act in a manner prejudicial to the consumer and to the advantage of the producer. One of the most common sources of bad light is the use of inferior burners, and a little attention and expense in this direction would often succeed in removing considerable and well-grounded complaint.

THE prizes offered by the Worshipful Company of Plasterers, in connection with the Schools of Art of the Science and Art Department, namely £8 8s. for the best, and £5 5s. for the second best, original design in monochrome for one bay of a music-room in a country gentleman's house, have been respectively awarded to George W. Shepherd, of the Coalbrookdale School of Art, and to Alfred Hall, of the Cirencester School of Art; and the prizes for an original design modelled in plaster, for a panel for letting into the wall of the hall of a hunting seat, have been awarded for the best (£7 7s.) to Walter Allan, of the Royal Architectural Museum School of Art, Westminster, and for the second best (£4) to Alfred Rooke, of the Brighton School of Art.

THE latest excavations made by order of the Athens Archaeological Society at Tanagra, the well-known place in Boeotia whence come the charming terra-cotta figures, have, according to

Nature, yielded important results. On the northern side of the town, in front of the principal gate, fifteen tombs were discovered which were completely untouched. They contained some sixty clay figures, most of them perfect, and measuring between 10 and 35 centimetres in height. They represent satyrs and women standing and sitting, and one is a group of two figures. Besides these many vessels were found, amongst which some twenty lekythoi (paint and oil phials) with antique painted ornaments. Unfortunately most of these were broken. One vase which was found in a stone case shows an artistic inscription which designates it as the work of Teisis. Fourteen scraping-irons were found, and in two of the tombs some fifty small terra-cotta ornaments were discovered, most of which were brightly coloured, and some coloured with thin gold. The published report mentions twenty vessels, some broken, ten of which are ornamented with paintings. Two of these are said to be particularly fine. Of the numerous clay figures only eight could be got out in a tolerably perfect condition.

The Earl of Bradford has consented to open the Fine Art Exhibition in aid of the Funds of the new Infirmary at Bolton on the 5th of September next. The infirmary building has recently been erected at a cost of £25,000, and is admirably adapted for the purposes of an exhibition of paintings and works of art. The Exhibition Committee have already been successful in obtaining the loan of a large number of very important and choice works of art from private collections, and it is expected that several eminent artists will respond to the invitation of the Committee and contribute to those already obtained. In addition to the paintings there will be more than forty pieces of sculpture, together with a rich collection of bronzes, art pottery, ancient armour, and other interesting objects, including six cases of specimens of industrial art from the South Kensington Museum. The exhibition will remain open about two months.

On Tuesday in the Public Health Section of the International Medical Congress, an important discussion took place on measures for preventing the spread of the home contagia, such as scarlet fever, smallpox, &c. Dr. Dudfield and Dr. Tripe spoke at some length as to the necessity of a general measure for the notification of infectious diseases. Dr. Thorne Thorne, one of the honorary secretaries, gave instances to show how the spread of scarlet fever was checked in towns having both local Acts rendering compulsory the notification of that disease to the sanitary authority, and hospitals in which the first cases occurring could be isolated. In Leicester, where epidemics have every four or five years caused between 200 and 300 deaths from that disease, the system of notification came into operation in the middle of an epidemic in 1879, and as the result of its operation some 160 cases were soon isolated, hardly a second case taking place in any court or yard from which first cases were removed. Similar and even more striking results were recorded as having occurred at Warrington. From the speeches made and the manner in which they were received it was evident that the opinion of the section was in favour of some compulsory system of registration for cases of infectious disease, but no specific action was taken in the matter.

The *Essex Telegraph* says:—"The BUILDING NEWS of Aug. 5th gives ten sketches of domestic architecture in Essex—gatherings from the sketch-book of F. W. Woodhouse. Essex is particularly rich in these quaint old houses, and it is much to be regretted that some systematic record is not kept of these fast-vanishing beauties. There are many specimens yet remaining of the old half-timbered work of the fifteenth and sixteenth centuries, and the remains of ornamental plastering, some of which are of great beauty of design, and would tax to the utmost the capabilities of our modern workmen. A small remaining portion may yet be seen upon some old houses in Maidenburgh-street, Colchester, which in our boyhood was almost perfect, and there is another splendid specimen at Wivenhoe, of Elizabethan design; also a few others which still exist to protest against the slobbering and rubbishing contract work of our own times." Any of our readers who may find themselves sketching in the neighbourhood may be glad to know of the additional examples mentioned.

The proceedings against the Grand Junction Waterworks Company for neglecting to give a proper supply of water to several firms at the West-end were continued on Wednesday, at the Marlborough-street police-court. One case was concluded, and the Company ordered to pay a fine of ten pounds, and five pounds costs; but a summons taken out by Messrs. Jay, of Regent-street, was only partially gone into, and was then adjourned. Mr. Poland, for the defendants, intimated an intention of appealing to a higher Court, the Magistrate's opinion being strongly against a contention by counsel that the remedy of the complainants, if any, was by action.

On Wednesday a unique exhibition of ancient and modern needlework, shown by the Ladies' Work Society, was opened at Scarborough, supplemented by some valuable and rare specimens of Mediaeval needlework and embroidery. The South Kensington Museum contributed a box or medicine-chest covered with embroidery, said to have belonged to Louis XIII.; a cope in Italian velvet and German embroidery; a chasuble of the 15th century; several coiffrets, and a chasuble of the 13th century; a Spanish orphrey of a cope or chasuble about the date of 1550; and the scarf of a military commander handsomely embroidered to represent arms and musical instruments, in gold and silver lace, with fringe of the same. Turning to the modern works of the fair sex, the great attraction is the quilt exhibited by the Duchess of Connaught. This magnificent work is the result of the labours of the ladies of the Sloane-street Institution, and was presented to the Duke of Connaught on the occasion of his Royal Highness's wedding. Princess Louise is the exhibitor of nine specimens of valuable ancient and modern needlework. Miss Wemyss, of Wemyss Castle, contributes a very handsome screen and hanging. Near it is a curious dress, said to have been worn by Queen Philippa, of Hainault, at a fancy ball. The design is the arms of England and France quartered together in embroidery and appliqué.

THE correspondence with reference to the retention of the organ-screen of Westminster Abbey, to which we referred last week, still continues. Among others, Mr. G. G. Scott writes to express his regret at the recent removal of the transept-screens of the choir, designed by his late father. Mr. Scott adds:—"Until the refitting of the choir by Mr. Blore, the area below the lantern ('the second pavement,' as Dart terms it) was elevated by three steps (forming the *gradus chori*, so frequently referred to in the 'Liber Consuetudinarius') above that of the choir itself. From thence two steps (the *gradus presbyterii*) ascended to the sanctuary. On this 'second pavement' stood the matutinal altar, and here, too, was placed the great Paschal candlestick. Under Mr. Blore, I believe, this area was lowered to the level of the choir, by which change the *gradus chori* was obliterated, and that most awkward flight of five steps, by which the sanctuary is now approached, was the result. May I express a hope that as the organ-screen is, happily, to remain, the ancient levels of the crossing-bay may be restored and its lateral screens re-erected at the higher level? As the pulpit would, of course, be raised with the floor upon which it stands, the change would be a solid gain to preachers and hearers alike."

CHIPS.

A fine art and industrial exhibition and workmen's flower-show has just been held at Bristol. The architect appointed to plan and direct the arrangements of the various buildings was Mr. E. Henry Edwards.

In making excavations in Balkenae-lane, Colchester, for the main sewerage works, the workmen have dug up a Roman altar, having upon it a legible inscription. The altar has been placed in the museum at Colchester Castle.

Mr. R. J. Collier's sale of freehold land on the Alexandra Park estate on Tuesday seems to have been a successful one. The lots sold realised £2,003. The price realised was about £1,300 per acre.

The North Cornwall Railway scheme is so far advanced that last week Messrs. Galbraith and Church, civil engineers, have been instructed by the committee to make preliminary surveys, with the view of determining the route.

Cambridge House, Blackheath, lately destroyed by fire, is being rebuilt from the designs of Mr. J. Wall, A.R.I.B.A., architect, of New Cross: Mr. Banks, of Lewisham, is the builder.

The local board of Long Eaton, near Trent Junction, on Monday raised the salary of Mr. Sheldon, their surveyor, by £20 per annum.

In consequence of sectarian disputes amongst the labourers, a strike occurred on Monday at the new sewerage works now in progress at Ballymena, the contract for which amounts to £10,000.

Llanhydrock House, Bodmin, the seat of Lord Robertes, which was recently destroyed by fire, is to be reconstructed on the old site and old lines, at an estimated cost of £40,000. Mr. Coad, of London, a native of Liskeard, is the architect, and Mr. Lang, of Liskeard, is the builder.

A new Congregational school-chapel was opened at Laisterdyke, near Bradford, Yorks, last week. It consists of assembly hall, accommodating 820 adults, a lecture hall, seated for 140 persons, infants' room for 120, and classrooms. Mr. S. Robinson was the architect, and the cost has been £1,400.

It was reported to the Swansea Harbour Trust, at their annual meeting on Monday, that the new East Docks will probably be ready for opening in October next. Mr. Abernethy is the engineer-in-chief, and Mr. Walker the contractor.

A new passenger-station is in course of erection at New Wincing, near Castle Eden, on the branch line between Thornley Junction and Stockton. Mr. Kitching, of Darlington, is the contractor.

A wrought-iron lectern has just been manufactured by Mr. Henry Chapman, of Colston-street, Bristol. It is to be placed in the new church at the County Lunatic Asylum, and is from the designs of Mr. E. Henry Edwards, architect, of Bristol.

A new reservoir is approaching completion at Cooway, for the local board of that town; it is being constructed from the plans of Mr. James Farrar, C.E., of Bury, Lancashire, under the supervision of the borough surveyor of Conway.

The parish-church of Cwm, in the Vale of Clwyd, was reopened last week after restoration. Mr. R. Lloyd Williams, of Denbigh, was the architect, and the work has been carried out partly by Mr. J. Rhywen Jones, of Rhyl, and since his death by Mr. Walter Williams, of St. Asaph.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—Discussion on "Plumbing." Mr. Ernest Hart in the chair. Society of Arts room, Adelphi. 7.30 p.m.

Holloway's Ointment.—This ointment may be rubbed into the system, so as to reach any internal complaint. By this means it cures sores or ulcers in the throat, stomach, liver, spine, or other parts. It is an infallible remedy for bad legs, bad breasts, contracted or stiff joints, gout, rheumatism, and all skin diseases.

Trade News.

WAGES MOVEMENT.

THE NAIL TRADE.—The great strike in the Worcestershire and Staffordshire nail trade has come to an end, the men having determined to accept the 20 per cent. advance offered instead of the 30 per cent. demanded.

Doubling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to

CHARLES TRASK,
Norton-sub-Hamdon, Ilminster, Somerset.
—[ADVT.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters.
Designs and Estimates.

General Repairs and Alterations Executed. Experienced Workmen always in readiness, and sent to any part of the country.—[ADVT.]

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE
CORSHAM DOWN
CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.
(See trade advt. on p. XXV.) ADVT.

TENDERS.

* * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

BANSTED, SURREY.—For additions to Banstead School for the managers of the Kensington and Chelsea School District. Messrs. A. and C. Harston, 15, Leadenhall-street, architects:—

Potter, W., Sutton (accepted) ... £3,583 0 0

BARROW-IN-FURNESS.—For the construction of the following streets, for the town council:—Back Cliffe-lane, Hawcut; Blake-street, extending from Hindpool-road to Duke-street; Foundry-street; New-street; Blake-street, extending from Duke-street to Bath-street; Lismore-street; Back-street, between Duke-street and the Volunteer Drill Ground:—

McKenzie, F. (accepted).

BARROW-IN-FURNESS.—For supply of yard gullies, for the town council:—

Messrs. R. Entwistle and Co. (accepted), for 100 of each kind 3s. 3d. each, and 3s. each for any required after the first 100.

BELFAST.—For painting the workhouse:—

Marks, W., Donegal-street, Belfast (accepted) £198 0 0

BEXLEY, KENT.—For the supply of various road materials to the Local Board during the twelve months ending the 23rd September, 1882. Mr. E. Reave Boulter, surveyor. Accepted tenders:—

Gabriel, for broken Guernsey granite, 2in. gauge, 11s. 2d. per ton; ditto Penzance ditto, 11s. 7d. delivered on wharf at Erith; also, for 6 by 12 Pimlico stone kerbing, 10s. 6d. per foot; ditto Kentish ragstone ditto, 10s. 6d.; Kentish ragstone spalls, free from hazzock, 6s. 5d. per ton, delivered free in trucks at Bexley and Sidecup stations.

Manuelle, for broken Quenast granite, 2in. gauge, at 11s. 3d. per ton, delivered at Bexley and Sidecup stations.

Filmer, for broken surface picked field flints, at 8s. 6d. per ton, delivered at Bexley and Sidecup stations.

Tuff, for broken Sittingbourne flint, at 4s. 10d. per yard, delivered free on wharf at Erith.

Benstead and Son, for Kentish ragstone sittings, at 6s. per ton, delivered at Bexley and Sidecup stations.

Allichin, for Dartford flints, delivered on roads of No. 1 District, at 7s. per yard.

BRADFELD, SHEFFIELD.—For widening, raising, and improving Oughtibridge-lane, for the Ecclesfield and Bradfield Highway Board. Mr. F. A. S. Crawshaw, surveyor to the Board:—

White, J., Sheffield ... £570 0 0

Hill, J., Hillsboro' ... 420 0 0

Powell, J., Grenoside ... 395 0 0

Green and Anthony, Totley ... 391 1 0

Fox, J., Bradfield ... 348 0 0

Burrows, H., Barnsley ... 381 7 0

Armitage, B., Walkley ... 312 9 0

Helliwell, J., Deepcar (accepted) ... 296 0 0

BRIGHTON.—For alterations and additions at No. 103, Kings-road, Mr. A. Loader, architect:—

Newnham, J. M., Brighton ... £331 0 0

Lockyer, G. R., Brighton ... 327 0 0

Holloway, Brighton ... 315 0 0

Hackman, W., Brighton (accepted) ... 305 0 0

BRIGHTON.—For alterations and repairs at 81 and 85, Buckingham-road. Mr. A. Loader, architect:—

Lockyer, G. R., Brighton ... £1,188 0 0

Newnham, J. M., Brighton ... 1,177 0 0

* Accepted.

BRIISTOL.—For the erection of baths and washhouses at Jacob's Wells, for the town council. Mr. Josiah Thomas, city surveyor:—

Krauss, August, Bristol (accepted) £13,107 0 0

(Eighteen tenders received.)

For mechanical engineers' work in connection with above baths:—

Fraser, W. J. and Co. (accepted) £3,535 0 0

BROMLEY, MIDDLESEX, AND RATCLIFFE.—For painting the exterior of the Union Workhouse, at Bromley, Middlesex, and the exterior of the workhouse premises at Ratcliffe, for the guardians of the Stepney Union. Messrs. A. and C. Harston, 15, Leadenhall-street, E.C. architects:—

Crisp and Tomlin ... £394 0 0

Shepherd, H. T. ... 324 0 0

Derby, A. W. W. India-road, E. ... 284 0 0

* Accepted.

BROWNHILLS, NEAR WALSALL.—For the proposed sewerage scheme works:—

Law, G., Kidderminster (accepted) £2,377 0 0

BUCKLAND, PORTSMOUTH.—For the erection of new mission-room and class-rooms, Kingston-road, Buckland, for the Rev. E. Jacob, vicar of Portsea. Mr. E. J. Smith, Commercial-road, Landport, architect. Quantities by Mr. W. Yearlye, Clarence-square, Gosport:—

Huyter ... £1,435 0 0

Crow ... 1,416 0 0

Rapley ... 1,400 0 0

Taylor ... 1,303 0 0

Farmier ... 1,300 0 0

Earwaker ... 1,287 0 0

Tull (accepted) ... 1,275 0 0

CANNING TOWN.—For repairs, &c., to South Halkville schools, Canning Town, E. for the West Ham School Board. Mr. J. T. Newman, 2, Pen-court, E.C., architect:—

Crabtree, A. ... £197 12 6

Reed, A. ... 145 0 0

North Bros. (accepted) ... 120 0 0

CANNOCK.—For erection of heating apparatus at West-hill School, for the Cannock School Board:—

Jellyman, Cannock (accepted) ... £82 5 0

CARRIFF.—For supplying and laying concrete at the new free library, for the town council. Messrs. James, Seward, and Thomas, architects:—

Pearson, J. C. (accepted) ... £1,452 4 6

CARLISLE.—For building a byre and repairs to buildings at Walby Farm, Carlisle, for Mr. L. Armstrong:—

Builder's work:—

Routledge, J. and J. ... £105 0 0

Nicholson, J. ... 101 10 0

Tremble and Johnston ... 87 18 6

Irving, J., Carlisle (Kingstown bricks) ... 65 15 0

Ditto (Scotch bricks) ... 60 15 0

Joiner's work:—

Gill, A., Hackenberg ... 32 0 0

Ritson and Parker, Carlisle (red wood) ... 31 0 0

Ditto (white wood) ... 29 0 0

Nicholson, J., Carlisle ... 30 10 0

Gill, H., Carlisle ... 28 10 0

Irving, J., Carlisle ... 28 9 0

Moore, J., Carlisle-by-Carlisle ... 27 18 0

Footbridge, W., Stapleton ... 26 0 0

Roxcroft, G., Hay Close ... 25 10 0

* Accepted.

CARRINGTON, NOTTINGHAM.—For the erection of a villa in Pelham road. Mr. Arthur Marshall, Southey-street, Nottingham, architect:—

Messers, F. ... £2,152 0 0

Vickers, H. ... 1,865 0 0

Bell and Son (accepted) ... 1,788 0 0

CHELSEA, S.W.—For supply and delivery of about 450,000 3in. by 9in. by 6in. yellow deal paving blocks, about 10,250 bushels Portland cement, and about 2,000 yards of Thames ballast, for paying part of Fulham-road, for the Chelsea Vestry. Mr. G. H. Stayton, C.E., surveyor:—

Wood blocks:—

Lee and Chapman, City ... Per 1,000.

Knight, J., Pimlico ... £6 10 0

Lloyd and Co., Nine Elms (accepted) ... 6 7 6

Thames ballast:—

Faller, G. A., Millwall ... Per cub. yd.

Brass, J. H., Chelsea ... 4s. 10d.

Bull, R., Chelsea ... 3 7

Corrington, H., Pimlico (accepted) ... 3 6

Portland cement (scheduled price, 4s. per sack):—

Prass, J. H., Chelsea ... 4 p.c. below.

Weston and Co., Upper Thames-street ... 6

Eastwood and Co., Lambeth ... 7 1

Burrow and Barrow, Queen Victoria-st. ... 12

Mann, A. J., Chelsea ... 12 1

Cleaver and West, Pimlico ... 29

Formby and Co., Grosvenor-road ... 21

* Accepted.

CHICHESTER.—For repair to the workhouse, viz., for stripping and retiling roof, and for a number of small ventilating windows. Mr. J. Kerwood, St. John's-street, Chichester, surveyor:—

Gambling and Sons ... Windows each. Roofs.

Coles ... £1 19 0 £89 0 0

Willsher ... 1 10 0 £5 2 6

Rodgers (accepted) ... 1 2 0 52 10 0

1 6 0 40 10 0

CHICHESTER.—For alterations to the workhouse, for the Doncaster board of engineers' work.

Total. £6,790 0 0

6,237 10 0

6,206 6 0

6,165 17 0

6,150 0 0

6,081 0 0

5,898 0 0

5,766 14 0

5,658 0 0

5,514 16 0

5,505 4 6

5,479 0 0

5,469 0 0

5,404 13 0

5,149 0 0

5,100 0 0

5,078 14

CHICHESTER.—For alterations to the workhouse, for the Doncaster board of alterations.

Total. £5,907 13 6

5,909 9 0

5,785 17 0

5,750 0 0

5,690 0 0

5,590 0 0

5,478 14 0

5,478 0 0

5,288 0 0

5,129 0 0

5,135 0 0

4,783 0 0

4,538 0 0

4,800 0 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

4,798 12 0

FOLKESTONE.—For new premises, for Mr. S. Josephs, High-street and Tontine-street, Folkestone. Mr. R. Pope, Folkestone, architect:—

Clemmans ... £1,985 0 0

Slade ... 1,875 0 0

Webster ... 1,850 0 0

Baker ... 1,800 0 0

Freddie ... 1,791 0 0

Dunk ... 1,790 0 0

Mercer ... 1,720 0 0

Tonbridge ... 1,710 0 0

Fells ... 1,701 0 0

Holdom ... 1,695 0 0

Brooks ... 1,625 0 0

FOREST GATE.—For repairs, &c., to Ollesia-road schools, Forest Gate, E. for the West Ham School Board. Mr. J. T. Newman, 2, Pen-court, E.C., architect:—

North Bros. ... £135 0 0

Abrahams, R. ... 115 0 0

Reed, A. (accepted) ... 96 10 0

HALIFAX.—For the construction and erection of a telegraphic gasholder at Stoney Royd, for the Halifax town council:—

Clayton, Son, and Co. (accepted) ... £9,370 14 9

[Lowest tender but one received.]

HAVERSTOCK HILL.—For erecting Nos. 1, 2, and 3, Wycombe Villas, for Mr. T. D. Bellamy. Mr. R. Groom, architect:—

Toms ... £3,723 0 0

Nash ... 3,575 0 0

Langmead and Way ... 3,458 0 0

Gregory and Bence ... 3,339 0 0

Gould and Brand ... 3,317 0 0

White (accepted) ... 3,279 0 0

HAYES BRIDGE.—For farm buildings at Hayes Bridge Farm, for Mr. John Wild:—

Garratt, G., Uxbridge ... £240 0 0

Hanson, A. and B., Southall ... 203 0 0

Hunt, Hayes ... 195 0 0

Hardy, T., Cowley (accepted) ... 183 0 0

Salter, Hayes ... 183 0 0

HAYLE, CORNWALL.—For painting and renovating the Copperhouse Wesleyan Chapel:—

Hitchens, Redruth ... £91 19 0

Eva, J. K. and Son, Penzance ... 79 10 0

Kinsman, W. H., Penzance ... 65 0 0

Piney, J., Penzance (accepted) ... 57 0 0

HOXTON.—For alterations and additions at the Adam and Eve, Hoxton-street, for Mr. Gilbert. Mr. H. E. Pollard, 14, Duke-street, Adelphi, surveyor:—

Smith, O. G. ... £576 7 0

Marsland ... 307 0 0

Weston ... 280 0 0

Jackson and Todd (accepted) ... 279 0 0

HULL.—Accepted for the under-mentioned street improvements, by the town council:—

Russell-place:—

Wilson Brothers ... £208 4 2

Somerscales-street:—

Hodgson and Harman ... £135 12 0

Hessle-road:—

Pedron, Joseph ... £93 15 1

KINGSTON.—For new roads, sewers, and surface-water drains for the British Land Company, Limited, on their estate at Kingston. Mr. Henry B. Michell, surveyor:—

Keble, Regent's Park ... £1,941 0 0

Dunmore, Hornsey ... 1,814 0 0

Thompson and Son, Battersea ... 1,790 0 0

Wilson, Walthamstow ... 1,740 0 0

Crockett, St. Pancras ... 1,698 0 0

Poll, Bromley ... 1,540 0 0

Harris, Camberwell ... 1,529 0 0

McKongie and Co., City ... 1,527 0 0

Lizzy, Hornsey ... 1,525 0 0

Acoc, City ... 1,467 0 0

Jackson, Leyton (accepted

THE BUILDING NEWS.

LONDON, FRIDAY, AUGUST 19, 1881.

RECENT EXHIBITIONS AND THEIR RESULTS.

OF sanitary and artistic exhibitions the profession and the public have surely had enough. Now the season has ended, we may venture to inquire what good, if any, they have done? It is not our intention to raise the question whether exhibitions are really of any value to the manufacturer or to the public. All that we need point out is that these displays are not to be looked at as competitions of skill or excellence of workmanship, but rather show the average results of those qualities. Those who send in goods do so with the view of measuring their productions, not so much with others of the same class, but with the level of public opinion. Last week we published the list of awards in the various sections of the late sanitary exhibition at South Kensington, from which we gather that the awards of merit for general excellence are pretty numerous. As the judges are experts in each section, we may at least fairly take the awards as indicating something more than ordinary merit. It will be seen, on glancing down the list of names and the exhibits, that a very large proportion belong to construction, in which the architect and engineer are more or less directly interested. Concrete, stoneware, parquet flooring, paints luminous and non-poisonous, architectural glazed ware, corrugated iron, wall-linings and decorations, non-arsenical wall-papers, window-opening apparatus, sash-lines, door furniture, sill-bars, ventilators of all kinds, heating apparatus and stoves, and all kinds of closet apparatus, valve-closets, and water waste preventers, to say nothing of traps and sanitary ware of every variety, are the leading features; and it is certainly of some service to the architect to know which of these several productions have, after a technical examination of their merits, been most approved.

If it has been the means of bringing before the architect any idea of value in sanitary construction, or if it has served to gauge his own knowledge of sanitary details, the recent exhibition has at any rate served one useful purpose. In the department of planning and hospital construction, very little was shown with which the profession was not already acquainted. Plans and models of sanitary dwellings, hospitals and theatres, artisans' dwellings, and Turkish baths were not wanting; they were contributed by architects and engineers who in many instances had actually carried out the buildings they served to illustrate, and to this extent they were useful as records more or less of value; but we cannot regard them as the best examples of the most recent experience. In the planning and construction of buildings, little improvement, as a matter of fact, has been made of late years. To take ventilation as an instance, the approved principle of admitting fresh air by well-contrived inlets, and of allowing for the escape of the vitiated air by other channels, has not been impugned, and the principles adopted in the construction of prisons and hospitals twenty years ago have been maintained, though some theorists still insist upon the advantage of extracting the vitiated air at the bottom of the room and allowing the fresh air to enter at the ceiling level. Upon this moot point probably architects and engineers will long be divided, however united they may be in approving of a distinct source of supply and a separate means of

egress. The models and plans shown in this section of the exhibition do not help the young and inexperienced architect much in coming to an intelligent decision upon the best means of introducing air, or of extracting it after it has been used. In many of the systems complicated heating arrangements are shown, in connection with various distributing channels for the warmed air, and these illustrations serve more the apparatus-maker than to illustrate the principle of economical warming. We may say the same of the numerous ingenious devices for extracting air or of exhaust cowl, which now claim notice, and the architect must consult his own knowledge and judgment in adapting the most desirable of these appliances to the case he may have in hand. The principle in many of them is the same, though the tyro may easily be led into supposing each pattern he sees to have merits of its own. To take the ordinary suction or air-pump ventilator as an example. Every ventilator which has no mechanical arrangement, such as a rotating-screw or fan, belongs to the principle of an induced current, a principle already familiar to those of our readers who know anything of the effects of currents of air impinging on surfaces in different angles of obliquity. Each claimant in the field has a particular notion of placing the component plates; and some of these are undoubtedly better than others for certain purposes; thus we should prefer the horizontally-disposed plates to prevent a blow-down, but not for currents of air which are generally horizontal.

With regard to hospital planning, the plans we have already described are instructive as tracing the history of this kind of architecture; they all, however, adopt the isolated block or pavilion as the unit, and the isolation of the closets from the ward, and we may usefully compare the first important plan for a hospital—that of the Herbert Hospital, Woolwich—with the plans for the reconstruction of University College Hospital by Dr. G. V. Poore and Mr. A. Waterhouse, A.R.A., both of which we have described. The pavilion system has now been tried, with results which point to it as the only true principle; though physicians and architects will still differ as to the best mode of disposing the blocks with regard to the administrative centre; and probably, from a strictly scientific view, the circular system advocated by Dr. Marshall, which we illustrated lately, is better than the long range with its wasteful length of corridor connection. The plans and designs contributed by Mons. Tollet, Mr. E. C. Robins, F.S.A., Mr. T. Worthington, Professor T. Roger Smith, Mr. H. Saxon Snell, Mr. Ernest Turner, Mr. Yeoville Thomason, Dr. Mouat, Mr. W. Chisholm, Messrs. Coe and Robinson, Mr. F. E. Jones, and Mr. C. O. Ellison indicate the progress made in arrangements and details which we should like to see periodically recorded. Dwellings for the labouring class, if we may judge by the drawings exhibited, show a grasp of conditions, though still leaving a great deal to be desired; but for other kinds of sanitary architecture, such as abattoirs, baths, and wash-houses, there were not enough examples to lead to any satisfactory conclusion with regard to them.

Architects may at least have gathered more practical information with regard to many materials. Nothing can appeal more to one's sense of cleanliness and thoroughness than concrete stable-fittings and paving. Manufacturers seem now to have perfected this material; the same remark applies with almost equal force to stoneware, and no recent exhibition has shown so many illustrations of the value of the material for sanitary and artistic purposes. Here, again, competition is so great that architects will have some difficulty in future in dividing

their favours; the excellence of manufacture is more general. We need only refer to "traps" (the names of which are legion), gullies, drain-pipes, troughs for latrines, and various forms of intercepting arrangements, which are now bewildering from their endless variety. Those which seem to claim the architect's and engineer's attention are comparatively few, and have been pointed out by us. The artistic developments of stoneware and its allied materials, terracotta, glazed ware, faience, &c., have kept pace with their more useful applications, and we have some pleasure in recording a more general taste in matters of design and colour. Scagliola marbles and Parian cements, enamelled bricks and architectural ornament, have supplied the artist with resources which are now more recognised than at any previous time of the present century—that is to say, with artistic sense of what is truthful and honest.

Parquet flooring is a manufacture which has received "first class" mention, and perhaps among modern, or rather revived, manufactures, it holds a deservedly high place. Owing to improved machinery for cutting wood, modern parquetry equals the old French floors. Probably the first parquetry laid in London was in the 17th century. Evelyn notices one room at Cashibury "parquetted with yew." But the manufacture of thin parquet was of later date, and a firm of the name of Steinitz, in 1840, set up a manufactory in London. Improvements in paints have been rapid of late years; and the white zinc paint of the Albissima Company, among others, besides the luminous paint, is worth mentioning. Few of the features of recent exhibitions have been more numerous or important to the architect than fittings. Windows have always been a *crux* to the architect. Praiseworthy attempts have been made to improve upon the common sash-window, but the ordinary sash, with its cords and weights, is still used. Compensating door-hinges, water-tight sill-bars, fasteners of improved form, bell-hanging appliances, bolts and locks, are among the appliances which have been rewarded.

There is one other section to which we may allude, and where we find ingenuity has taxed itself in producing modifications rather than improvements. The "first-class" awards and those of "merit" have been plentifully bestowed in this section. If we carefully examine the closet-apparatus, we find many variations in detail which have not affected the principle in view—that of producing a self-flushing and cleansing arrangement. The points for architects to consider in specifying closet apparatus are the advantage of self-cleansing basins and flushing rims, that of the "valve" over the "pan" closet, and good flushing, and, not least, effective traps and junction with soil-pipe. In the matter of regulating or waste-preventing cisterns, the recent contrivances have tended to perplex rather than make clear, and we may safely say simplicity of action and the avoidance of mechanical valves and other fittings likely to get out of order, are the chief recommendations. The siphon-action and the preventers depending on a vacuum and displacement of air are probably the simplest contrivances. Disconnecting drain-traps and gully-traps possess much likeness, and the opinions of plumbers seem to be divided as to the advantages of the two principal types of traps, and if we are to judge from recent controversies like that reported elsewhere, there is more to be said for the Ω -trap than we were disposed to accord to it. We cannot here advert to stoves: many of general excellence, combining the Arnott and slow-combustion principles with the ventilating-grate, have been placed in the highest class or otherwise commended, and we may await the forthcoming examination of the merits of some

of these in another competition to take place shortly.

PASSAGES AND CORRIDORS.

IT is a frequent characteristic of a badly-planned house that it is full of passages. In nearly all the plans of novices we find long and tortuous passages, often badly lighted, and cutting up the apartments. These first attempts at arrangement invariably place the rooms in a row, each having an external door, with a long corridor or passage leading to them. It is the easiest method of setting about a plan, and this idea is generally that uppermost in the minds of those who have no notion of building, but who like to give their ideas to their architect. More experience leads to a reduction of passages, and the best planner seems to have the art of minimising his passages and locating his rooms round a hall or landing in a compact form. In public buildings where the apartments are numerous and have to occupy wings or other semi-detached blocks, long corridors are of course necessary, yet in planning of this kind it is much easier to design unnecessary passages than just sufficient to give access to the rooms. The whole art of planning economically consists in being able to reduce the length of internal walling, and to dispose the rooms with the least waste of space. The old houses of the 11th and 15th centuries furnish very few examples of wasteful passages, but this is owing to the very different conditions which the old builders worked under. In Haddon Hall, for example, the apartments are ranged round two courts, and they open into one another by doors of intercommunication. Afterwards corridors and galleries became more common, as we find them in the old houses and mansions built in the time of Elizabeth. Lord Bacon, in his "Essay on Building," speaks of "stately galleries" with cupolas in the length of them, in his view of what a perfect palace should be, and we know how important a feature of houses of this age the open gallery was, with its carved balustrades and posts—a feature which still lingers in a few of the old hostleries and inns. These galleries, in one or more tiers, were eminently picturesque means of uniting the several rooms round a court, and they had at least the merit of avoiding an internal and dark corridor. If we refer to the plan of Longleat, a well-known Elizabethan house, we shall find an internal groined corridor round the two courts and lighted from them—a feature not common certainly in English residences, but one borrowed from the Italian cortile, in this instance, by its reputed architect, John of Padua. It is a pity space is too precious in England to allow the use of interior courts, along which outer corridors can be obtained, as we find them at Hampton Court, giving opportunity for painted-glass and other decorations, entirely out of the question in our modern central corridors, where gloom and dust seem to linger. The narrow dingy passage and stairs, and the circuitous corridor, are two essentially modern arrangements, and we find very few modern buildings of ordinary size in which the corridor is made an architectural feature. They usually present monotonous surfaces of dull drab plaster, occasionally relieved with pilasters; they lead often to a blank wall, and are pierced at intervals with dark doorways. A recess or two, a bayed window or a staircase at the end, would make a great difference; but the corridor is now looked upon merely as a necessary evil to give access to a series of rooms which cannot be entered in any other way. The architect treats it as a channel, not much better than a drain, if we may

judge by the miles of dull wasted corridors in many of the blocks of chambers and offices in the City. Dark and dreary, and often unusually tiring and puzzling in their ramifications, they had better have been intersected by more staircases instead of wasted upon a desolate office or two, whose door with ground glass seems to mock the length of the approach.

We may refer, more particularly, to the arrangement of passages and corridors. One of the main principles is to make them communicate in the most direct way. A passage or a corridor ought to connect two points in a manner which shall not suggest any doubt in the mind. For a long corridor to lead to a blank wall and then to turn, and leave the stranger in doubt as to his whereabouts, is one of the worst possible faults, though we are constantly seeing buildings intended for municipal offices and other official purposes, planned with "blind" corridors really leading to no apparent rooms, and only intended to give access to one or two offices in their way. To lead a corridor round a corner to enter perhaps a small office or set of lavatories, is equally objectionable—architecturally speaking, it is *infra dig*; but this sort of arrangement is common also. A corridor from a main hall or centre should lead somewhere, and it is better to make it give direct access to a large apartment or to a hall of some architectural importance than to make it expressly for the purpose of giving access to a few rooms on its route. A circuitous corridor is not only bewildering and tiring, but shows want of contrivance and resource, and generally is the source of other defects. In public buildings corridors may be managed to afford striking effects by making their intersections features, and by producing extent of vista, and some of our leading edifices—the Houses of Legislature, the New Law Courts, and the Manchester Town Hall—furnish instances of admirable arrangements. On the other hand, there are many lamentable failures. Need we notice the spacious, but gloomy and wasteful corridors in the Leeds Town Hall, and many other buildings of recent date? In Classical buildings, arranged on a grand scale, this feature has been and can be made not only useful but impressive, though to accomplish it at the sacrifice of space, and the cutting up and reduction of the apartments, is to increase cost as well as to display poverty of design.

Straightness is very essential to corridors, and any change of direction ought to be shown by a lobby, or some decided indication. With regard to the all-important question of lighting, architects fall into strange blunders and omissions. There are three methods of obtaining light for central corridors: the first is by having courts or areas at intervals, the second by having end lights, and the third by well-holes and floor lights; and there is a fourth mode, which is rather an afterthought than a method, and that is to borrow light through doorways and walls. It is strange how often we see the latter plan resorted to in competition plans as a substitute for design and contrivance. A borrowed light is a mere subterfuge, and cannot be called planning, even if it affords a plea for ventilation, as we sometimes notice it does. The first and second plans we have mentioned are the only architectural means of lighting, and areas should be placed near the junctions and most frequented parts. It is a common fault, too, to find steps in a long corridor, than which a more dangerous expedient could not be devised. If necessary, they are only properly placed at the ends, or near well-lighted lobbies. Resort to gradients is always better avoided, and equally objectionable are narrow corridors and contraction of width. It is better to avoid any break or cause of obstruction, especially in corridors which connect entrances with large rooms and assembly

halls, and to increase the width only near the vestibule. The rules we have given appear self-evident, and yet, strange to say, we have found them so seldom observed in the designs submitted for important buildings, that we think we are justified in calling attention to them. With respect to small buildings and houses, the less we have of passages and corridors the better, as they not only add to cost, but also to discomfort and inconvenience.

THE NATIONAL COMPETITION DRAWINGS AT SOUTH KENSINGTON.—II.

WE now take up the drawings in oil, water-colour, and chalk. The paintings of figures and groups in oil-colours are as usual numerous, and the work this year in the class of oil-studies is full of promise. The gold medals are awarded to students of Edinburgh, Liverpool, and Birmingham. Robert E. Morrison's oil group reflects much honour on the Liverpool South District school. The subject is a stoneware jar or pitcher, and bronze goblet of antique shape, arranged before yellow drapery, or a silken material of golden hue, which is thrown across a partly exposed background or bas-relief. The red geranium in basin brightens up the darker shadows, the light and shade are reflected and half-lights are cleverly put in, and the whole composition is rich and harmonious. For a similar group, Elizabeth Bark, of the same town, receives a silver medal. We must speak very highly of the group by John J. McClymont, of Edinburgh, showing a cracked Chinese vase, with an illuminated book open, relieved by a dark ground; the colouring and reflected light are admirable, and a delicate harmony pervades the work. On the same screen we notice a few groups in oil, for which bronze medals have been given; and of these we must commend the work of Florence Plant, Birmingham, for some vases prettily grouped with wallflowers and a lily. The dark background gives a rich contrast of colour. Equally creditable is Janet McGown's (Edinburgh) group, in which a stoneware jar and fruit have been arranged before a green curtain. The execution is forcible and masterly, and the texture and contrast of colour well painted. A silver medal has been creditably won by Constance Prince, of Manchester Royal Institution, for her excellent rendering of nautilus and other shells and Japanese tray, against a bas-relief background; and Annie Hastling, of the same school, has also earned her reward of a silver medal for her very æsthetic group of a blue-green vase, with plates of pomegranates and peacock feathers. The grouping is natural, a rich harmony of green, yellow, and blues predominates, though these are generally in a secondary key of colour. The execution is massive and bold. An excellent study of drapery has been awarded a bronze medal, the student being Emily Seymour, of Birmingham. The colour is drab, and the treatment of the folds natural. Among the several book-prize oil-studies we must particularly mention as worthy of a higher reward, Lucy Leaver's (Nottingham) admirable group of blue and white vase and plate against a lattice panel. The grey drapery at side, and the shell, are cleverly painted, and a quiet and feeling treatment and tone add to the merit of the work. W. S. Boyd, Birmingham, also takes this prize for some well painted pottery and flowers; C. L. Palmer, South Kensington, for a solidly-painted breastplate and drapery; and F. W. Davis, Birmingham, for a vase and yellow drapery. A group made up of a red earthenware jar, blue vase, and green drapery, has a bronze medal. It is by E. W. Payton, of the same town; and a silver medal distinguishes Samuel May's (W.

London) light Japanese group of a fan, bronze jar, and fruit. Before leaving this class of studies, we may notice a study of a mouldy cheese, pipe, and jug, by W. Keeling, Sheffield, which has a bronze medal.

The monochrome studies in oil from the antique are not so numerous as the groups. James C. Michie, Edinburgh, wins a gold medal for a monochrome study of man with infant in his arms, from a cast, and T. Allison, also of Edinburgh, takes a silver medal for a half-draped female figure of Venus, boldly painted in brown, the figure being set off by a dark background. The horse's head from the antique, by Miss Wight, Kidderminster, is a cleverly-painted study. The subjects in oil from life are few, and, perhaps, it may be argued that our students gain all they require for painting the human figure from casts of the antique. These, however, although they supply almost perfect ideal proportions, do not teach the student so well as the living figure, the mobile forms and muscular development seen in action, nor give him the delicate shades of flesh and half-tints. The highest reward has been won by a Birmingham student, William A. Breakspere, in this class. It is a seated nude figure of a youth, one arm being behind him, painted on a light background. The light and the shaded portions are cleverly managed, and the execution bold and vigorous in handling. A book prize only goes to Anna Ritter, S. Kensington, for a female nude figure, seated, the limbs being well foreshortened, and the flesh-colour and shading executed with considerable skill. Turning to water-colours, the exhibited drawings are equally worthy of the prizes awarded them, though, in an instance or two, the degree of merit has not been very nicely adjudged. Beginning with the groups, Frank Suddards, Bradford, is the winner of the gold medal. The subject is composed of vases, a goblet, Japanese fan, and shells, and the artist has arranged them in a skilful, quiet, unostentatious manner against a dark, warm, sandstone background, carved in low relief, partly made up with drapery. A red flower upon the dark shadowed portion of the latter gives life and colour, and the depth of tone, rich colouring, and forcible execution, leave nothing wanting. It is equal to oil in depth and tone. Joseph W. Stubbs, also of the same town and school, takes the silver medal (as he does in two other cases) for a group of pottery. The bright yellow stone-ware jar lying on its side, and the Chinese figures, are clever and quaintly grotesque in their grouping; and Margaret Moore's (Leicester) delicately-drawn study of white-briar roses in a glass dish is very refined and feelingly coloured. A large water-colour study of a group of game, which receives a silver medal, and several groups, which are distinguished by bronze medals, may be noticed. No kind of subjects are so useful in calling out the skill of the young artist in outline and colour, light and shadow, as a group of objects, in which the fictile element, combined with fruit, feathers, and other *objets de luxe*, are introduced. It is satisfactory to find the works of the schools in oil and water colours chiefly confined to these subjects, and in this respect the exhibition compares favourably with the work sent up by some of the Board Schools, where landscapes and pictures are the staple productions of the scholars. Colouring in monochrome is a strong point in the best schools, and the silver medal drawing of a horse's head, by Julia Mountford, Birmingham, may be taken as a sample of the drawings in this class of study. It is not, to our thinking, quite so good as the drawings for lions' and horses' heads, for which the bronze medal has been bestowed. The horses' heads, from the antique, by T. C. Castle, Birkenhead, and the drawing, by

Katherine Reynolds, Brighton, of the same subject, are both skilful renderings in sepia, from the cast; the first receives a silver and the latter a bronze medal. Robt. C. Daws, of Bradford; Sam. May, West London; Margaret Moore, Leicester; R. Beggs, Edinburgh, are others who have won silver and bronze rewards for water-colour groups. The monochrome ornament from the cast we have briefly noticed, and in this department two lady students carry away bronze medals for excellent work.

The chalk drawings from the antique include many very masterly studies. This time Mary H. Surenne, Edinburgh—a student who has done excellent work before—wins the first prize for a drawing of figure, spirited and feeling, and another female student, Emma L. Osman, South Kensington, takes a second prize. Rowland Holyoake's chalk drawing (accepted at the Royal Academy) is an excellent study from the antique, of man with cymbals, Florence Reason, Bloomsbury, has a well-foreshortened study of limbs, and W. Busk, of S. Kensington, an ancient player, all three receiving silver medals. For chalk drawings from the living model, Alfred Hitchens, S. Kensington, is the highest prizewinner. The figure is that of a man holding a dagger, and there is much muscular movement and expression indicated. A well-drawn figure from life by Constance L. Anson, S. Kensington, wins a silver medal; and the same reward is given to J. W. Stubbs, of Bradford, for a study of boy's head. We notice a clever chalk study from life, of a female figure, by Helen Jackson, of Lambeth; and there are other clever drawings, for which bronze and book prizes are given, that it would be superfluous here to name.

We cannot conclude our notice of the present exhibition without saying a word on a feature of these yearly collections, which reflects one of the most active and growing impulses among the students who attend the Government schools. It is only subordinate to the branches of art we have already been describing. The value of copying good styles of ornament it is needless to urge here, and the work shown of this class is highly commendable. We may instance the studies of enamels. A student of the Training Class, Arthur D. Riley, takes the gold medal, for some beautifully-drawn copies of Italian, Indian, and Japanese enamels. The Della Robbia border of a medallion used externally on the Villa Della Loggia, near Florence, date 1442, is unique. The studies of majolica (awarded), by Dora Lowenthal, are also very interesting, as illustrating the true ware by that name—Spanish and Italian. We note a sgraffito jar and an Azulejo tile among the copies. The studies of arabesque ornament by W. Busk; the design for an inlaid table-top, by M. Hayes, showing some well-disposed Italian ornament; W. G. Schroder's design for fire-dog, and H. Sharpe's drawing of candlestick, are exceptionally good and masterly. The designs for book-cover, by M. Denley, Lambeth; painted ceiling by F. Gibbons, Cirencester, are also creditable evidences of taste in ornament of this kind.

Among the illustrations of wood-carvings we mention here some clever sepia drawings, from Italian and French examples, by A. Whitehead. Natural productions, treated ornamentally, are represented by a few drawings of surface ornament: chiefly by an oak-panel study by T. Finchett, Manchester; leaves and flowers, ornamentally disposed, by G. Randall, Kidderminster; a design for a picture-frame by E. Edgill, Shrewsbury. Studies of historic styles of ornament include copies of architectural mouldings and features. C. P. Chambers, Barrow-in-Furness, has taken the highest prize for a series of sepia drawings from casts exemplifying every period, from

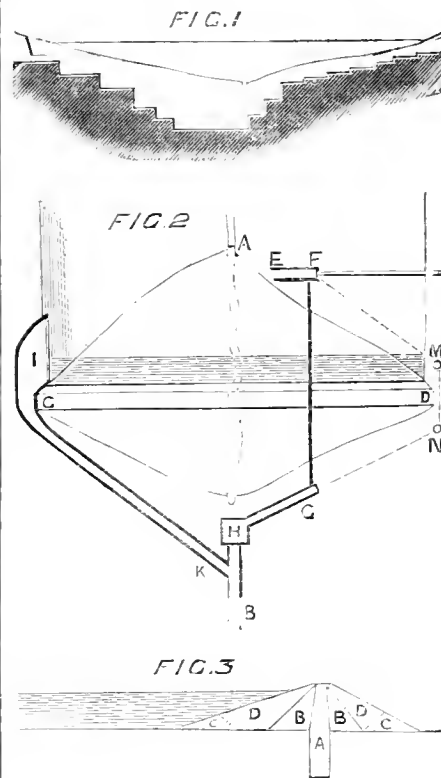
Egyptian to Renaissance Cinque Cento. The Gothic examples are weakly drawn and shaded, and the mouldings and capitals look crude. Though the student earns the prize for industry, we venture to think shaded drawings of this kind of very little use; after all, they are mere fragments snatched from their real position and connection, and leave the student ignorant of the meaning and continuity of the architecture of which they are only disjointed members.

THE WATER QUESTION.—XIV.

EMBANKMENTS.

ON reference to authority we find it was not "a dozen or twenty" reservoirs, as we stated in the last article on this subject, that Mr. Bateman not long since said he was then making, but *ten or twelve*. As if to compensate for this error, however, we did not add, as we now do, that he had made seventy or eighty large reservoirs.

The great embankment of the Vyrnwy reservoir for the supply of Liverpool, the construction of which was begun the other day with so great a ceremony, is the first embankment of the kind—for a large reservoir—in this country. Embankments as high, and higher, have been made with



earth; but this is to be of stone, regularly built as masonry—a huge retaining-wall 84 ft. high. But in general reservoir embankments are made with the materials found on the spot or within a short distance, be they earth, clay, shale, or stone.

Puddled clay, upon which the watertightness of reservoir embankments has for so long a time depended—since, at least, the time of Brindley and canal-making—has come to be regarded with disfavour and distrust where it is itself exposed to the action of water. When some canal-makers complained to Brindley that they could not stop a run of water, his advice was to "puddle it—puddle it!" and the good reputation which puddle has always had in waterworks engineering led at one time to its too free and careless use, and it was solely depended upon for the water-tightness of reservoir embankments, which was not always effected.

Certainly, some reservoir embankments of earth have been made of very great height, and they have stood safely, and there is no apprehension whatever that they will not always continue so, with, of course, due attention to the outer parts, to repair the continued action of the weather—frost, thaw, &c. But these embankments have been well-made, not only in the core, which is formed of puddled clay from end to end of the bank, like a wall, but on each side of it; on the inside to prevent the water in the reservoir having access to it in any considerable body, and on the outside to prevent the water with which the puddle is made being drawn out of it, whether by evaporation or capillary attraction, by which it might become gradually dried, and the cracks which would be consequently formed might extend so far into the wall as to reduce its virtual thickness materially. Rough stone, for instance, or earth loosely tipped in, would admit the air to it, and the water incorporated with the puddle would continue to evaporate as long as the air itself was not saturated with moisture. It does not readily part with the water with which it is incorporated, and not at all if the outer and drier air is wholly excluded from it; but this can only be done by placing against it a compact material. On the other hand, in the presence of water having any motion, it easily dissolves—melts away, and the best puddle for a wall—that is, the closest in texture, melts the soonest under this action; nevertheless, it is absolutely necessary that puddle should be so worked as to bring it to a close texture; but at its best it is porous, and if water has access to it under great pressure, it is only a question of degree how much water will be forced through the puddle wall. In the first place, a great deal of water is used in making it; dry clay will absorb nearly a third of its own weight of water; and if it be taken, not in a purposely hard state, but in a naturally dry state, it will absorb, in the process of puddling, from one eighth to a sixth of its weight of water. Thus, water acting on one face of a puddle wall under pressure tends to force the water out on the other side, as water is incompressible, and the quantity it can force through in a given time is limited only by the smallness of the pores and the length and tortuousness of the course which a run of water must follow. It is, therefore, highly important to protect the puddle from contact with water under great pressure. It might almost seem that if it requires so much protection it can be of little use, and that it might be dispensed with altogether; but this extreme would be as unwise as that of depending solely upon it without precautions; and as it is so readily procurable, it remains still a necessary material for waterworks reservoirs.

There are two kinds of puddle—clay puddle and gravel puddle—proper to be used for different purposes, or rather in different positions, for the same purpose of watertightness, the one consisting of clay only, the other with stones incorporated. When there is a liability to a wash of water, stones are necessary to hold the clay together, and of stone or rounded gravel-stones are the best, besides being generally the more easily obtained, inasmuch as they are more uniformly dispersed through the mass of clay than angular stones can be in the process of working, which is by cutting and cross-cutting with long bladed tools, reaching down at every stroke through the layer of clay being worked into the puddle beneath it. The tool slips out a rounded gravel-stone without much disturbance of the adjoining clay; but angular stones, when struck by the puddling tool, have a tendency to congregate together. Gravel puddle is proper to be used where weights have to be sustained, as for the walls of a service reservoir. Clay puddle can hardly be worked stiff enough to

support the weight, which squeezes the clay outwards and upwards, and there is an inconvenient settlement of the wall; but with gravel puddle the weight can be sustained and watertightness effected also, because with a mixture of gravel the puddle can be worked stiffer.

The sketches 1, 2, and 3, show respectively a longitudinal section, a plan, and a cross-section of an embankment formed of earth, with a puddle-trench and wall. The trench is shown to be cut straight down, so that the bottom is as wide as the top, and the advantage of this over sloping sides is that, in case the ground should not prove watertight at the depth anticipated, the trench may be carried down to any further depth. The trench is filled in with puddled clay up to the surface of the ground, above which, up to and above the top water-level of the reservoir, the puddle is continued as a wall, having a batter on each side of 1 in. to a foot, and finishing 8 ft. thick at the top; 4 ft. is not a sufficient thickness, 6 ft. is sufficient with precautions, but 8 ft. is advisable; if, however, there be the means of placing a nearly water-tight mass of earth next the puddle, as BB on the sketch, the thickness of the top of the puddle may be 6 ft.

The description of the various parts of the work is as follows:—

In the longitudinal section, Fig. 1, the bottom of the puddle-trench is cut into the hill-side as far down as to pass through loose or fissured ground to a water-tight bottom, which is often found nearer the surface on one side of the valley than on the other. That side should be chosen for the discharge-pipe or culvert, but it cannot always be determined before the puddle-trench has been cut.

On the plan, Fig. 2, A B is the original course of the stream; C D, the two ends of the embankment; E F, an open channel, cut near the bottom of the reservoir; F G, the discharge-pipe, laid in the solid ground; some lines laid in a culvert of masonry, itself laid in the solid ground. G H, an open channel; H, the gauge-basin; I, the waste-weir; I K, the byewash.

The discharge-pipe has a valve on its inner end, at F, and it is necessary to erect a tower of some kind, from the top of which it can be worked. Access to the top of the tower is procured by means of a bridge, either from the top of the embankment or from the side of the reservoir, as shown in the sketch. When the puddle-trench is everywhere sunk below the level at which the water is drawn off, the discharge-pipe is taken round the end of the bank, for the sake of being in the solid ground, and a tunnel is then preferable to an open trench, as shown by the dotted line F, M, N, G, shafts being sunk at M and N. It may not be quite justifiable to put the preference of a tunnel on the less disturbance of the ground, for with careful timbering, perhaps less disturbance would occur with an open trench. The open trench can, at least, be closely filled in again, which cannot be said with certainty of the space between the crown of a tunnel and the earth above it. Although tunnels have of late been much advocated instead of culverts, it would certainly be unwise to adopt them in every case. In every case, however, there is a necessity for a tower or valve-well, for a valve cannot be satisfactorily worked with sloping rods, and because it is absolutely necessary to place a valve on the inner end of a discharge-pipe, if any regard at all be had to the safety of the reservoir. Certainly, discharge-pipes have been laid under embankments, which have had no valves on the inner ends, the discharge being controlled at the outer ends, at the foot of the embankment; but considering that a cast-iron pipe, if of large size, may be broken by the external pressure of the earth, and that, whatever the size, it is subject to leakage at the joints, where

it cannot be got at for repair, this method will not bear repetition. A valve, then, being necessary at the inner end of the discharge-pipe, and a tower for access to it, it becomes desirable to draw off the water, not from the bottom of the reservoir, where it is muddy, but as near the top, at all times, as is practicable, and the tower affords facilities for the insertion of a short pipe through the wall at as many different heights as may be desired. Instead of placing the tower or valve-well in the reservoir at or near the foot of the slope of the embankment, it has been sometimes placed almost in the middle of the bank, close to the puddle wall, and the water is conducted to it by a culvert from the foot of the inner slope of the embankment; but this position does not afford the facilities of drawing off the water at different heights that the exposed tower does. When it is preferred to lay a culvert of masonry, or to form a tunnel, instead of laying the discharge-pipe bare in the ground, it becomes a question whether the water should be discharged through the culvert itself or the tunnel itself, or whether a pipe should still be laid up to the valve-tower, through the culvert or tunnel; but there is very good authority for letting the water run through the culvert or tunnel itself. With a good masonry culvert or tunnel of sound bricks or thick stonework, a pipe in addition seems superfluous, where the reservoir is constructed for one discharge only; but if it be so situated that two discharges are required from it, one, for instance, for a town supply, and another for the stream itself, the continuation of the supply-pipe up to the valve-tower, through the culvert or tunnel, is necessary, the discharge to the stream running on the bottom of the culvert or tunnel beneath the supply-pipe, which is supported from side to side so as to leave room beneath it for the stream-discharge. The quantity given to the stream, under these circumstances, is usually required to be open to inspection by turning it over a gauge-weir to a depth agreed upon, the length of the gauge being fixed, by which the quantity being discharged can be ascertained for the satisfaction of millers and others interested in the stream.

The waste-weir and byewash are shown in the sketch on the opposite side to the other works, but, according to circumstances, they may be on either side. They are very important parts of the work, for when the reservoir is full at a time of flood nearly all the water must pass that way, and therefore not only must the length of the waste-weir be sufficient to prevent the flood raising to a dangerous height against the embankment, but the byewash must be so constructed that it will not be torn up by a great body of water rushing down so steep a channel.

In the cross section, Fig. 2, A is the puddle-trench and wall; B B, material selected from that excavated as being the most easily compacted; C C, a rough stone bank necessary for the outer slope, and advisable also for the inner; D D, the rest of the material excavated, except peat. This is a material which, although sometimes abundant on reservoir sites, is very objectionable in an embankment, even in small quantities.

THE SANITARY AND CONSTRUCTIVE SUPERVISION OF DWELLINGS.*

By LEWIS ANGELL, M.Inst.C.E.

THAT "an Englishman's house is his castle" is a fondly-cherished tradition. Be the Castle one of Indolence, Ignorance, Dirt, or Disease, who dare invade it? But a castle means isolation, a separation of neighbours by

* Read before the Association of Municipal and Sanitary Engineers and Surveyors at Birmingham, on July 8. See p. 65 ante.

walls and entrenchments; and so long as the lord thereof and his retainers remain within the keep, their doings do not concern the outer world. But if the garrison sallies forth, committing devastation, are not the attacked justified in invading the castle? "Self-preservation is the first law of nature"; and if sanitary science, unknown to our mediæval ancestors, has taught the modern Englishman that the safety of his own well-ordered castle is dependent upon his neighbour's being also set in order, surely the most radical opponent of paternal government will concede that freedom must be qualified by the moral and physical rights of our neighbour. One of the earliest applications of this principle of compulsory sanitation was in the Vaccination Acts. Legislation also prohibits the exposure of infected persons and clothing. More recently the principle has been extended by local Acts requiring that the various kinds of infectious disease shall be reported to the medical officer of health. The extension of sanitary supervision to dwellings is therefore not only in harmony with established principles and precedents, but is, in fact, a demand which has found expression in the recent establishment of societies in London and Edinburgh for sanitary inspection on co-operative principles. The latest development of the movement is the "London Sanitary Company," an association of eminent sanitarians who propose to combine philanthropic principles (limited) with the business of a big plumber. The company contemplates, as a "moderate estimate," an annual receipt of 10,000 guineas from 10,000 houses, independently of "entrance fees" and the profits from plumbing. The skilled advice of the highest medical and sanitary authorities will be secured, surveys and reports made by "an efficient inspecting staff acting under the direction of the company's engineers." The company will put dwelling-houses in a perfectly sanitary condition, filter water, cleanse cisterns, prevent boiler-explosions—in fact, sanitary repairs of all kinds will be "neatly executed at the shortest notice." A dividend of 20 per cent. is suggested by the prospectus, and $7\frac{1}{2}$ per cent. guaranteed by the plumber whose business has been acquired by the company as a "going concern," and whose services the company have been fortunate enough to secure as "managing director." It is to be regretted that the aspirations of the company should stop short in so great a work. Surely ratepayers should not object if the company would also take over local boards as a "going concern," and guarantee a dividend, however small. A guinea rate per house per annum officially levied by the sanitary authority would very much more than maintain an efficient and responsible staff of sanitary inspectors, who would extend their protection to the poor as well as to the well-to-do subscribing shareholders, whom alone the "Sanitary Company" proposes to benefit. The fact of the existence of such societies, be they due to philanthropy or stock-jobbing, raises a great question:—Is such sanitary supervision necessary? and, if this be granted, by whom should it be conducted? That supervision is necessary will be admitted by all who, like the members of this association, have had any official experience. Thousands, probably hundreds of thousands, of houses are annually put together, we cannot say built, in such manner as to be dangerous to the lives of the occupants. Not only is stability disregarded, but every essential principle of sanitation ignored; the water-pipes, the drain-pipes, the very site frequently a huge dust-bin, form a combination of contaminating influences which lower vitality and endanger life. This result is due as much to ignorance as to carelessness—a concourse of fortuitous evils rather than a conspiracy, although one regrets to have to add, as the result of official experience, that in too many instances it is also the result of the most wilful and wicked cupidity. As a practical illustration I may be allowed to quote my own official experience. For more than fourteen years past I have had the supervision of by far the largest district in the country governed by a local board; all other places of its size, and very many smaller, have municipal corporations. I refer to the district of West Ham, in Essex, which forms part of the "outer ring" of "Greater London." It includes nearly 130,000 inhabitants, having more than doubled during the last ten years. Some 14,000 houses have been put up during my term

of office, and at present they are increasing at the rate of about 2,300 per annum, equivalent to a new street of nearly 200 houses per month. These buildings require supervision. Being "over the border," we have no building fees as in the metropolis, a fact which induces the speculating builders to come over. If only a guinea were charged on each building—only *one* guinea, not the *annual* guinea invited by the "sanitary company"—my board would, independently of the rates, derive an income which would enable them to provide a qualified and responsible supervising staff not only to enforce the proper construction of new buildings, but to discover defects in old ones. The Local Government Board recently issued a series of model bylaws for buildings, involving very much detail; the advantage of their adoption was manifest, but adoption and observance are very different matters. I would have gladly urged their adoption by my Board had I not also felt there was no chance of their general observance over a district of $7\frac{1}{2}$ square miles with the staff I had at my disposal. The matter was so represented to the Local Government Board, and the imposition of building fees urged so as to provide a staff to carry out the bylaws; the reply was a courteous promise of consideration, but hoping, in the meantime, their "model" would be adopted. To this day the Local Government Board has done nothing to assist the officers, neither has my Board adopted the bylaws, for I hold it is bad policy to enact laws which cannot be enforced, which will be observed only by respectable and entirely disregarded by "jerry" builders. The infliction of penalties here and wholesalescape elsewhere is suggestive of official favouritism, and I maintain that we had better be without such minute laws than to bring them and the officers into disrepute and contempt by their habitual infraction. It is not, therefore, out of any want of appreciation or spirit of opposition that West Ham has not adopted the model laws of the Local Government Board. The moment the means are provided to maintain a staff for their observance, their adoption is certain. And here, in passing, I cannot refrain from giving public expression to a feeling present in the minds of every member of this association. As public officers, the Local Government Board impose their obligations upon us, they favour us with their criticisms, but in no single thing do they either consult, assist, or protect us. When an epidemic breaks out, locally or generally, one of the first suggestions made by sanitary authorities and local newspapers in their panic is to institute a house-to-house visitation; but, in fact, it is seldom attempted, and never effectually done, because it means expense, the ordinary staff being as utterly inadequate for such extraordinary efforts as it generally is unequal to ordinary requirements. But, whatever the extent of the staff, the local authority has no power of inspection unless there be knowledge or reasonable suspicion of the existence of a special nuisance. In any case, the power of entry can only be enforced after compliance with certain formalities involving time and trouble; on the other hand, be the householder ever so anxious as to his safety, he cannot, of right, require an official inspection of his premises unless a nuisance is known or suspected to exist. However serious may be an epidemic, sanitary officers have no power to make house-to-house inspections. It does not appear to be unreasonable that local authorities should have the power during epidemics as well as at all reasonable times, on reasonable grounds, to make house-to-house inspections, or that the ratepayers should, at all times, have the right to require such inspection. A short amending clause in the Public Health Act would readily effect all that can be reasonably expected. But to give effect to such power and satisfy the periodical demand, would impose on the local authorities the obligation of employing a sufficient staff of qualified engineering and sanitary officers. At present, at the best, sanitary inspection is not exercised in any sort of systematic manner—houses are built and drains are laid, especially, as has been said, in the suburbs of London, practically without effective supervision; and why? not for want of power, but because of the paucity of the engineering and sanitary staff. The public are not sufficiently educated in the importance of sanitary principles to induce them to consent to the payment of the necessary staff out of rates; but, as already

shown, there is an equitable way by which ratepayers may be relieved of rates and reconciled to the existence of officials—viz., by putting the burden on the right shoulders and imposing fees upon the chief offenders against sanitary laws—those who build houses and drive profit therefrom. Such fees would, of course, go to the local authority, and not, as in London, to the district surveyor. Some years ago local bylaws required a certificate to be given before any new house was occupied, but the clause has been expunged by the Local Government as *ultra vires*. If fees are imposed by legislation, it should also be enacted that an official certificate should be granted on the satisfactory completion of a dwelling-house. Such a certificate would be of real value, inasmuch as no one need then occupy a new house without its production. Sanitation would thus become a real increment of value in house property. Impressed with these views, I have, for years past, urged them, in season and out of season, long before the conception of the new limited sanitary *quasi* philanthropic companies. Some sixteen or seventeen years ago I joined in a memorial to the Home Secretary to enable local authorities to provide by fees for the proper supervision of buildings. A few years later I wrote to Mr. Gladstone on the subject, and he courteously promised to forward my letter to the proper department. For years past I have urged my own board and others to obtain Parliamentary powers to charge fees, and last year such a clause was included in a Bill promoted by the West Ham local board. There was no opposition, local or otherwise; the Local Government Board not only did not object, but officially recorded its opinion that the circumstances of our case were so exceptional as to justify the application. The metropolis has long had such powers; Bristol has for forty years; even the little town of Eastbourne has such powers. With these precedents, and such exceptional reasons, a committee of the House of Commons expressed its willingness to hear our case, and waited for our evidence; but a power greater than Parliament, an *imperium in imperio*, put a veto on our clauses, and ruthlessly struck them out; this omnipotent power, Lord Redesdale, totally ignorant of the place and the circumstances, is governed by the abstract idea that powers outside the Public Health Act should not be given to local authorities, totally disregarding the fact that every session exceptional powers are given to local authorities throughout the country in accordance with their varying necessities. No less than fourteen towns have recently obtained independent and varying local Acts for the report and registration of infectious diseases, such as small-pox, typhus, scarlet-fever, &c. Why, in the name of all that is "abstract," should these fourteen towns be granted such exceptional powers not included in a general Act, applicable to all towns? Why should Eastbourne in 1879 obtain the powers which are refused to West Ham in 1881? Because, replies my Lord Redesdale, "exceptional circumstances" exist at Eastbourne. Eastbourne being a pleasant resting-place from Saturday to Monday, I took the opportunity of investigating the "exceptional circumstances." A large part of the town is owned by the Duke of Devonshire, the very streets are called "Hartington," "Cavendish," and other of the family names. The duke's local agent is a leading member of the Local Board, and, whether or not he will acknowledge the soft impeachment, has the credit of obtaining the recognition of the "exceptional circumstances" applying to the pretty houses of dual Eastbourne and those who dwell therein during "the season." That any circumstance exists, "exceptional" or otherwise, in Eastbourne which has not tenfold force in West Ham is distinctly challenged. In short, the few hundreds of the upper and middle classes who visit the toy-like town of Eastbourne are to be more exceptionally protected in their temporary dwellings than the thousands of toiling factory artisans who are compelled to live all the year round on the Essex marshes. My present object is not to discuss the wrongs of my own district, but to illustrate, by a typical case, the difficulty local authorities have to encounter in an honest and reasonable endeavour to cope with a great evil and promote sanitary well-being. Here is a case in which an efficient supervision of the operations of building societies, speculating builders, and their accessory works requires an addition of some half-dozen inspectors to the

local staff. "Pay them out of rates," say abstract legislators, "it is a municipal obligation"; but we municipal engineers and surveyors know too well the difficulty of obtaining decent payment for our own services to expect a sufficient assistant staff. Large towns like Liverpool, Manchester, Birmingham, or Leeds, may provide the necessary staff ungrudgingly, but it is not so everywhere. And why should such burdens be laid on the rates? Estate owners and builders are working for their own interests, many making large fortunes.* Why, therefore, should they not contribute a fee, small in itself but large in the aggregate, to provide the supervising staff which their pursuit of fortune necessitates? Because, we are told, they are already adding to the rateable value of the town; if so they also receive, in common with others, the full value for their rates; but, as a matter of fact, such increase of buildings does not lessen the general rates, inasmuch as it involves a proportionate increase in the maintenance of roads, sewers, lighting, scavenging, police, &c., not to mention the School-board and poor-rates generally attending on the increase of a population. While abstract legislators, devoid of practical knowledge, are speculating, speculating builders are working: thousands of houses have been put up, and thousands more will follow before there will be any efficient control under a "general" Act. Imperial Parliament has no time for such trivial local matters. Surely there is as much necessity for "Home Rule" in England as in Ireland. Perhaps some of the members of this association will not assent to the full extent of my assertions. It is obviously derogatory alike to our pride and our efficiency as public officers to admit it; but I unhesitatingly assert, as the result of a long and varied private and official experience, that however good our local bylaws, and however anxious and capable our local officers, as a matter of fact there is no large town in Great Britain where, in its true meaning, sanitary supervision is efficient. Having quoted my official experience, I will crave a like indulgence in my private capacity in illustration of the defects of old houses. I have just entered a new residence; the house is not new, but a good, substantial, well-built family dwelling of the last generation. In it there are as many as four cisterns; in that from which the drinking-water is drawn sewer-gas was "laid on" by no less than three "services" or direct connections with the house-drains—viz., two flushing-pipes to water-closets and an untrapped overflow into the drain; each of the three pipes supplied sewer-gas for absorption by the potable water; another cistern had two connections with the drain—a closet-flush and an overflow-pipe; a third cistern was also connected with the house-drain by an untrapped overflow-pipe; but, curiously enough, the fourth cistern, not intended for the supply of drinking-water, was the only one unconnected with the drains. There were also two sinks in communication with the drains. In fact, within the house there were no less than nine drain connections with sinks and cisterns, exclusive of water-closets. All this was altered at considerable trouble and cost, much greater than if correctly done at first. No sewer gas can now enter the house or contaminate the water. The new arrangements were regarded as "fussy," and sarcastically described as "very scientific," and as a further comment upon the sanitary theories thus practically asserted was quoted the fact, which is undoubtedly true, that in the same house the preceding family had for very many years lived very healthy lives. The obvious reply is that, according to all the laws of sanitary science, the inmates of such a house ought to be ill; under such conditions escape must be due either to the "survival of the fittest," that is, the inherent resistance of robust constitutions, or to the protection of a special Providence which cannot be tempted with impunity, for those who know the law and disregard it may expect and deserve "to be beaten with many stripes." Let me quote another case or two. In the civic palace of the Lord Mayor of London, [in. of floating fungi-] scrub was recently found on the surface, and [in. of mud at the bottom of the cisterns, while a bottle of water on his lordship's table contained hundreds of nematoid worms. Nor is the West-

end of London better than the City, for in the cistern of the Athenæum Club, St. James's, was found a large quantity of offensive mud and animal organisms. The discoveries as to the insanitary condition of the Government offices are only too notorious. In poor neighbourhoods and small houses, the water-butts and cisterns, especially in London, are situated in close courts and contiguous to every kind of filth; generally placed over the water-closet, near a sink and dust-bin, untrapped pipes communicate directly from the cistern to the soil-drains. They are frequently uncovered, consequently the water absorbs the impurities of the surrounding atmosphere; they are not cleaned out from one year's end to another, so that they accumulate mud and slimy vegetation. But it is unnecessary to multiply instances, or enlarge on the existence of evils so well-known to us sanitary officers. To a condition of things such as above described, in houses new and old, is undoubtedly due the lassitude, the illness, and the death of thousands whose inherent power of resistance is unequal to the fight. Those who are subject to such influences stand very much in the relation of the unvaccinated to small-pox: they may escape, but the chances are obviously against those who neglect the protection so well known and so easily attainable. I think it has been sufficiently proved that sanitary supervision is needed in our dwellings, and that it is equally obvious the work should be a public and an official one, and not undertaken by amateur or stockjobbing companies whose philanthropy is confined to shareholders. That the work has not been done before is not the fault of us officers; that it can be done, if paid for, is the very argument on which the companies are founded; but that shareholders should be protected and the poor neglected is a proposition too monstrous to be discussed. Sanitary protection is the legal right of all without subscription or "entrance fee" beyond the obligatory general charge of rates. We have seen how means can be provided without increasing the rates by charging the costs on those who can and should provide them. Surely fees are sufficiently recognised in England: from a railway station to a Government office, can any information be obtained or act done without a fee? Why a fee should be imposed on every new house in London, Bristol, and even little Eastbourne with admitted advantage, but no other town should share in such an advantage, is inexplicable, unless it be to leave an opening for a new development of commercial enterprise in the formation of Sanitary Protection Associations (limited). It is true that an Englishman does not like officialism. We know, by experience, that it is in his nature to put himself in a fighting attitude towards officials; but if we must needs have officers, it is better to have the responsible officer of a legally constituted and recognised authority, than irresponsible employés of a limited liability company. It is a disgrace to our legislation that in England, the cradle of sanitary science, there is room for such companies. We read in the *Sanitary Engineer* of New York:—"Chicago has found the results of her system of factory inspection so beneficial that she is now applying it to tenement houses. Six inspectors are now making a critical inspection of the tenements, and will continue it until the 7,000 tenements which, according to the *Chicago Times*, there are in the city, shall have been examined. The *Times* says that the work has now been reduced to a system, and complete records are kept of all work done. These records consist of date, location, ward, district, name of owner or agent, description of building, number of rooms, number of families, with the number of persons in each, sanitary condition of the building, action taken in abating nuisances found, and explanatory remarks. Each inspector is provided with blanks, which he fills out at the close of each day's work. His report describes the condition of the plumbing, drainage, the local sanitary condition, and notes any violations of the city ordinances. In case anything is found about premises which is detrimental to health, a notice is served on the owner or agent, who is required to comply with the ordinances of the city relating to the abatement of nuisances." We also read that in New York and other States household plumbing is placed under official inspection. This is the outcome of more advanced public opinion in America. I have already hinted that the British ratepayer

is not yet sufficiently educated in sanitary principles; he does not yet appreciate the maxim that "Prevention is better than cure," that it is very much cheaper to employ a few inspectors than to pay the rates consequent upon preventable disease and the untimely death of the humble breadwinner. I therefore submit the following propositions:—That a more efficient and extended supervision of the sanitary and constructive details of all dwellings is necessary. That such supervision should be conducted by the responsible officers of the local sanitary authority. That it is just and expedient that fees be imposed on all new buildings, to provide the cost of such supervision. In conclusion, we must hope more from education than officialism. If sanitary science were studied in our schools, and our youth taught to avoid vitiated air as they would false quantities; if elementary hygiene were recognised as equal in importance with simple equations, many a good and useful life would have been saved for the commonwealth. But now, in the selection of a house, more attention is given to a "dado," a "cornice," and "æsthetic" ideas, than to the cistern, sink, or other vital conditions of health. How difficult even is it to obtain compliance with the most simple and obvious sanitary rules in one's own house! For example, whatever may be the radical defects of construction, sewer-gas may at least be neutralised and kept out of the house by always keeping the closet-door shut and the window open; but we almost invariably find the reverse rule to obtain, the window is shut and the door open, especially at night, when the house is almost hermetically sealed, and a current of sewer-gas, induced by the warm air, enters our sleeping-room at a time when our powers of resistance are at their lowest. In large hotels we find at the end of a long corridor of bedrooms a battery of closets with every window shut and every door open, unless some "fussy" people, like ourselves, take the trouble to reverse the arrangement by opening the windows and closing the doors. It is unnecessary to say more. The canon laws of house sanitation are very simple and easy to observe. Builders will say that "doctors differ"; it is not so; there is no differing upon general principles; they are so well known to every member of this Association, that it is unnecessary to state them; but for the advantage of the general public I may be excused for repeating some of the more important of them. There should be no connection between the house and the sewers excepting for sewage; the soil-pipe should not by any chance ventilate itself into the house; all other drains or pipes from cisterns, baths, lavatories, sinks, &c., should discharge into the open air; the drinking-water should have no connection with the closet. These are cardinal rules, the neglect of which may be fatal; but nearly everyone can discover for himself such neglects. There are, of course, other matters more difficult to detect. We have only stated principles and facts, well known to all sanitarians, which have been repeated over and over again. But sanitarians are few and the population is large; the population is also careless, and it is not until an unexpected, cruel, and irreparable death has smitten a family with deep affliction, that conviction is forced upon the survivors, and alas! when too late, they recognise preventable causes and adopt the simple precautions and protections which, at present, are almost exclusively the privilege of the occupants of workhouses and jails.

PRACTICAL NOTES ON PLUMBING.*

X.

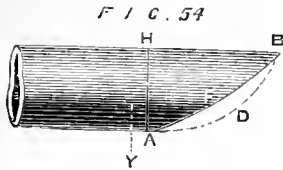
By P. J. DAVIES, H.M.A.S.P., &c.

KNUCKLE BENDS (Figs. 54 and 55).

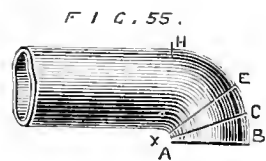
THESE bends are not unfrequently used in small-pipe work, especially for the bosses of cocks, valves, &c. They are likewise very handy for rain-water pipes, when the pipe is required to convey water from a cesspool through a wall into a rain-water or cistern-head, as also for trapless and some other water-closet work, such as Jennings' closet and trap in one piece. They are made as follows:—Fig. 54, shows the method. Most plumbers cut the end as from A to B, others cut it as shown by the dotted

* It was only last week that the Master of the Rolls, in giving judgment in a certain case, said, among other caustic remarks, "We are not to sacrifice the interests of the public to the interests of the speculative builder."

lines A, D, B, and then work the end B over, as best they can (often taking double the time they

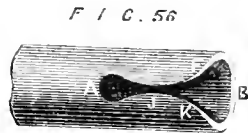


ought) in doing it. The proper way is first to strike the outline of the bend on the bench or floor, as at Fig. 55. X is the point to first strike



the throat A from; then, open your compasses to whatever size your bend may be required, and from H, strike the back, H E, C B; take the compasses and divide the back into any number of equal parts, as at H G, F E, C B, Fig. 57. Here you have 5in. set off, from B to H, Fig. 54. Cut the pipe to about the shape shown in the dotted lines, then place the point of the bolt or tommy (Fig. 23) at A, Fig. 54. Work this up from the throat or lip A, Fig. 55; then take the small point P of your dummy, Fig. 38 B, and place it inside the pipe at about E, and with the mallet or small dresser work the point B and the sides F, up to the proper shape. It will come up better if you open the sides F with your turnpin P R, Fig. 50.

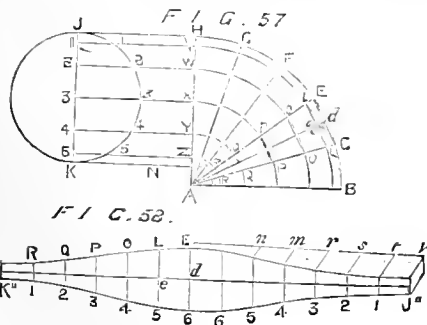
I have found the best method of cutting these knuckles is that described in Fig. 56. It is



done for small-pipe work, by first boring a hole A, and with the chipping-knife (a knife having a leather-covered handle, obtainable at any tool-makers, and similar to a backing-knife, excepting that it is stronger) cut the slit J, and round the ends off as at F, then drive the turnpin up and open the side F K; next with the bolt make the throat or lip, as shown at A, Fig. 55. Now with the mallet and dummy, work the end B, and sides F K up, as that shown at Fig. 55.

THE THEORY OF BENDING (Fig. 57).

A few lines respecting the theory of Bending may not be out of place here, Fig. 57 will assist



in the description. Let J K be the size of your pipe to be bent. Draw the right line J K; Divide this pipe into, say, five parts, as shown at 1, 2, 3, 4, 5, on the circle. Next draw the lines J H and K N, square to the line J K; now strike the line H A also square to J H, and anywhere on this line, as at A, strike the throat line, also the back, as at H G, &c.

Draw the parallel lines V 1, W 2, X 3, &c., through the divided part of the circle, and strike the curved line V L W O, &c. Next divide this curve from H to B, into five or as many parts as you choose, as shown at H G F E C B, and also divide one of these as at A d, and draw straight lines from point to point, as at L L, O O, P P, Q Q, R R; next strike the line J K, Fig. 58., and measure off from J 1, in Fig. 57, and set this distance on J 1, Fig. 58, thus measure from 1, 2, Fig. 57, and set this off on Fig. 58, and so on until the whole is marked off. When all is marked off and laid down as from J to G, Fig. 58, continue from G to K, which will be the exact distance round the bend. From d to E, Fig. 57, measure off the distance of the short line, and place this on the line K J, Fig. 58, as at E d and d G; also measure off L e, Fig. 57, and place this on the line L e, Fig. 58, and so on until you have the lot. Now draw the curved line through the distances or points R 1, Q 2, P 3, O 4, L 5, F 6, and this will be a development of one section, H G, Fig. 57.

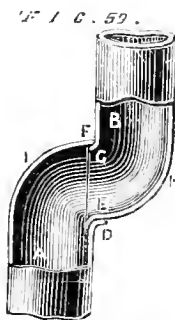
Now, seeing this, it is quite clear that when the pipe was in a straight line, the back and throat were of equal length and substance, therefore the piece 58 across R 1 was the same as that across E G; this being the fact; when pulling up bends at at Fig. 46, the molecules of lead must be either driven as it were into a heap at R 1 (but less so at Q 2, P 3, &c.), or worked from K towards E, that is, if you are not to strain the back; but if you work away by hammering the back out, you do not require to thicken the throat part.

I must now direct your attention to the "Split made Bends," Fig. 44. In this case you can take away the surplus lead without trouble.

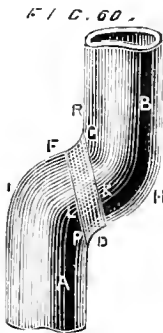
Now turn to Fig. 55. Here we have the back the thickest part—just what is required, for here it is that the friction of the water takes place with vertical soil-pipes.

DAVIES' SIMPLE "SET-OFFS," OR KNUCKLE-JOINT SET-OFFS.

Fig. 59.—The knuckle-bend may be converted



into a simple "set-off" by the method illustrated in diagram 59. In this diagram you are shown that the pipe B enters A, similar to that at E G. After preparing this for a joint, it is finished as at Fig. 60, and makes good sound

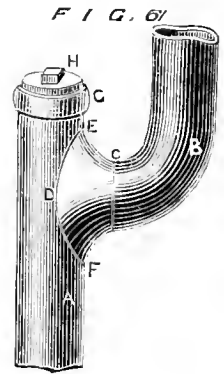


work. One thing is certain: this set-off is strongest at the part where strength is most required.

DAVIES' CLEANSING SET-OFF.

This is another simple set-off, made either with a bend or knuckle-joint. This set-off has a cap and screw, H, cleansing the soil-pipe. This requires no further description, and its

working is all that is required at about one-fourth the cost of labour in making ordinary



set-offs. I am pleased to say that these are the first on record.

(To be continued.)

MR. HELLYER'S LECTURES ON PLUMBING—DISCUSSION.

A DISCUSSION, arranged by plumbers, took place on Monday night on the subject of Mr. S. Stevens Hellyer's recent lectures on "The Science and Art of Sanitary Plumbing," delivered under the auspices of the National Health Society. At 7.30 p.m., the hour fixed for commencement, the large hall of the Society of Arts was well filled, the audience consisting almost exclusively of master and operative plumbers. Mr. Ernest Hart, Chairman of the National Health Society, presided, and was supported on the platform by Messrs. S. S. Hellyer, H. H. Collins, Ernest Turner, Rogers-Field, W. Eassie, S. H. Coles, and others. The proceedings, although animated, were very orderly throughout, and the interest was thoroughly maintained during the two and a half hours of discussion.

At the call of the Chairman, Mr. DANIEL EMPLAGE, Dane-hill Sanitary Works, Margate, opened the discussion by reading a paper. As a provincial man, Mr. Emplage said, he cordially agreed with Mr. Hellyer's allusion to country shops, especially with the advice given to young men to come up to London to improve themselves in their trade. At the same time he must point out that in many parts of the provinces a lively interest was taken in sanitary matters. He should have liked to have heard more from Mr. Hellyer on one or two points, including that of trap-waving or siphonage. About two years ago the speaker fixed an improved hopper-basin into a Beard and Dent's T-trap, taking a 2in. air-pipe from top of outlet into the soil-pipe vent, which was carried up full-bore to the top of the house. He happened to be near when the servant emptied a toilet-pail rather carelessly, and then, with equal thoughtlessness, left without flushing the basin, and the result was that the trap became unsealed. About the same time he fixed a similar basin into an unventilated S-trap, connected by a 6in. bend into a drain ventilated at each end by a 3in. shaft: this trap also occasionally lost its seal. He was rather puzzled by these cases, and had since made siphon-action in traps a special study, experimenting with the old S, the east S, the Eclipse, the V, the S and T-siphons, with several shapes made by his own men for the purpose, and also with stoneware traps of various makers. These were fitted for testing, in connection with improved hopper-basins, to drains and soil-pipes arranged in every possible manner. He had also made notes of over fifty arrangements, carried out in Margate, and from the several experiments was led to the following conclusions:—1st, that the S and T-siphons were, when unventilated, very unsafe, because easily untrapped by waving-out, or siphonage; 2nd, that the east S, the Eclipse and the V, held their seals much more tenaciously than the siphons, but were still very liable, under some conditions, to become unsealed by ventilation; 3rd, that the old S-trap was very much more difficult to untrap than any of those previously mentioned, but even this, when without ventilation, was

had spoken against movable cowl, and although he held a patent in a glycerine-movement cowl, he recommended the use, wherever practicable, of fixed cowl. Something had been said about architects' ignorance of sanitary details; there were many architects who were doing much to instruct people in sanitary matters, and some they knew had promoted these lectures to plumbers, but others declined to move, and he had been surprised lately to find some grave defects in drainage and ventilation in plans by one of the first architects of the kingdom. At the same time, it should not be forgotten that there were so-called plumbers who could not make a joint properly, and did not understand the simplest principles of health; but it was to be hoped that the general interest taken in the subjects and the development of the School-board system would reduce the numbers of this class. In conclusion, he urged plumbers to exert themselves to make theirs, as it should be, the leading and most advanced of the building trades.

Mr. J. VANCE said he had to do work for a gentleman who, finding from Mr. Buchan's book that a pan closet would cost £2 12s. and one constructed on better principles £5, ordered the former, and before long had to spend another £3 on ventilating-pipes to remedy the smells. In this case he ventured to tell the architect that he knew the pan-closet would never be satisfactory, when he was told, "You are not paid to know, but to do." He suggested it would be better for all parties if an architect would explain directly to the plumber what he wanted done in a house, instead of issuing orders through the foreman.

Mr. S. D. SCOFFERN spoke at considerable length on protection from bursting of domestic boilers, education, and other foreign subjects, amidst impatient cries of "Question," and was at length called to time by the Chairman.

Mr. H. H. COLLINS, F.R.I.B.A., said some mention had been made of the trapless closet, and having used it in his own house, with a large family, he must say it answered admirably. If placed in proximity to a sewer, it would, no doubt, be objectionable; but properly ventilated it was infinitely superior to other closets. It had no container, no \square -trap, no apparatus to get out of order, and little brass-work to become corroded. There was, certainly, a tendency to accumulate a little filth beneath the pan, but he gave the housemaid some spirits of salt, with directions to cleanse it about once a week, and that kept it quite sweet. There was one objection about this closet to plumbers—he had never had it repaired. He feared architects, as a body, through carelessness, but not through ignorance, had neglected some practical matters in favour of the artistic side of their profession, till there was some danger that specialists would take this engineering and sanitary work from their heads. In criticising their plans and specifications, however, it should be remembered that architects were not always their own masters, any more than was Mr. Hellyer. Mr. Norman Shaw and other leading architects, and such plumbers as Mr. Hellyer, might be able to refuse to carry out work unless their ideas were followed, but the young and struggling architect or plumber couldn't take such high ground. The way in which the crassly-ignorant or obstinate client could best be convinced of his errors, was by the delivery of such lectures as those of Mr. Hellyer, and the wide-spread discussion they gave rise to. When the public was fully educated, pan-closets and similar abominations would pass into limbo, and be only known as matters of history. He had regretted to hear a speaker early that evening say, in very ill taste, that from all the lectures delivered by Mr. Hellyer he had not gained one particle of information. He was very sorry for that individual. (Loud applause.) He scorned to bestow that false praise which was but satire in disguise; but he must say that the efforts of a gentleman closely engaged in business who had given up so much of his time gratuitously to instruct others in the details of his and their trade, and to impart the benefit of his experience, deserved grateful recognition at the hands of plumbers. (Loud applause.) If Dr. Johnson's dictum were true, that we could learn something even from a fool, the gentleman who had complained of Mr. Hellyer's rudimentary instruction could not be said to have displayed a large amount either of wisdom, intuition, or experience.

Mr. LAMMAS having spoken, Mr. WISE proposed that a plumbers' association should be formed for mutual improvement and protection, the reading and discussion of essays, and of trade questions.

Mr. SAVORY suggested that the whole of Mr. Hellyer's lectures should be printed in book-form, together with the criticisms in the papers and of that evening, and sold at a low price, say, 4d. or 6d. per copy.

The CHAIRMAN said, before calling upon Mr. Hellyer to reply upon the discussion, he ought to explain that that gentleman did not volunteer to give these lectures. On the contrary, when the committee of the society had decided to adopt Mr. E. Turner's suggestion, and inaugurate a series of lectures to plumbers, the speaker applied to Mr. Hellyer as the person best qualified to deliver such a course, but he at first declined on account of his health and pressure of business. The committee pressed him, however, feeling that whether plumbers as a body agreed or disagreed with Mr. Hellyer's opinions, they would have the benefit of a searching, able, and honest discussion of the leading questions still unsettled. How far these expectations had been realised the audience would judge (applause), but Messrs. Eassie and Rogers-Field desired him to express their opinion that the lecturer had shown considerable knowledge of his subject. If the lectures led to further discussion and inquiry, the great object the committee had in view would have been gained, and it had been a great source of satisfaction to the society to see these lectures so numerously attended. He hoped many would compete for the prizes offered by the society, and he could assure them that every effort would be made to secure practical and theoretical competency as well as impartiality amongst the judges.

Mr. HELLYER, who was greeted with warm applause, said, when solder was only half-heated it would not run freely, and he feared his tongue was not likely to be fluent, as the discussion had not been of a character to warm him much. No one had a right to hold opinions on sanitary plumbing unless they were based on good grounds. His views could not be shaken, for they were based on the solid rock of practical experience. Cows were an advantage in hundreds of cases, as they helped to increase the up-current. He had tested this at the cost of £200 or £300, and therefore was certain of what he advanced. Something had been said about society men and non-society men, and their relative skill, but in his firm they never asked the question; so long as a man was honest, industrious, and steady, that was all they wanted. In a letter to the BUILDING NEWS, Mr. Davies had said the best work the lecturer exhibited in that room was done by a society man; but this was a mistake, as the man in question had left the society about eight months previously. What he had meant to say was that the society was not particular enough as to the qualifications of a man before admitting him as a member. He was glad Mr. Davies had found out the way to improve the \square -trap, but even then the \square -trap held twice the quantity of water that the siphon-trap did. Mr. Court had said that he had done harm to young plumbers; but this was not so: his chief aim in coming there and lecturing was to benefit the younger men. His advice to have two pots of solder for underhand and general work only applied to large jobs, where eight or ten pairs of men were employed. In such works the time occupied often decided the question whether the master would or would not make a profit. He confessed he had put his foot into it by telling them he had made some pan-closets; but in a note to the circulars he put the warning, "This closet is totally unfit for use." Indeed, he had only made about thirty in the last two years, and then under pressure. In the hotel in question he explained the disadvantages, but was told the building was to be largely used by foreigners, and that the proprietor had pan-closets fixed in the portion already occupied, and preferred them. Mr. Buchan had supported what he had said as to siphon-traps with the weight of his experience, which was very valuable. The trapless closet, so strongly recommended by Mr. Collins, must have a very short arm, or illness might occur in the house. The majority of people would not, he feared, keep it so clean as was necessary. The owners of houses were finding out that their property was enhanced in value by being "well-drained and well-plumbed," to quote an

Americanism, and the occupiers were also learning the importance of these matters. Since it was a question of health or disease nothing should be allowed to stand in the way of plumbing progress.

Mr. J. HART asked if the competition was still open for plumbing specimens; because if so it was unfair towards those who had exhibited at the recent sanitary exhibition.

Mr. W. H. COLES, secretary, said the subjects for the society's competition would be announced on the 15th September, and work must be sent in by the 30th September.

Several competitors urged it would be unjust that other plumbers should have the opportunity of entering now, after seeing the new ideas embodied in the specimens already sent to the Sanitary Exhibition at South Kensington, and Mr. Coles and the Chairman having failed to meet the objections, Mr. Collins replied, showing that the competitions were distinct. That just closed at Kensington was for extra prizes offered by Mr. Hellyer; that, the conditions and subjects of which were to be published on September 15th, was for prizes offered by the National Health Society, and specimens sent to Kensington could be re-entered for this competition, and so would stand a double chance. The meeting closed with formal votes of thanks to Mr. Hellyer and the Chairman.

CAMBRIAN ARCHEOLOGICAL ASSOCIATION.

WE referred briefly last week to the proceedings of this association on the two concluding days of its annual meeting, and now append a fuller report.

On the Thursday the party reached Wenlock by breaks from Stretton, and proceeded thence by train to Buildwas. Visiting the Abbey, Mr. Allport Leighton produced a plan of the original buildings, so far as they have been traced or can be conjectured. The abbey was founded in 1135, by Roger de Clinton, Bishop of Chester, for Cistercian monks, and dedicated to St. Mary and St. Chad. The monks were silent, stern, austere, and plain—there was no elaborate sculpture about their buildings, and no splendid shrines. The church was cruciform, 163ft. long and 26ft. wide, with nave, central lantern-tower, chancel, north and south transepts, and chapels. The nave was 70ft. long, and consisted of five bays. The arches were slightly pointed, and the period Transition Norman. The pillars were simple, massive, round, with square indented capitals, and cushion and mouldings, which varied slightly, and only ran around one half the circumference. The clerestory windows are round-headed, deeply splayed, and the shafts have sculptured capitals. The nave and aisles were not vaulted. There was no west door, but a flat buttress between two lofty windows. That end of the church was probably appropriated to the lay brethren and the infirm monks, the aisles being for strangers. At the west end there had been a wooden gallery of the 15th century to connect the aisles, so that strangers could pass from side to side without interfering with those in the nave. The nave was separated from the choir by a rude screen dividing the two eastern bays from the rest. The lantern-tower rose but slightly above the high-pitched roof. The arches sprang from brackets, and there was a staircase from the south transept which led into the tower. The chancel was the oldest part of the existing building, but had been altered very much. The chancel and chapel were groined. The east end was square, and without aisles. At this end was a triplet of lofty round-headed windows, which were originally in two tiers. The window on the south side had also been lengthened; that on the north side was untouched. There was an aumbry and piscina. In each transept were two chapels, those to the north transept being the most perfect. In the north transept is also a door leading into the adjoining sacristy, dormitory, and cloisters. North of the sacristy is the chapter-house, at a level of 5ft. below the church. This is oblong, with round-headed doorway, a round arch on each side, with chevron mouldings. The apartment was vaulted in nine compartments on four slender columns. The capitals and corbels were simple but various. There were also some sepulchral crosses in the chapter-house of the date of the 13th century, and it would be ob-

served that the windows had not been glazed. Mr. Leighton also pointed out the position of the dormitory and cloister, and referred to Buck's view of the building in 1731, which was pronounced not to be very accurate. North of the cloister was the refectory with butteries and kitchen and the guest-house, where true hospitality was ever extended to the poor wayfarer and stranger. North of the cloister was a passage or slype, and next the hall, of three bays with round pillars, communicating eastward with the infirmary chapel and court. Still north was the hall of the infirmary of two bays separated by four short round pillars of the 12th century. The south bay has the table-hall, and in the northern bay were beds for the sick and infirm. Eastward were the infirmary lodge and the abbot's lodge. Here there were tiles of the 15th century, and there was also a portecullis. Near was a subterranean passage which led to an underground chamber which was presumed to be the place where, in troublous times, the neighbouring families took their deeds and other valuables for concealment.—The party returned by train to Wenlock, and then visited the church. At the west end of the nave, but inside the tower, was a feature in regard to which, as time was pressing, no one ventured to offer an explanation. It consisted of an arcade, with some beautiful carved work, and a casual glance seemed to show that the tower had been built up against the other masonry. Inside the church, under the gallery, was a small Saxon arch. The breaks having been again occupied, the party drove over Wenlock Edge, up Harley-bank, and, turning to the left, proceeded towards Acton Burnell. The castle was glanced at, and then the church. Entering the vehicle again, the party drove to Leebotwood, and thence proceeded by train again to Stretton.

On Friday the party reached Shrewsbury by train, and the breaks which awaited them at the station conveyed them to Haughmond Abbey. Mr. Leighton here pointed out the very beautiful arch and doorway, which, he said, was all that remained of the church. The doorway was the entrance on the south side. The church itself was destroyed, but the foundations had been traced, so that the form of the building had been ascertained. It was said that stones were brought from Wroxeter to build the church, but he did not know that to be a fact. He did not know what had since become of the stone. The adjacent tombstones, now inclosed in iron railings, were about the 13th century. There was on one a cross rising from the shield, on which, no doubt, the arms had been emblazoned. The high altar must have been somewhere near. Mr. Leighton then pointed out what he believed to have been the lavatory, and then the chapter-house, and, in reply to a question, said he supposed the old font the latter contained must have been found among the ruins. Part of the chapter-house had been modernised by the Barkers, who utilised it as a dwelling. The arches and figures below were examined with a good deal of interest. Mr. Leighton then pointed out what he believed to be the abbot's refectory, but what has been said to be the infirmary. One of the arches he believed led to the buttery and the other to the kitchen. Adjoining the refectory were the abbot's lodgings. The party next visited the old well near, with its covering of masonry. The party then drove towards Wroxeter, and, arriving at this interesting relic of the Roman occupation of England, Mr. Leighton pointed out the three arches in the portion of the walls which remains, and also a hypocaust, the construction of which he explained. As to the date of the wall they had no clue, except that a silver coin of Trajan had been found among the mortar.

The party next proceeded to Wroxeter Church. Here there was a very massive old font, near the doorway, and, in other parts of the church, monuments to Sir Thomas Bromley and wife, dated 1558, and another to Sir John Burber and wife, dated 1618, the figure of the former being in armour. On the other side of the church, in the chancel, was another very fine tomb, with two figures and the inscription:—"Here lyeth the bodye of Sir Rychard Newporte, Knyghte, which dyed, beinge one of the Queen's Majesty's Counsell in the Marches of Wales. Deceased the 12th daye of September in the year of Our Lord God 1570 and Dame Margaret his wyfe which deceased the — in the year of Our Lord God —." It was suggested, in reference to the blanks, that the tomb was erected prior to

the wife's death, and the blanks never filled up. Underneath were figures of the members of the family of the above, and one who died in infancy was wrapped in swaddling clothes. Inside the church was a curious string-course, running around the chancel-end. In the garden of the Vicarage near, was a summer-house composed of stones from Wroxeter, and among them were some very fine specimens of Saxon work. The party then returned to Shrewsbury, where the inspection of the Museum afforded evident pleasure, but there was a very general expression of regret that more commodious and better accommodation cannot be obtained for the display of so interesting and valuable a collection. Mr. Jebb produced for the inspection of the visitors an ancient jug, which was found recently near Ditton Junction Railway Station, near Rumcorn, by Mr. Webb, of Crewe, in sinking a well. A piece of Samian ware was also found, and two coins. The jug is of the 12th or 13th century, and was found 12ft. from the surface. There was an old well there, and the jug is supposed to have fallen in. It is in excellent preservation. Two coins were found at the same time. One was a second brass Domitian, A.D. 96, and the other a second brass Nerva, A.D. 98.

In the evening the party returned to Stretton by train, and a meeting of the members subsequently took place. Mr. Richard Williams, of Newtown, exhibited "the Towyn incised slate," which has of late excited so much interest among archaeologists. This slate, which is very curiously marked with figures, was discovered in a field near Towyn about eighteen months ago, about 3ft. below the surface of the ground, and was, at the instance of Professor Rhys, referred to Mr. J. Park Harrison, a gentleman who had previously acquired celebrity on account of his painstaking researches in connection with the Easter Island tablets and the markings on the chalk in the Cisbury pits. Mr. Harrison was so impressed with the curious nature of the engravings that he, with Mr. Williams, devoted several days last spring to excavating the ground where the slate was found, the result being that extensive ruins were discovered of what are supposed to have been dwellings of Irish settlers, or Marauders, in the 4th or 5th century, as well as numerous stone and iron implements, bits of pottery, and animal and human bones. A full account of these discoveries, with illustrations, is in preparation by Mr. Harrison, and, at the request of the committee, Mr. Williams permitted Mr. Worthington Smith to make an exact drawing of the slate and its inscriptions.

SUSSEX ARCHEOLOGICAL SOCIETY.

THE last excursion of the above Society to Ashburnham will, according to the report in the *Sussex Advertiser*, long be remembered by the members of the Sussex Archaeological Society as one of their most enjoyable and interesting "outs."

The gathering place was at Pevensey, whither the members with their friends flocked from all regions, some coming from as far as London. A large number assembled, to be further reinforced at Ashburnham, where about 350 persons mustered in front of the church. Nine vehicles of various dimensions were kept in readiness for conveying the party from Pevensey to Ashburnham, and these proved none too many. The arrangements for the excursion had been made by the Sub-Committee, consisting of the Honorary Secretaries, Rev. W. Powell, of Newick, and Mr. F. Barchard, of Horsted Place, and Mr. Robert Crosskey, Mr. J. C. Lucas, and Mr. Griffith. The train reached Pevensey at about 11 o'clock. The visitors repaired first to Westham Church in the vicinity of the station—a plain, but rather interesting church—over which the party were conducted by the vicar, who made a most audible cicerone. The church, which is a large stone structure, built partly in the Decorated style of English architecture, dates back to the year 1539. It consists of a chancel, nave, and two chapels, that on the south being dedicated to St. Katherine. From Westham the party proceeded to the fine ruins of Pevensey Castle, which is one of the most perfect of castellated remains of Roman origin. The outer walls of the castle inclose an area of about eight acres, and are almost 20ft. in height. In the interior is a smaller fortification, of a quadrangular form,

with round towers, and was at one time entered by a drawbridge. The circumference of the outer walls is about 260 rods, and must at one time have been of immense strength. Many an archaeologist cast a longing eye on these remains, and one could read in the expression of his face that he could content himself amidst the ruins without going any further. A few of the party, who had made good use of their time, went on to Pevensey Church, a fine and interesting structure of considerably greater age than Westham, and which was much admired. After about half-an-hour's drive, revealing some interesting sights in the distance, such as Hurstmonceux Castle, which is said to be one of the oldest brick buildings in the county, the seemingly small, but scattered village of Wartling was reached, and a halt was made to inspect the little church, which lies far away from the main portion of the village, in one corner of the parish something like five miles from the opposite end. The wooden spire is rather a rarity in Sussex. The next ride was from Wartling to Ashburnham. The Vicar (the Rev. Rose Fuller Whistler) was waiting outside the church, and proceeded at once to show the visitors over the church, explaining its various features of interest. The church was rebuilt in 1663; and one of its most remarkable features is that in all of the windows the mullions are of oak instead of stone. The Vicar read a paper on the church.

The party were next conducted to the mansions of the noble Earl of Ashburnham, where they were shown through the various apartments. The party entered by the west door, in the entrance-hall of which are hung several very fine portraits of the Earl's ancestors, and other celebrities of days gone by, amongst whom we noticed King Charles I., Queen Elizabeth, Mary Queen of Scots, Prince Rupert, and the Earl of Marlborough. There were also in the hall several miniature coats of mail, old-fashioned muskets and pistols, and other relics of ancient warfare. The majority of the portraits in this room are by Sir Peter Lely and Sir Joshua Reynolds. The manuscript library contains some very fine specimens of ancient manuscripts dating back as far as the 4th century. The next room was that of the main entrance. Here were hung Rembrandts and Vandykes, and pictures by other celebrated artists, such as Salvator Rosa, and Gainsborough; but the chief object of interest was a little glass case in which were deposited the watch and underclothing which King Charles is supposed to have worn on the day of his execution.

The dinner took place at about half-past three at the George Hotel, Battle.

The speeches concluded, the majority of the party betook themselves to the vicar's residence, where the Rev. R. F. Whistler had many things of archaeological interest to show them, among which was an ancient iron violin, which is 19in. in length and 3½in. in width. There has been much discussion as to the origin of this violin; and the Suffolk Archaeological Society, who had it for many years, came to the conclusion that it was made some time during the reign of Henry II. Among the collection was also a fleshbook in very good preservation and also an immense spur, such as was used by the knights of old. Another very interesting relic was a portrait of one Isaac Ingall, who died in 1795 at the good old age of 120. The inscription on the brass plate which is attached to it says, "Sir J. W. Webster caused this portrait to be painted." It had been hoped that the party would have been able to have visited some of the old smelting furnaces, which were still kept in use during the lifetime of the late Earl of Ashburnham, but as they were distant some two or three miles from the vicarage, and as the time for the return journey was drawing near, it was found impossible to do so, but it is hoped that on some future occasion the members of the Society will have an opportunity of seeing them, and also other places of interest in and about the neighbourhood. The return journey was commenced about 6.20.

SCIENCE AND ART DEPARTMENT.

THE twenty-eighth report of the Science and Art Department of the Committee of Council on Education has been issued. It shows that the number of persons who during the year 1880 attended the schools and classes of Science and Art in connection with the department are as follows, viz.:—60,871 attending Science

schools and classes in 1880, as against 59,519 in 1879, and 837,308 receiving instruction in Art, showing an increase upon the previous year of 41,864. At the Royal School of Mines there were 25 regular and 175 occasional students; at the Chemical Department Science Schools, 245 students; at the Metallurgical Laboratory, 79. At the Royal College of Science for Ireland there were 20 associate or regular students, and 38 occasional students. The lectures delivered in the Lecture Theatre of South Kensington Museum were attended by 4,702 persons. The evening lectures to working men at the Royal School of Mines were attended by 1,800 persons, being 626 more than last year; and 230 science teachers attended the special courses of lectures provided for their instruction in the new Science Schools at South Kensington. The various courses of lectures delivered in connection with the department in Dublin were attended by about 736 persons. The total number of persons, therefore, who received direct instruction as students, or by means of lectures, in connection with the Science and Art Department in 1880 is 906,771, showing an increase as compared with the number in the previous year of more than five per cent. The attendance at the Art and Educational Libraries at South Kensington and at the National Library in Ireland in 1880 has been 84,184, a decided increase over that of last year. The museums and collections under the superintendence of the department in London, Dublin, and Edinburgh were last year visited by 2,332,443 persons, showing a decrease of 167,321 on the number in 1879. It should, however, be observed that the number of visitors to the South Kensington Museum shows a large increase, the numbers being for 1879, 879,395, and for 1880, 981,963. The returns received of the number of visitors at the Local Art and Industrial Exhibitions, to which objects were contributed from the South Kensington Museum, show an attendance of 696,541. The total number of persons who during the year 1880 attended the different institutions and exhibitions in connection with the department has been upwards of 3,935,155. This total, compared with that of the previous year, presents a decrease of 8,552. The expenditure of the department during the financial year 1880-81, exclusive of the vote for the Geological Survey, which was £21,717 12s. 11d., amounted to £312,963 17s. 10d.

PARKES MUSEUM INTERNATIONAL MEDICAL AND SANITARY EXHIBITION, 1881.

THE Medical and Sanitary Exhibition organised by the committee of the Parkes Museum was open for the last time on Saturday, August 13th, when the number of visitors, exclusive of season ticket-holders, was 1,221, making a total of 24,333 visitors for the four weeks during which the Exhibition has been open, allowing only for one visit by each season ticket-holder. During the day the secretary, Mr. Mark Judge, visited the different exhibitors for the purpose of ascertaining their opinion as to the success of the Exhibition. The exhibitors generally expressed themselves as well satisfied with the result, some going so far as to say that they had done an exceptional amount of business owing to the fact that a very large proportion of the visitors had been either medical men, architects, or engineers. The representatives of the exhibitors who have been in daily attendance during the Exhibition marked their appreciation of the arrangements made for their convenience by presenting, on Saturday, a small purse of gold to the superintendent, Mr. Smithson. The closing of the Exhibition was taken advantage of by the St. John Ambulance Association to give a demonstration of ambulance practice, and during the afternoon a large number of the visitors assembled in the conservatory to witness the practice, which was conducted by Major Duncan, Mr. Cantlie, of Charing Cross Hospital, Mr. Furley, Dr. Crookshank, and Surgeon-Major Baker. Prizes were competed for by squads of the Grenadier Guards, the Finsbury Rifles, and the Metropolitan Police. Mr. John Eric Eriksen (the chairman), Dr. Poore, Dr. Steele, Mr. George Godwin, Mr. Rogers Field, and other members of the Exhibition committee were present during the day. It is expected that the prizes which

have been awarded will be distributed at the annual meeting of the Parkes Museum, in the autumn.

ARTISANS' AND LABOURERS' DWELLINGS.

THE report of the Select Committee on the working of the Artisans' and Labourers' Dwellings Improvement Act, 1875, and the amending Act of 1879, is only submitted to Parliament as an interim report. The Committee have been unable to complete the examination of witnesses, and after reporting the evidence, they recommend the reappointment of the Committee next session. It is virtually admitted that the operation of the two Acts has not realised the expectations of those who promoted them; and, indeed, in many towns they are simply a dead letter. The explanation is to be found in the fact that the improvements contemplated by the Acts cannot be effected without placing a serious charge, in one form or another, on the rates; and, with rare exceptions, the local authorities have shrunk from exercising the powers which the Acts place in their hands. As an interim report the Committee suggest:—(1st) that the confirming authority should allow the immediate demolition of any houses closed by the local authority; (2) that the confirming authority should have power to assent to the basement and ground-floor of any building being let as shops or workshops; and that, in considering the amount of accommodation to be provided for the working-classes displaced by any scheme, the confirming authority should give a liberal interpretation to the relaxing power in the 4th Section of the Amending Act of 1879, and take into account the facilities of transport to a reasonable distance, as part fulfilment of the obligation to provide equally convenient accommodation; and (3) that the local authority should give every facility to purchasers by simplifying conditions of sale and otherwise.

EARTHWORKS IN CENTRAL CUMBERLAND.

IN a letter to the *Carlisle Journal*, "R. S. F." (initials which may be recognised as those of a widely-known antiquarian writer, resident in the merrie city) describes the works of excavation which have been carried out during this summer by Mr. Robinson, of Maryport. Operations were begun at a Roman camp below Cærmot, a mound overlooked by the Ordnance surveyors *in toto*, though described by West in his "Guide to the Lakes," and was probably the "camp in the parish of Ireby," mentioned by Camden and Blome. The credit of its rediscovery belongs to Mr. Jackson, F.S.A., who has shown that the Roman road from Old Carlisle to Keswick runs through the site. A careful survey, made by the writer, under the guidance of Mr. Robinson, showed that the camp is square with rounded angles, and measures about 160 yards by 140. It is defended by three ramparts of earth and two ditches, extremely well defined on all sides but the east, where the modern road to Bewaldeth has encroached upon them. The east gate is in the centre of each side, and the Roman road to Keswick runs through the north and south gates. Apparently this road went to Keswick by the east side of Bassenthwaite Lake; it is to be wished that some antiquary would trace it. The spade and picker did not reveal the presence of stone in the ramparts, and the paucity of remains found indicate that the camp was not long occupied—probably only while the road was being made. The garrison was then reduced from a cohort to a century, and a new camp was formed in the north-west angle of the old one. For two sides of the new camp, the triple ramparts of the old camp served; on the east side a ditch and rampart were also made, on the site of the road through the old camp, joining the east and west gates. The west ditches of the old camp were continued and turned through the old west gate, one being continued as the ditch just mentioned, and the external one being stopped immediately after rounding the angle. The engineers seem to have thought it unnecessary to defend the new camp with the triple ramparts and double ditches of the old, and so to have contemplated a mere temporary occupation. Such seems to have been the duration of occupation of both

camp—within whose areas the foundations of buildings have not yet been found. But immediately outside of the north gate of the large camp Mr. Robinson bared the foundations of two small rectangular chambers, the lower courses of masonry being in, but they do not present any very distinctive Roman character. The buildings, be they Roman or not, have been roofed with lead, and were destroyed by fire. Mr. Robinson took out more than three stones weight of lead that had run into the soil, and more yet remains. Quantities of iron nails, in a decomposed condition, were also found, and much charcoal.

A camp is marked on the Ordnance Map near Snittlegarth, and of it Mr. Robinson has made a ground plan. It is a most singular place. On a plateau of a hill, well sheltered on three sides by rising ground, and with a lovely view to the south, a rectangular piece of ground, about 80ft. by 30ft., has been isolated by a trench with regular scarp and counter-scarp. This trench is 12ft. broad at bottom, 23ft. at top, 5ft. deep, and the scarp and counter-scarp 9ft. One thing is puzzling—What has become of the earth taken out of this trench?

The Ordnance map marks three circular camps on Aughtertree Fell. Circular inclosures are not uncommon in the North. Besides the large one at Mayborough, near Penrith, there is and at Kirkby Stephen; another near Hayton, Carlisle; one called Tower-tye, in Naworth-park; instances also exist at Triemau, at Haltwhistle, at Walwick Chesters, in Yorkshire, in Wales, Ireland, &c. Their use has locally been much disputed, some authorities being of opinion that they are prehistoric, and have protected settlements of neolithic men; others that they are of later date and are mere cattle-kraals. But Mr. Robinson seems to have proved the Aughtertree Fell circles to be prehistoric, for in a tumulus near he has found no fewer than twelve urns of ware of the usual British type, containing calcined fragments of bone. These three circles at Aughtertree are not on the top of a hill, but on the slope of one. Each is about eighty-five yards in diameter, and is surrounded by a ditch, which must once have been about 6ft. deep, the earth from it forming a rampart within the ditch. Each circle has had one entrance; one, however, seems to have a supplementary inclosure at one side of it, and this circle is divided into compartments by radiating stone walls, similar to the stone ones at Hugill, near Ings. The entrance to one circle is rudely paved. From the vicinity of the tumulus, its connection with the circles may be conjectured. Other tumuli must have existed in the neighbourhood, but the external traces have perished under sub-aërial denudation.

A mile or two further on, at Thistlebottom, exists a small square Roman camp, which has not yet been examined. A larger one is near Overwater. The position of these two in and their connection with the general Roman system of grasp on Cumberland, "R. S. F." adds, remain to be worked out; the connecting roads must be explored.

CHIPS

Mr. Robert Morgan, C.E., an inspector of the Local Government Board, held an inquiry at Reigate on Friday, into an application from the town council, for sanction to borrow £5,000 for works of separate drainage for storm water. Evidence was given showing that the large volume of storm-water militated seriously against the success of the sewage-farm, and it was therefore intended to dispose of it by a separate system. No opposition was offered to the proposal, to which the inspector appeared to be favourable.

The workmen in the employ of Messrs. Phillips and Powell, and of Mr. G. Wiltshire, builders and contractors, of Swindon, combined on Saturday week for their annual excursion, when the party, numbering 200 hands, besides friends, proceeded by special train to the Wye Valley, proceeding via Gloucester, Ross, and Monmouth, staying to visit the ruins of Tintern Abbey and Chepstow Castle, and the Wyndeliff, and returning by way of Lydney and Gloucester.

The parish-church of Honeybourne, Worcester-shire, was reopened last week, after restoration.

The drainage and sewerage of the town of Newmarket, Cambs., is on the point of completion. The contract has been carried out for the local board of health by Mr. Hook, of Soham, from the plans and under the supervision of Mr. Clark, their engineer.

CONTENTS.

Recent Exhibitions and their Results	221
Passages and Corridors	222
The National Competition Drawings at South Kensington.—II.	222
The Water Question.—XIV.	223
The Sanitary and Constructive Supervision of Dwellings.	224
Practical Notes on Plumbing.—X.	225
Mr. Hellyer's Lectures on Plumbing: Discussion	227
Cambrrian Archaeological Association	228
Sussex Archaeological Society	230
Science and Art Department	230
Parkes Museum International Medical and Sanitary Exhibition	231
Artisans' and Labourers' Dwellings	231
Earthworks in Central Cumberland	231
Chips	231
Our Lithographic Illustrations	232
Palliser's Useful Details	232
The Architectural Association at Worcester.—II.	245
Dry Rot in Timber	246
The Pollution of Rivers	246
The Society of Engineers at Bishopgate Goods Depot	246
Minster Church, Isle of Sheppey	246
Some Architectural Aspects of the Earthquake at Chios	247
Building Intelligence	248
Competitions	248
Architectural and Archaeological Societies	248
Archaeological	248
Parliamentary Notes	249
To Correspondents	249
Correspondence	249
Intercommunication	250
Legal Intelligence	251
Water Supply and Sanitary Matters	251
Statues, Memorials, &c.	251
Our Office Table	252
Tenders	253

ILLUSTRATIONS.

THIRD PREMIATED DESIGN FOR THE EXCHANGE STATION,
LIVERPOOL.—ST. MARGARET'S, KIRKCALDY.—LAHORE
CATHEDRAL.—OLD WORCESTERSHIRE HOUSES.

OUR LITHOGRAPHIC ILLUSTRATIONS.

THE EXCHANGE STATION, LIVERPOOL.—THIRD PREMIATED DESIGN.

This design, submitted in the recent competition by Mr. Thomas Mitchell, F.R.I.B.A., was awarded the third premium. We noticed the design at length last week, on p. 190.

ST. MARGARET'S, KIRKCALDY.

This house, of which we give a perspective and first-floor and ground-plans, has been erected from the designs of Mr. R. R. Anderson, A.R.S.A., of Edinburgh.

LAHORE CATHEDRAL.

The foundations for a new cathedral at Lahore were put in some time ago, but the present design is on a much more dignified scale than was at first proposed. The old foundations have, however, been utilised by Mr. Scott, the architect, as far as possible. The material of the walls is almost entirely of brick, red brick facing being used both within and without. Nearly all the mouldings also are of red pressed bricks—the local stone, being extremely hard, and having to be brought from a considerable distance, is used as sparingly as possible. The cathedral is groined throughout with brick arches, the ribs being moulded, with stone springers, &c. The choir is apsidal on plan, and has an ambulatory. The walls of the nave and choir are strengthened by flying buttresses. The windows are very small because of the intense heat and light—those in the clerestory of the nave, transepts, and choir are set back very nearly to the inside face of the walls, and have deeply recessed openings with overhanging arches carrying the walls and parapets on the outside. The windows of the lower portion of the building are provided with wooden shutters. The roofs and fittings will be of teak. The roofs will be covered with small red tiles made in the neighbourhood, they being the only material which will withstand the great heat of the sun. An organ-chamber is provided over the first bay of the north choir aisle, which is groined in two stages, and projecting stone galleries look into the choir and north transept. The work is being carried out by native workmen, and is now considerably advanced.

OLD WORCESTERSHIRE HOUSES.

The selection of drawings forming the double page which we give to-day—by way of illustrating the excursion of the Architectural Association, some particulars of which are given on page 245—are taken from Mr. W. Niven's

admirable collection of etchings of the old manor-houses of Worcestershire, published a few years ago, and now out of print. The volume was the first of the similar volumes published by the same architect of Warwickshire houses, including the monograph of Aston Hall, all of which works have been favourably reviewed by us at the time of publication. The two bottom subjects, Eastington Court and Middle Littleton Manor House, were not included in the programme of the week's excursion; but inasmuch as they well illustrate the stone-constructed style of house of unimportant character in Worcestershire, and also the more ordinary manner of timber-construction, with detail of the best kind, we have thought them well worthy of illustration on this occasion. Eastington Court has of late years been rendered suitable for modern use, and is occupied as a farm-house, being the property of E. G. Stone, Esq. The bargeboards are richly carved with the vine, and grotesque heads decorate the spandrels of the porch. A good oak screen remains in the hall in its original position. The house is about three miles from Upton-on-Severn, and is situated in the parish of Longdon. Middle Littleton, in Upton-Snodsbury parish, has never been of much size or importance, and is of 16th-century date. The masonry is particularly good, and the design, though plain, is admirably treated. A fine tithe-barn, nearly equal to the celebrated one at Bredon, stands near the house, and is worth examination. The other buildings here shown are described in our account given of the proceedings in the order in which they were visited.

CHIPS.

An inquiry was held at Penzance on Tuesday week, before Mr. S. J. Smith, Local Government Board inspector, respecting an application from the town council for sanction to borrow £1,250 for rebuilding a portion of the sea-wall and esplanade, opposite Marine terrace, washed down during the storms of last winter, and £1,000 for completing the work of street-improvement in Morrabs-road.

The first rails were laid last week at Swansea, of the Cwmwrla section of the tramways extension in the Carmarthen-road. The contractor is Mr. E. Everingham.

The local board of Cheston adopted, last week, plans prepared by Mr. Haslam, for the extension of the gasworks in that town.

A mural brass commemorating the restoration of the south aisle and porch of Cherry Hinton parish church, as a memorial of the late Rev. Dr. H. W. Cookson, master of St. Peter's College, Cambridge, has just been placed in that church. It was designed by Mr. G. G. Scott, M.A., and was executed by Messrs. Burlison and Grylls, of Newman-street, London, W. The chancel of this church is to be restored next spring, when a new pulpit will also be erected.

The rural sanitary authority of St. Austell, Cornwall, have instructed their surveyor, Mr. Sambell, to prepare plans and estimates for supplying Polgooth with water, from springs on the grounds of Sir Chas. B. G. Sawle, which have been granted at a nominal rent.

Mr. A. A. Bradbury, late head-master of the Hanley school of Art, has been elected to a similar position at Chesterfield, from whence Mr. T. C. Simmonds has gone to the Glasgow school of art.

The chapel of St. Michael-on-the-Downs, near Wantage, was reopened on Saturday week, after restoration, from the designs of Mr. W. Butterfield. The new works include a new bell-cote with bell, cross on east-end gable, encaustic tiles, the gift of Messrs. Nulton and Co., in chancel, renewal of nave-floor, and erection of vestry. Mr. John Wheeler, of Wantage, was the builder.

The town council of Evesham adopted on Wednesday week, plans prepared by Mr. George Bower, the gas-engineer, for extensive additions to the gasworks, rendered necessary to meet the increased consumption, but adjourned for a fortnight coming to a decision as to the scheme prepared by Mr. McLandesborough, M.I.C.E., of Cheltenham, for a new water supply from the Broadway wood spring, estimated to cost £10,250 in execution.

The Hull board of guardians last week appointed Mr. W. B. Thompson, of that town, as architect for the proposed extension of the workhouse by a new wing on the men's side.

An organ to cost £650, and to be built by Mr. Nicholson, of Worcester, has just been promised to the modern church of St. Mary Magdalene, Sansome-walk, in that city, by a local gentleman.

PALLISER'S USEFUL DETAILS.*

ANOTHER work on details has been sent to us from America. Messrs. Palliser, Palliser, and Co., of Bridgeport, Conn., U.S.A., who are both the authors and publishers, aim at supplying large scale and practical drawings of details for the use of building artificers and others, to meet the demand for the requirements in the prevailing styles. Good practical details of construction are no doubt of more importance in America than in this country, and we must credit the authors with the very best intentions of supplying the demand by the issue of the present large folio of plates in Gothic and other modernised styles of work. As modern English taste in these matters is so widely divergent from the Gothicised designs now prevalent in America, it would not be fair for us to express an opinion on the merits of the present work. Such a detail as that shown for entrance-gates would be rather costly. The flat archway abutting against the pier would, we fear, have the effect of pushing over the latter, or at least not improving the verticality of so slender an erection of masonry, and the authors have wisely avoided hanging the gate from the pier by throwing its weight on a runner. Some of the smaller wooden gates and fences are suggestive, though we cannot approve of so many curved braces, stop-chamfers, and incised ornaments. The designs for inside-doors are, to our minds, spoilt by decoration of a questionable sort. The cut and chamfered panels, the struts in the panels, and the quadrant devices are now meaningless, and only remembered as a few of the vagaries of the late Gothic mania. A sheet of details of chimney-pieces and overmantels will be found useful to joiners and others, and the designs for sideboards, writing-desks, book-cases, &c., on plate 5, are free from extravagances. The ends of some of the cases and cabinets would have been less open to objection if the notchings had been omitted, and surely it is a spurious sense of ornamentation which carves and indents the constructive framing of a piece of furniture.

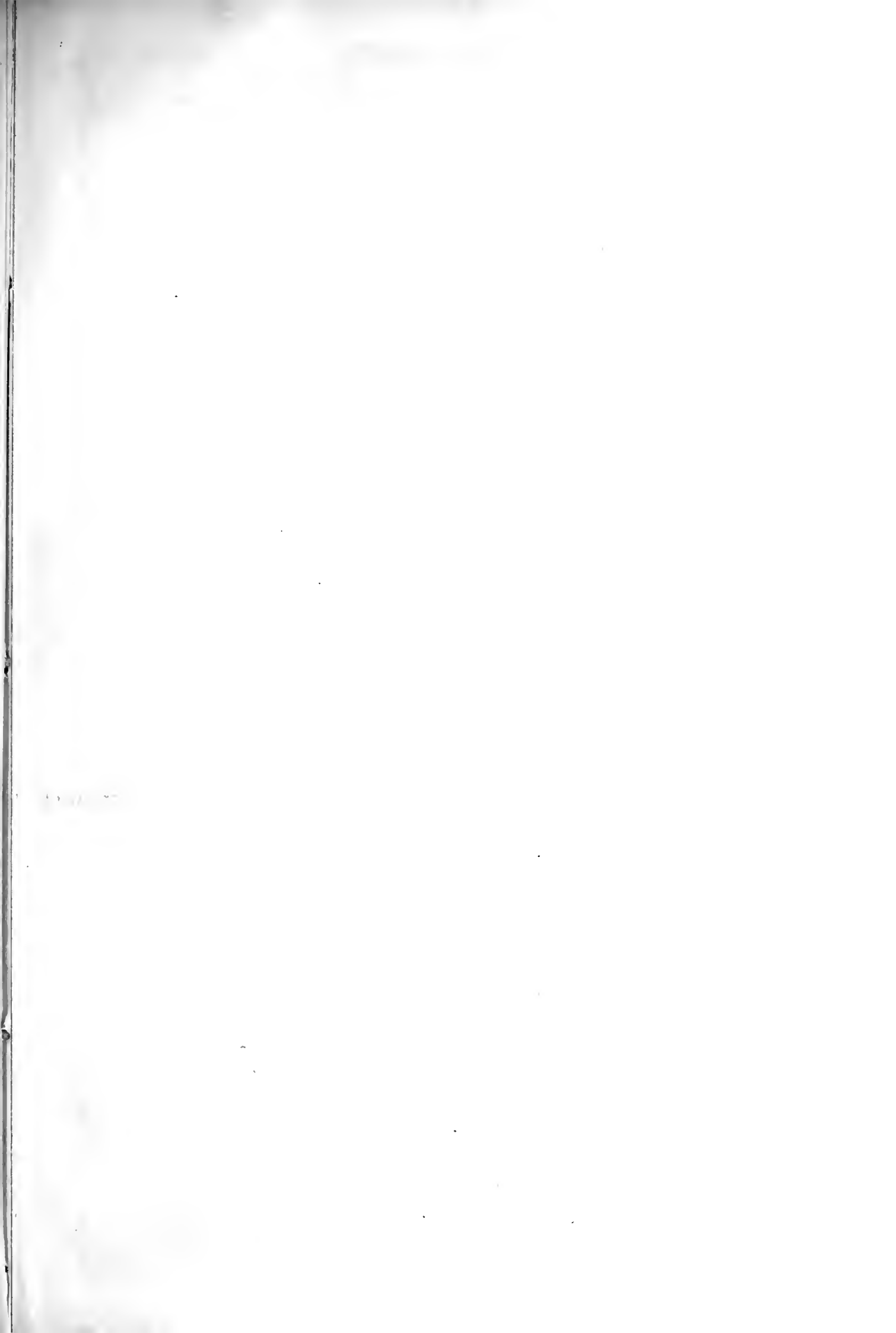
A more sensible sheet of details is given of timber gables and framing, and also of tiled and shingled gables, which will be found of service. Another useful drawing of details shows a porch with balcony over, and a verandah; gable-balconies, bracketted balconies, with stencilled relief in panels, and various other kinds of wooden construction are given in the following plates, in which details of rafters' feet, guttering, windows, and the manner in which the window-sills are framed into the studwork are indicated.

The most useful part of the work before us are the plates describing handrailing, with instructions for working the details of bank- counters. Besides woodwork, details are furnished of brick and stonework, terra-cotta dressings, conservatories, cupolas, chimneys, church seats, and various other fittings and adjuncts of buildings. The details are generally drawn to a scale of $\frac{1}{4}$ in. to 1 ft., and in all there are no fewer than 40 plates printed on thin paper. Being to a working scale, they will be found of service to carpenters, joiners, and masons, and we have no doubt Messrs. Palliser's work will be duly appreciated by the American workman. The price of the work is 12s. 6d.

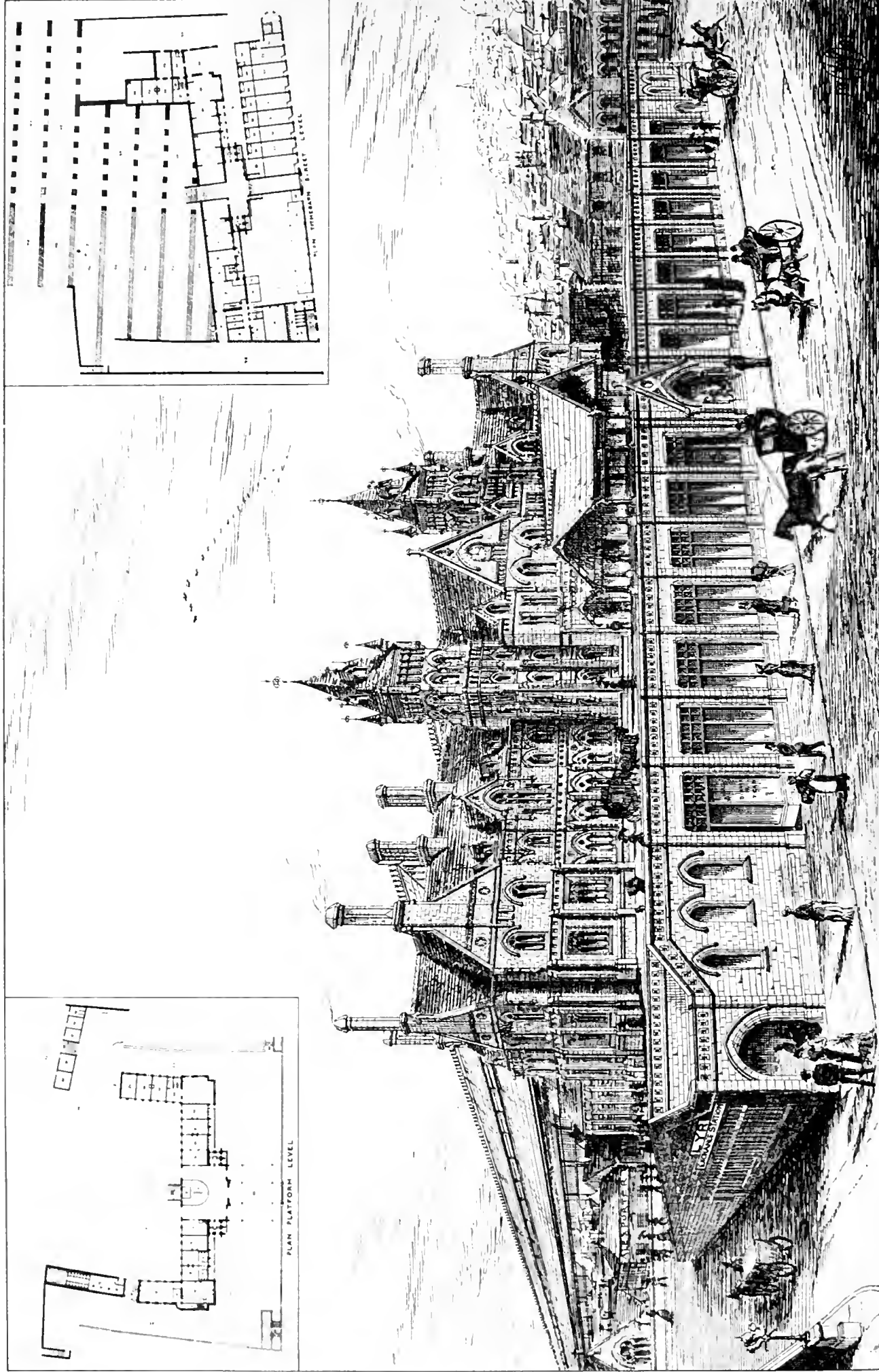
The village church of High Tooton, Lincolnshire, was reopened on the 3d inst., after further restoration, including boarding the internal ceiling, and the erection of the Taylor memorial reredos. In the latter, red Mansfield stone is used for the base, Ancaster stone for the upper portion, and alabaster for the panels, a pure white variety being used for the central panel, which is carved with the Agnus Dei, and mottled Derbyshire for eight side ones, in which are sacred emblems. In the wings are square trefoil panels, three on either side, of yellow Mansfield stone, inscribed in legible Gothicised letters with the Lord's Prayer, Creed, and Commandments. The reredos has been erected from the designs of Mr. Edmund B. Ferrey, of Spring-gardens, Charing-cross, by Messrs. White and Sons, of Vauxhall Bridge-road, London, S.W.

The Wighton board of guardians adopted, last week, plans by Mr. J. S. Mart, architect, for new wards, to cost £250, to be erected on the west side of the workhouse.

* Palliser's Useful Details. Published by Palliser, Palliser, and Co., Bridgeport, U.S.A.



THE BUILDING DEWS, AUG. 19. 1881.

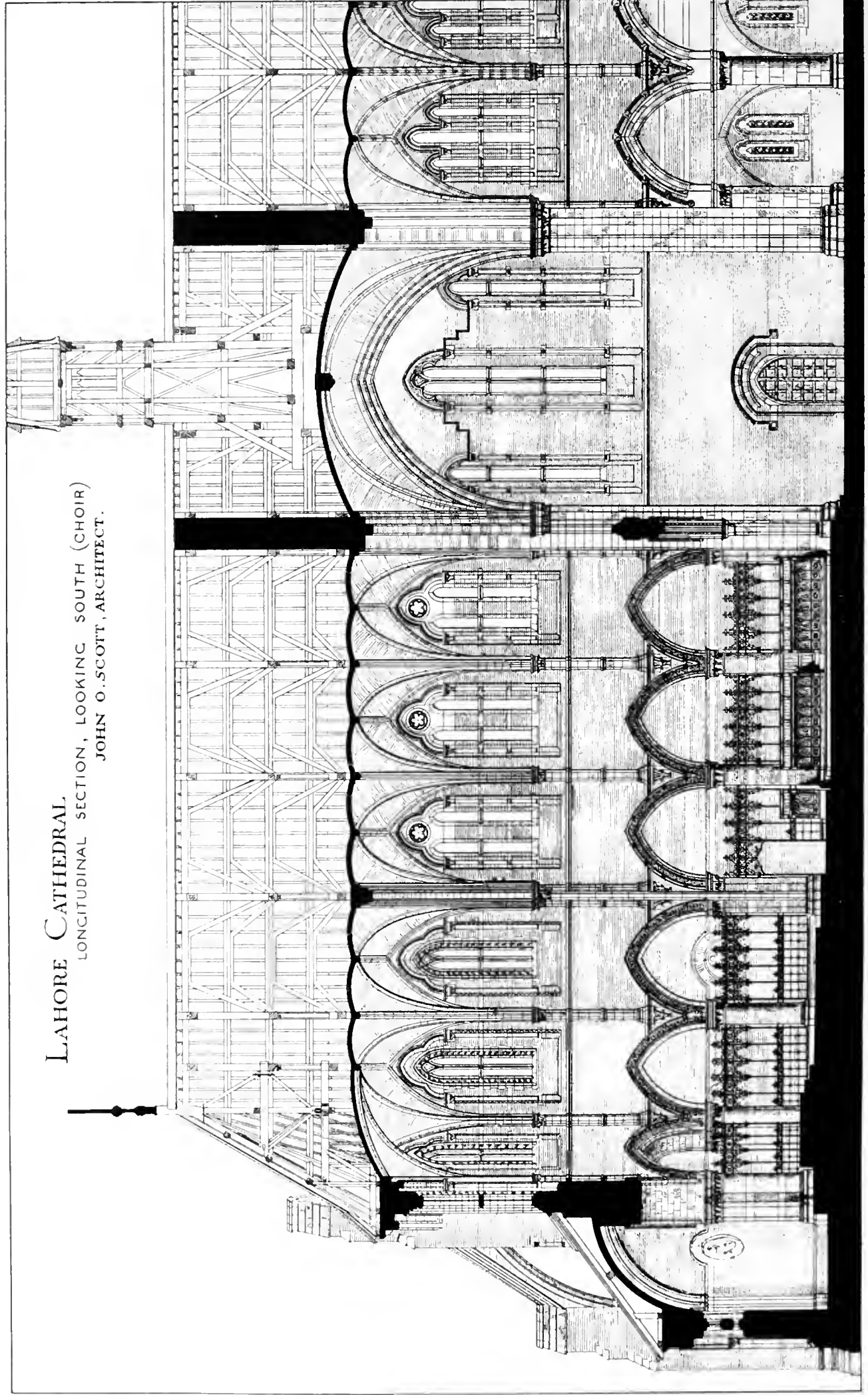


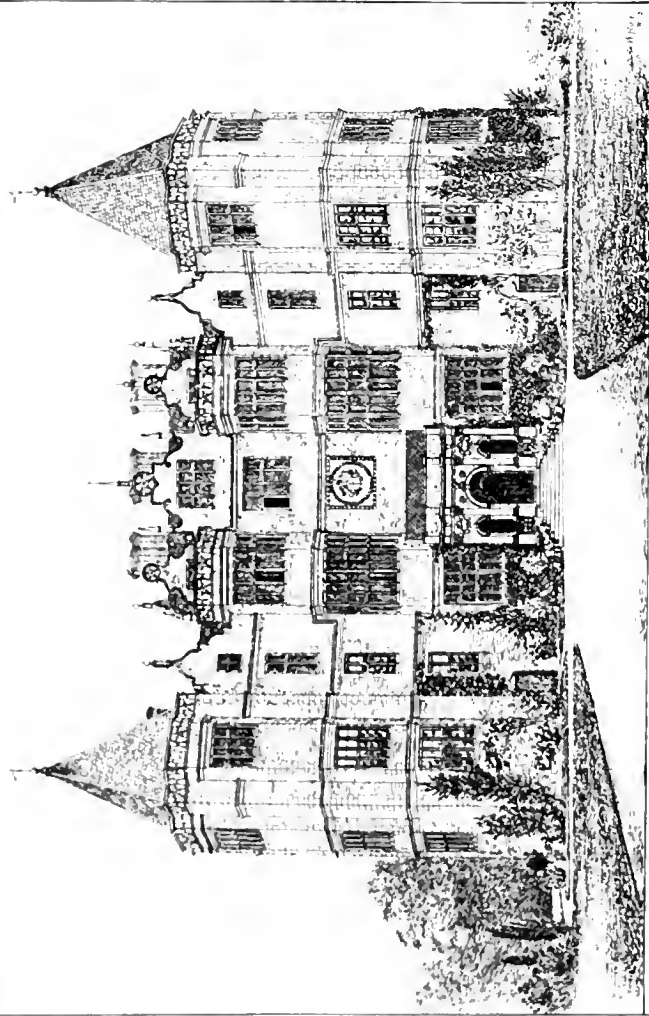
THE EXCHANGE STATION LIVERPOOL FOR THE LANCASHIRE AND YORKSHIRE RAILWAY COMPANY THIRD PREMATED DESIGN
 THOMAS MITCHELL ED. B. A. ARCHT.
 Photo Engraved & Printed by James Alcorn & Co. Queen Square, W.C.

THE BUILDING BEGINS. AUG. 19, 1881.

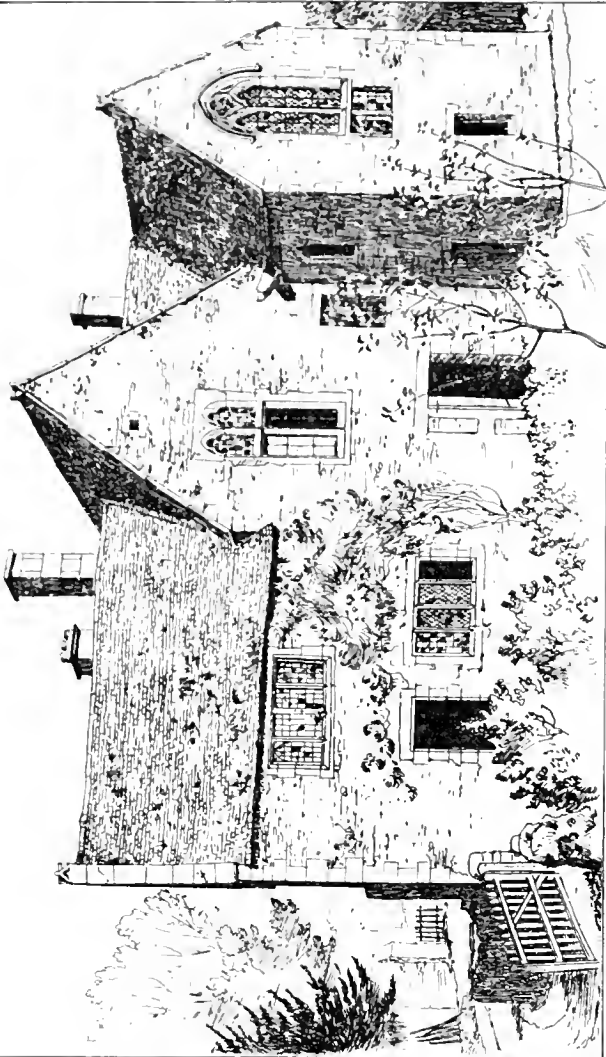
LAHORE CATHEDRAL

LONGITUDINAL SECTION, LOOKING SOUTH (CHOIR)
JOHN O. SCOTT, ARCHITECT.

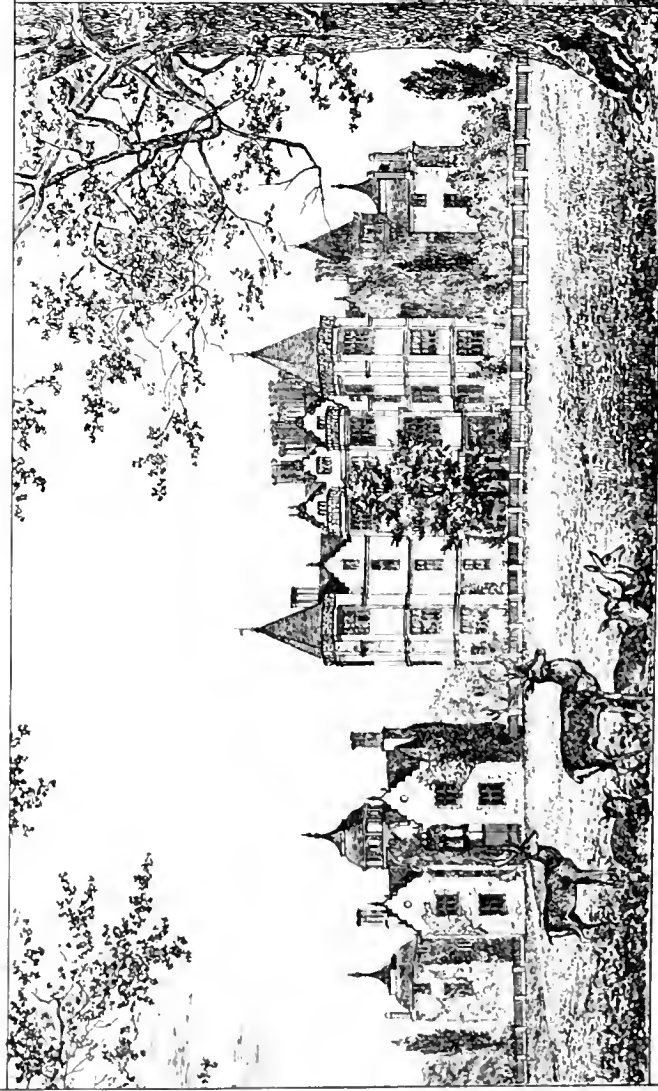




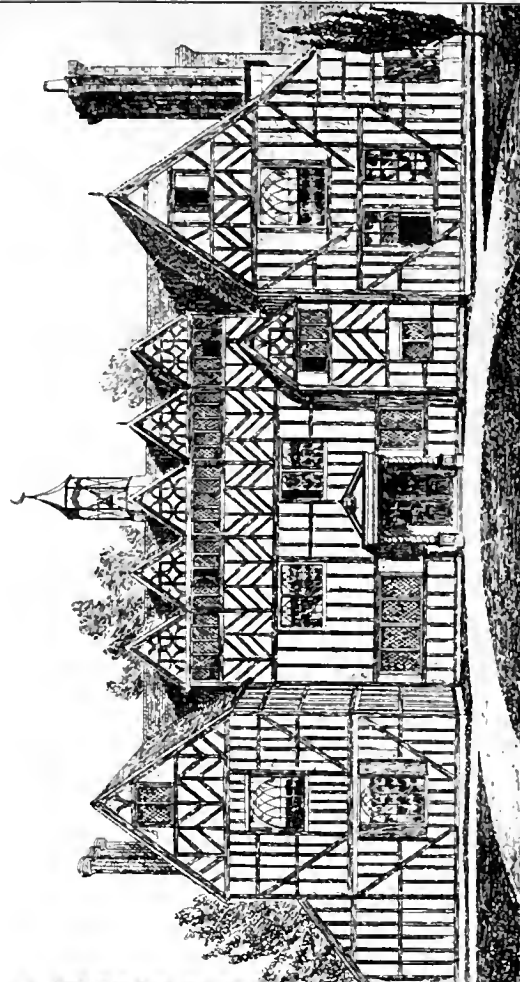
ENTRANCE FRONT, WESTWOOD HOUSE



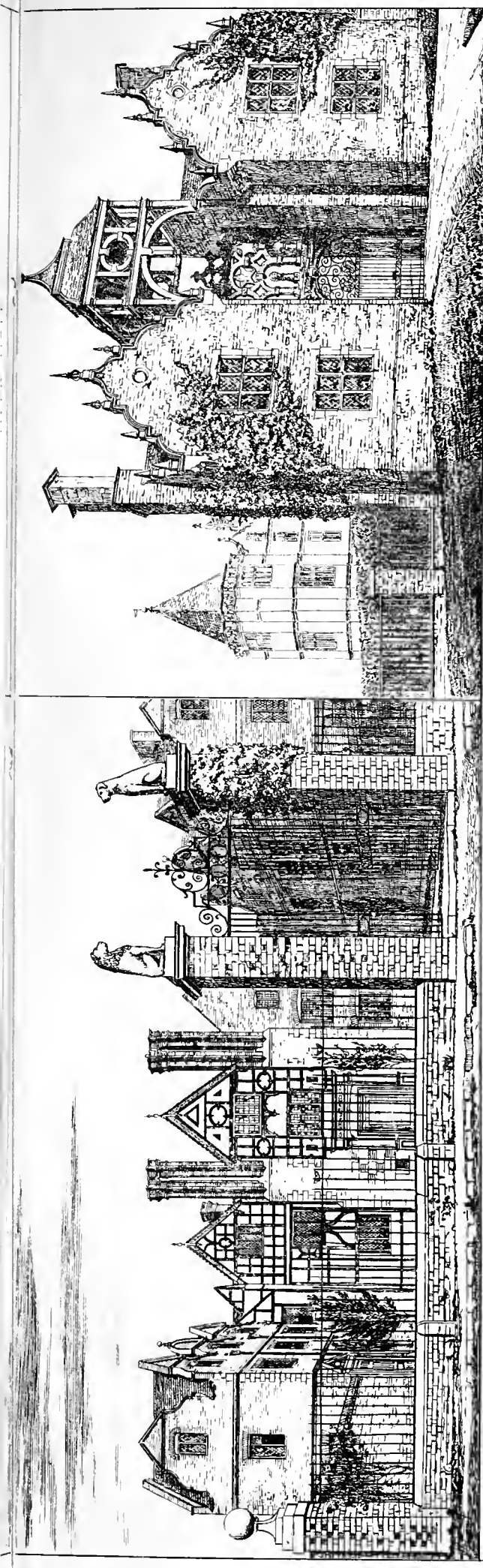
MANOR-HOUSE OF THE ABBEY OF PERSHORE



WESTWOOD HOUSE, GENERAL VIEW.

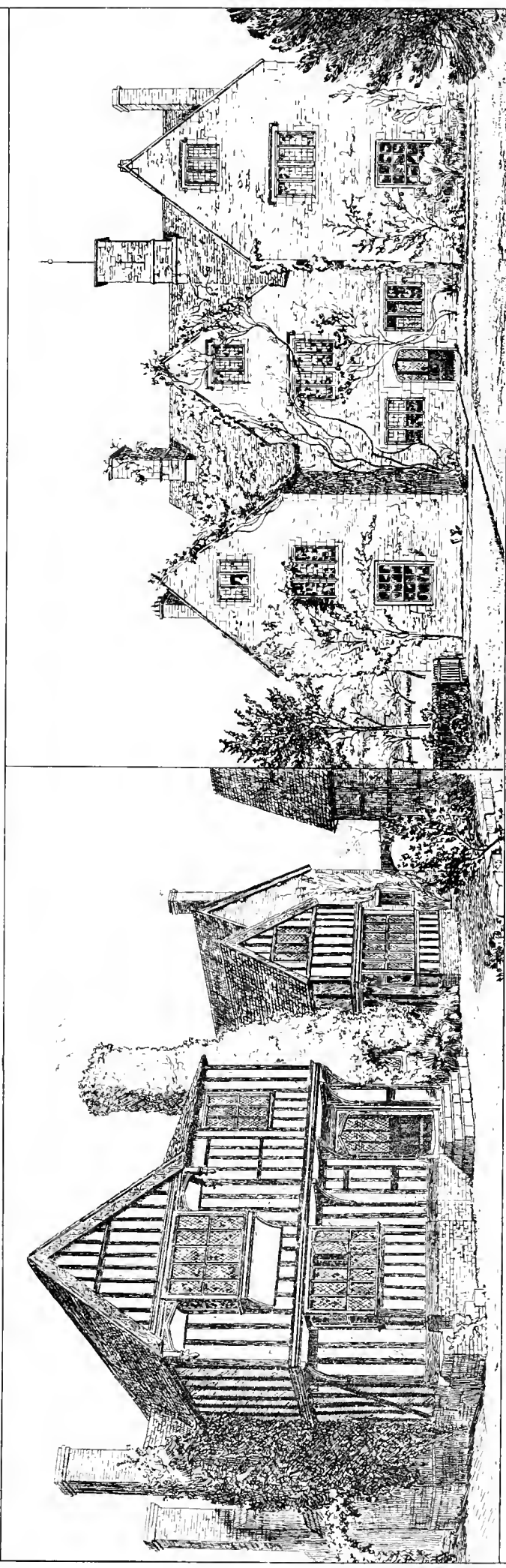


MEER HALL.



SEVERN END

THE GATEHOUSE WESTWOOD HOUSE.



EASTINGTON COURT

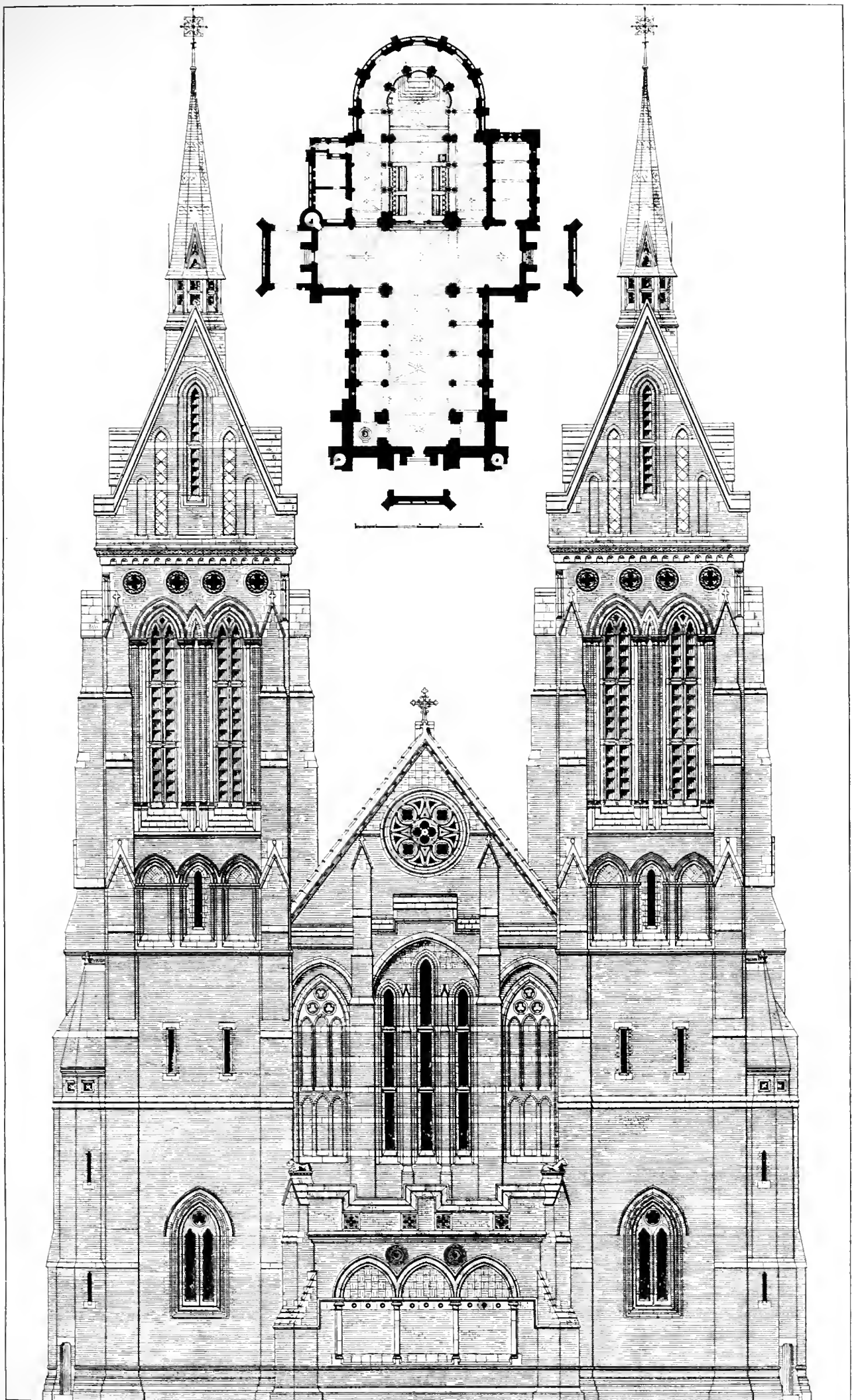
MIDDLE LITTLETON MANOR-HOUSE

OLD WORCESTERSHIRE HOUSES

A. A. EXCURSION WORCESTER AUG 1881

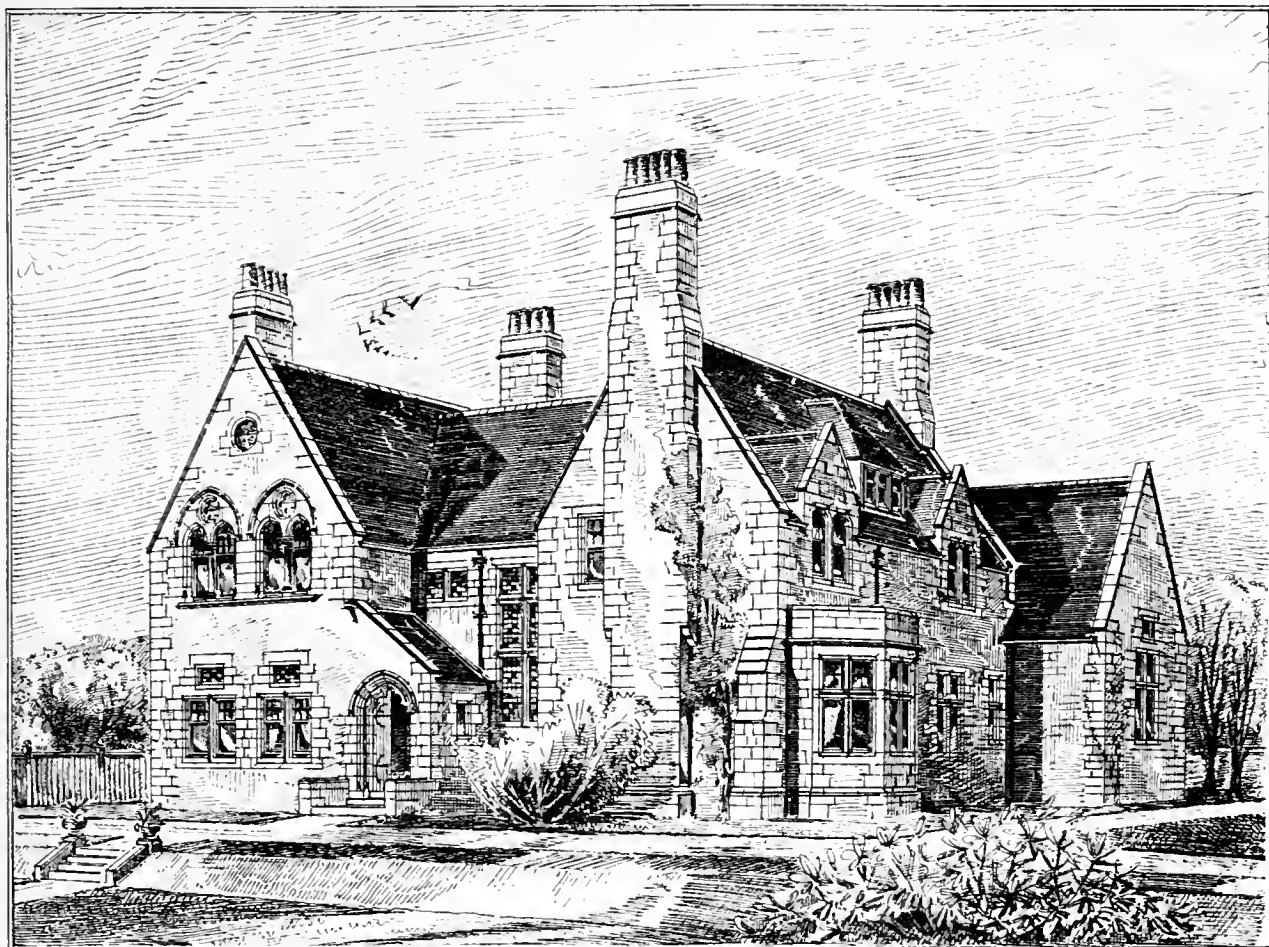
Photo Lithographed & Printed by James Averman, 6, Queen Square, W.

A. H. B. 1881



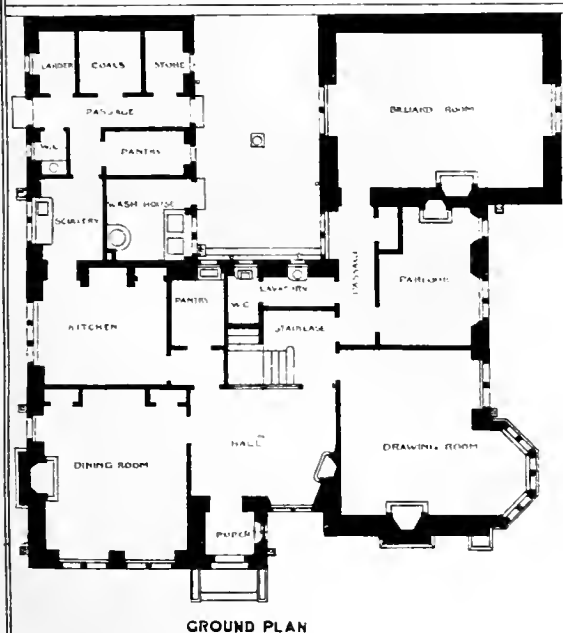
LAHORE CATHEDRAL

WEST ELEVATION

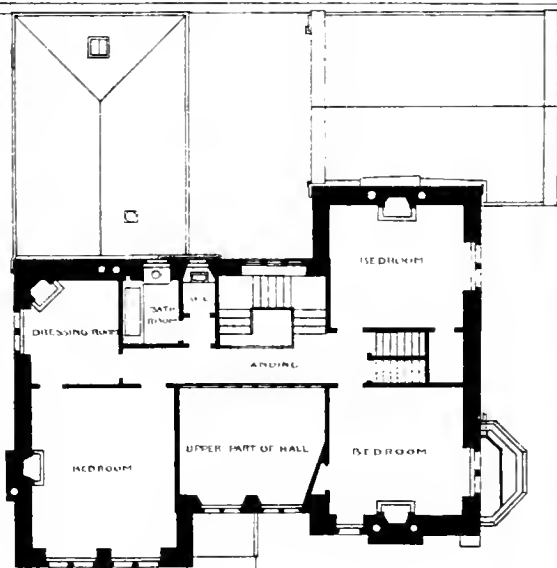


ST. MARGARET'S KIRKCALDY

R. ROWAND ANDERSON A.R.S.A. ARCHITECT



GROUND PLAN



FIRST FLOOR PLAN

0 10 20 30 40 50 Feet

THE ARCHITECTURAL ASSOCIATION
AT WORCESTER.—II.

ON Monday last the Architectural Association excursion party, who are now visiting Worcester, as we stated last week, began the programme of their proceedings by a visit to the Cathedral Church, where the excursionists were met by Mr. Wm. Jeffrey Hopkins, F.R.I.B.A., who gave some dates and particulars of the building and its precincts, including the remains of the Guesten Hall and Edgar Tower. Originally, Worcester Cathedral was dedicated to St. Peter, and the first Bishop Bosel is recorded as having fixed his seat here towards the close of the 7th century. He was followed by a succession for three centuries, during which period little seems to have been done, when Oswald, helped by King Edgar and Archbishop Dunstan, completely revolutionised the Secular College of St. Peter, and established a monastery dedicated to St. Mary the Virgin, and many of the secular clerks or priests became its members, the new monastic church being completed about A.D. 983. This building was destroyed before many years elapsed by the Danes. Portions of the monastic buildings and church which followed are now to be seen, notably in the crypt, which is one of the most remarkable, as well as one of the earliest, examples of the kind in England. This is the work undoubtedly of Bishop Wulstan, who rebuilt the cathedral in 1054. His work has suffered from sieges and from fires; but to the failures of the Norman towers is also due much of its destruction. The crypt, with its many arcades, having unusually light circular shafts and singularly vaulted roof, is well deserving of notice. The radiating chapels round the apse have been destroyed, but with this exception the building is in very good preservation, and is well cared for. The only other similar examples in England are at Canterbury, Gloucester, Rochester, and Winchester, but here a special character is obtained by the numerous columns already referred to, and these were rendered necessary by the treacherous nature of the site, which is very sandy and closely situated to the Severn river. The choir is mainly of Early English date, like the eastern transepts, Lady-chapel, and choir aisles. The work is of the best period, though, unfortunately, in several particulars very much over-restored, and, consequently, in parts is very unreliable. The east-end window of five lancet lights, however, which is entirely new, is a fine work, and does great credit to the late Mr. Perkins, to whose ability as an architect it bears admirable witness. The same remark may also well be made with regard to his restoration of the cloisters, showing how capable he was to do such work when left unfettered by those who employed him, or when not interfered with by meddling amateurs. It is but just to his memory that this remark should be made, inasmuch as Sir Gilbert Scott has usually been credited with all that is good in the work of restoration here, while Mr. Perkins has rather unfairly been charged with the guilt of all that was badly done. Sir Edmund Beckett helped with some portion of the work, more especially in the rebuilding, or rather recasing, of the tower, in which work most of the old lines of the ancient tower were quite departed from. The only works carried out by Sir Gilbert Scott were the choir fittings, reredos, and screens, including the rather overdone pulpit in the nave, and the rich altar-tomb monument to Lord Lyttleton, late Lord Lieutenant of the County, erected in the north transept. The remainder of the work was carried out by Mr. Perkins, who was engaged on this restoration for more than 15 years, more than £100,000 having been expended on it. Following the Early English choir we have the Decorated nave, with its rich arcade and handsome triforium over, surmounted by an unimportant clerestory, and covered by a vaulted roof throughout. The two western bays of the nave are much earlier in date, and are of Transitional Norman character, showing, however, distinctly, both by the earlier respond and work adjoining in the aisle, that the width, if not length, of the Norman nave has been preserved. The west doorway is in very bad modern Norman, and the large west window, filled with Hardman's glass in 1875, represents "The Creation." The same firm decorated the groining of the choir, under the direction of Sir Gilbert Scott, with flying angels, seraphim, Greater and Lesser Prophets, virgins, martyrs, and the rest, filling out the spandrels with foliage

and scrolls in an expensive and necessarily elaborate manner, the whole being quiet in tone if not eminently satisfactory. The cloisters are of Perpendicular date, having some quaint openings in the outside piers, and provisions for the old lavatories remaining. The Cathedral consists of choir with aisles, Lady-chapel and aisles, upper and lower transepts, and these are of the same height throughout; nave with aisles, northern porch and central tower, which is 170ft. high. The tower is on the same plan as the Norman one, and stands on the same site. It contains an admirable peal of fifteen bells, with a carillon machine playing thirty-five tunes, the work of Messrs. Gillett and Bland, of Croydon. The new organ is in the south transept, built by Messrs. Hill and Son, of London, like that in the choir, which latter includes most of the old one. The case of the grand organ is of very satisfactory design, elaborately carved with Flemish-charactered foliated enrichments, and angel figures executed throughout in oak, from the designs of Mr. John O. Scott. The artificial lighting of the Cathedral deserves a remark. It is effected by means of a continuous series of jets immediately over the stone string below the triforium arcade, and a most perfectly diffused and soft light is thus obtained, as in York Minster. The exterior of the building presents a very new appearance, and the old spires which occupied the angles of all the main walls not many years since, giving a special character to the church, have unfortunately been restored in a very different manner; commonplace low pinnacles doing duty in their stead.

Leaving the cathedral, the Chapter-house was next visited. It is situated similarly to that of Westminster, and presents a circular plan inside, the octagonal form being preserved on the exterior. The greater portion of the building is Norman, having a lofty and massive central shaft supporting its roof, which from the outside is now unseen, though originally, doubtless, of conical form. The windows are of Perpendicular date. Here are exhibited the remains of old vestments exhumed in 1862, and those found in 1870, when the tomb of Bishop William de Blois was opened. He died in 1236, and these fragments are thought to be of rather earlier date than this. Drawings of those found in 1862 were included in the A. A. Sketch-book for 1869-70, by M. H. Curzon, and the De Blois vestment were published from sketches by Mr. Charles Henman in the same sketch-book, in 1870. Great regret was expressed by the visitors at the removal of the Guesten Hall—a fragment only of which now remains to show the beauty of the demolished building. The roof was ruthlessly smashed, and thrown down in heaps on the College-green, probably to have been sold for firewood, if it had not been secured by the architect of Holy Trinity Church, which was then building. The dean and chapter gave it, however, eventually for this purpose, where it now remains. Next week we shall give a drawing showing it in detail. The difficulty experienced by the ecclesiastical establishments of Worcester in providing suitable entertainment for strangers rendered it necessary to erect a separate hall, and this work was undertaken by Wulstan de Brannsford, then prior (1320). In this court the convent held their monthly court, called "Guesten Hall Court," for determining of differences between the tenants, and this custom was preserved even to the days of Charles I. Many points in this hall corresponded in treatment with the Archbishop's Palace at Mayfield, Sussex, and Penshurst Hall, Kent. Mr. G. E. Street, R.A., reported on the Guesten Hall, with a view to its restoration, and published some pen-and-ink drawings of it in 1854, when every effort was made to prevent its destruction, but all without avail, as we have already noted. The refectory was seen, with its crypt below, of Early Norman date, and the Edgar Tower was likewise shown. The fourteenth-century figure of Edgar, which occupies the niche over the gateway, is much mutilated; and only so recently as to be remembered by Mr. Hopkins, the face and front of this figure was chopped off, on the occasion of some illuminations, to make way for the trophy of gas—so little have historical monuments been valued in Worcester. The Commandery and Deanery were visited by the excursionists during the day, under the direction of the president, Mr. Aston Webb. Of the former, we gave two views last week, the small exterior on the right

hand of the plate being a sketch of the entrance to the hall; and of the former, we gave the plans, with some particulars. Later on in the day, the Royal Porcelain Works and Museum were seen, under the guidance of Mr. R. W. Binns, F.S.A., the art director of the company. No one can fail to appreciate the excellence of the work produced, or value too highly the large collection of old Worcester and Japanese ware, including some splendid Kioto and Owari porcelain, exhibited in the Museum; but for some reason or other, the new work fails to display anything like the merit in character or design of the old.

On Tuesday, an early breakfast was made, with a start from the hospitable "Star" Hotel, at half-past eight, by carriages, the destination being Tewkesbury, where the Abbey Church, of which we gave an account last week, when a plan and view were given, was described by Mr. James Fowler, F.R.I.B.A., of Louth. Calling at Severn End, the timbered manor-house, which we illustrate to-day, was seen, and also the church at Hanley Castle was visited on the way. "Severn End," situated within a few yards of the river from which it takes its name, was for many generations the family seat of the Lechmeres, and over the entrance-doorway is painted the motto "Christus pelicanus," with the Lechmere crest—a pelican, az., vuluing herself. The central block of the buildings is of timber-built construction, dating from the time of James 1st, or perhaps of Elizabeth; in Queen Anne's time brick wings were added, forming a quadrangle in front, which is entered through a gateway of some importance. The piers, which are built in courses of brick in three different colours, are surmounted, the one by a dog and the other by a lion, as seen in the view of the entrance front herewith given.

The garden-front of the house presents a most picturesque appearance with its many and varied gables. It has long since been disused as a residence for the family, and now forms a well-kept and valuable museum for Sir Edmund Lechmere's collection of old furniture and antiquities, which are guarded by the residence here of the farm steward. The drawing-room is enriched by a richly panelled ceiling, "each panel in achievements clothing," but which certainly is too heavy for so low a pitch.

The east-lead cresting to the entrance-front gables, and the old enriched lead stack-pipe heads are very interesting. Only one old plaster enriched mantel-piece remains, and that is on the upper floor. In the garden is a quaint old garden-house, or justice-room, built by Judge Lechmere in Charles the Second's reign. It was carefully restored a few years since, and is now used as a little museum. Leaving Severn-end with very many regrets, as the time allowed failed to permit the completion of a good many half-finished sketches, the excursionists reached the church with the double chancels at Hanley Castle, which "Johan Leylands" in his "liberhouse journey" thus quaintly describes: "Hanley is from Upton a mile in *destra ripa Sabrina*, and a flitt shotte from Severne. It is an uplandish towne. The castle standith in a park at the weste parte of the towne," and "Syr John Savage, who lay much aboute Theokesbyri," is mentioned as being the predecessor of "Mr. Cometon, who elene defaced it yu his tyne, beyng keeper of it after Savage." Lord Warwick used the castle as a residence, and after him the Despencers. The building was large and square, and had four towers surrounded by a moat, but

"Now not one stone remains to claim the sigh
Of passing man, save when the hollow winds,
Bending the nightshade's head or nettle rank,
Disclose some sculptured fragments damp and green,
And half immaured in earth."

The church was restored by Mr. G. E. Street, R.A., in 1858, when he built both north and south porches, the former being in wood and the latter in stone, which arrangement was the cause of some criticism. The church was much altered by Judge Lechmere, who built the present square and massive brick tower at the time he altered Severn End. The parish-chancel is now called the Lechmere Chapel, and is used as a vestry and organ-chamber; many of the Lechmere family are also buried here. Some dreadful coloured glass is in some of the windows. Those to the north aisle have a singular treatment of cusped heads not often

met with. The church and churchyard are well cared for, and round the latter are some old alms and half-timbered houses. Reaching Tewkesbury, after a drive through Upton-on-Severn, where a view was obtained of the old debased Classic or so-called Queen Anne sort of church, by the river, and the new church lately built by Mr. Arthur Blomfield, M.A., and illustrated by us last year; some two hours were profitably spent in sketching both in the abbey and about the town, where several interesting half-timbered houses are still to be seen. We hope to continue our notes next week made on the following days of the excursion, during which time Pershore, Woolas Hall, Lorton Manor-house, Huddington Court, Mere Hall, Droitwich Church, Westwood Park, Salwarpe Court, Great and Little Malvern, Madresfield Court, Ledbury, and Worcester were visited. Next week also we shall continue our illustrations.

DRY ROT IN TIMBER.

THIS disease, if we may so term it, is still a matter of doubt between naturalists who have sought to explain the production of the fungi. Some have maintained that the fungi producing dry rot are spontaneously developed; others that they are produced by seed taken up and supported in the air, until favourable conditions are presented. The fine powder which distinguishes dry rot is composed of myriads of reproductive spores of the fungus. From a mildew it assumes a delicate white vegetation, and afterwards a leathery appearance. The fungi, over different materials, are of various colours, sometimes reddish, violet, brown, at others white and grey. It is well-known that very damp situations are not favourable to the growth of the fungus. In dry situations it is found to spread more rapidly, and we have seen the side of a party-wall covered with its fibrous cotton-like texture, the roots or filaments appearing to have extended from the basement. In this case the painting of the wall was in a pulverising state, and the skirting and flooring covered by it. The situation was quite dry. Absolute wet prevents its growth, but damp combined with warmth appears to be favourable to decay.

One of the principal naval builders of Chatham Dockyard has said the destruction of timber by dry rot cannot take place unless air, moisture, and heat are all present, and that the entire exclusion of any of these three stays the mischief. Mr. Britton, in his work on "Dry Rot," who quotes this opinion, observes, "The admission of air has long been considered the only means of destroying the fungus, but as it has frequently proved ineffectual, it must not be always taken as a certain remedy." He also says the air admitted ought to be dry air, so as to absorb the moisture; it will then exhaust the fungus. But care should be taken to let the air escape, and not allow it to convey the seeds of the disease to other parts of the building. Hence the value of free ventilation behind all skirtings, dados, wainscoting and floors in the first place. At 80° Fahr. dry rot proceeds rapidly, but at from 100° to 120° it is arrested. At low temperature it is also arrested. To prevent rot, good seasoning and ventilation are essential. Charring after seasoning and coal-tar are recommended. To cure dry rot, a solution of corrosive sublimate in water (an ounce to a gallon, used hot), or a solution of sulphate of copper (half a pound to a gallon of water used hot) are good washes.

THE POLLUTION OF RIVERS.

A PAPER on this subject was read by Mr. A. Holkison, C.E., of Hexham, at the annual two days' Northern Counties' Conference on Local Government held at Gilsland, near Carlisle, last week. Mr. Holkison said he should deal with legislation on river pollution in its bearing on sanitary operations in rural districts. The subject might conveniently be divided into the two heads of water supply and removal of refuse. With regard to the former point, he thought it was evident that future legislation must be such as to materially extend the sources from which the water supplies can be abstracted. The sewage clause in the Public Health Act did not actually prohibit the discharge of sewage into streams, and only

nominal sewerage works were made in order to comply with the letter of the law. Pumping from streams of large flow was rendered no more practicable by all that had yet been done, than it was in the days of unheeded and unchecked river pollution. Manufacturers did as much damage, and were only interfered with in those exceptional cases where the provisions of the Act were invoked by aggrieved parties. Attention must, therefore, be directed to deep wells, springs, and upland gathering-grounds, according to local circumstances, and a much higher standard of purity in the water-supplies would be essential than was formerly the case. As to the sewerage question, the discharge from the outlet of places already provided with a complete sewerage system emptying into a stream could be dealt with by the Local Government Board under the Health Acts, or by other people, under the Rivers Pollution Act. On the second section of his subject, the removal of refuse, large numbers of villages, with the sewage standing in the midst of the population, were confronted with the sewage-disposal difficulty as soon as any attempt was made to remedy the insanitary conditions. He described the difficulty that would exist in such a contingency, and said he considered it absolutely necessary, especially in widely-scattered districts, to limit the total volume of liquid requiring treatment to the smallest and least fluctuating amount possible, and he would not admit rain into the sewers. The admission of rain-water necessitated increase of size, and therefore of cost, in the sewer-pipes, and it was ineffective, for just when it was most wanted, in dry, hot weather, the provision for the performance of flushing was altogether absent. The true system of sewer-flushing consisted in the frequent accumulation and instantaneous discharge of a comparatively small volume of water, as against the continuous and unaltered flow of an amount possibly a hundred or even a thousand times greater. Used in this way, he had found that a volume of water, varying from one to two gallons per head of the sewered population per day, was ample for the most liberal and effective performance of flushing operations.

THE SOCIETY OF ENGINEERS AT THE BISHOPSGATE GOODS DEPOT.

ON Wednesday afternoon a number of members and associates of the Society of Engineers paid a visit of inspection to the gigantic goods depot of the Great Eastern Railway Company at Bishopsgate. The party were received and conducted round the building by Mr. H. Wilmer, assistant engineer. The depot is so extensive, occupying as it does an area of 11 acres, between Shoreditch and Bricklane, Spitalfields, that upwards of two hours were spent in the general inspection of the place. The operations for making the depot on its present scale commenced some five years ago, when the old passenger station at Bishopsgate was removed. It is anticipated that within another twelvemonth the contractor will have completed his work. Portions of the plan have been carried out as land has been acquired, but the site is now clearly defined. Though not quite finished, the depot is in working order, and the main part in use day by day, or, to use a better phrase, night by night. It would appear that much of the traffic at Bishopsgate is nocturnal. For instance, the visitors were shown into one large office, with accommodation for 60 or 70 clerks, but only two scribes were to be seen, the explanation being that at midnight the office would be an animated scene of gas-light and bustle. The construction of the depot is carried out in a thorough manner. The old extension on the Bethnal-green side was supported by wooden piles, but these are being replaced by arches, which show some good brickwork. It may be interesting to state that a few coins came to light during the excavations, though thought little of importance to the antiquarian has been discovered. Of course, it is likely enough that at a greater depth than the spades of the workmen descended many a relic of the remote past may lie hidden. Two large markets, one for fish and the other for potatoes, are to be constructed under the spacious arches and adjoining Wheeler-street, which bisects and runs beneath the depot. In the latter market, accommodation will be afforded for no less than

15,000 tons of potatoes. It is estimated that this vast depot when finished, will have cost nearly half a million of money. At the conclusion of the two hours' inspection, Mr. Rigg, on behalf of the party, thanked Mr. Wilmer for the trouble he had taken and the explanations he had rendered; and Mr. Wilmer, in reply, expressed himself only too happy to offer every facility to the Society of Engineers to see the works of the company.

MINSTER CHURCH, ISLE OF SHEPPEY.

REPAIRS and reconstruction having been in hand during the past year, and no notice taken in the BUILDING NEWS, a few remarks from an amateur in building may be of interest to those who may be disposed to visit Sheerness.

Its situation is on a high ridge $2\frac{1}{2}$ miles distant, and every facility, which is very rare, is offered to those inspecting. Externally we notice two apartments or halls, one with an almost flat roof of considerable height, another with similar end gables, sharper, and covered with slates, the northern building having the base of a wide square tower with buttresses projecting beyond the west façade. Let us examine these three buildings. 1st. The Tower. Its west façade presents a Perpendicular entrance, with square-hooded canopy and quatrefoils in the spandrels; above this a well-proportioned Perpendicular window of the usual type, without any cuspidation; shortly above this the stonework ceases at a set-off, and we notice a sort of crotchet, surmounted by the appropriate "horse's head" as wind vane. (See "Ingoldsby Legends" for reason.) The tower is obviously very incomplete. It may be noticed that two newel staircases lead down, in circular hollows in the interior of its thick walls, one into the north church under the tower, the other now into a garden, but formerly into the monastic or nuns' buildings, all of which, except the gateway (entire) have disappeared, their stones entering into the formation of many a farm-shed. The west façade of south church presents now a single lancet, a Perpendicular insertion, a circle in the gable pierced, and traces of other and higher lancets; in fact, in plans published some time back, the architect proposed a complete Early English restoration, which Mr. Christian has not adopted, but has repaired the Perpendicular work. Coming now to the south façade, which is entirely formed of the south wall of St. Catherine's aisle, and a very roomy porch, we notice several lancets, with doubtful external stonework, probably previous repairs (?), and Perpendicular insertion higher up, breaking into the lancet areading within. The east façade, which comprises both north and south churches, is most interesting. The south presents three tall lancets; the north no window till right high up, and that a very Late one; but on the extreme right is a fine entrance-doorway from the other building, Early English, and just over its right side is a small opening in the masonry, within which, in the solid wall, are seen two stone bearings, which probably supported the wheel of bells or single altar-bell. This aperture opens into the interior by a quatrefoil in a block of stone. Along the north façade we notice nothing of importance; no external marking of nave and choir—in fact, this abuts on private property. Having now entered the spacious porch on the south side, we observe a round-headed Early English entrance, with dogtooth moulding and niche above, this having been quite concealed in the late plaster. Being now in the south church, or St. Catherine's aisle, it is found to be a single apartment, containing only the base of a wood screen as a division into nave and chancel, the upper portion having been destroyed some years back, to give a better view of what we will now describe. The tall lancets we saw externally are, inside, barely seen at all, owing to the reintroduction of the reredos of the time of Wren, itself a very handsome incumbrance—pediment, vase, and acanthus-leaves; but why in a church, with a certain amount of vacant wall-space elsewhere, it should here have been replaced, is a puzzle, as all pilasters, string-course, &c., had been previously made good. Its speedy removal will, however, be a matter of ease, unlike one-half the structures erected in stone in the present day, in similar situations. On either side of the gangway we have walked up will be noticed a long marble slab, in which is set a

full-sized brass figure; this is the well-known "Northwood Brass," and a few slight repairs have been done by Mr. Waller, at the expense of a descendant of the family. Previously these figures were close together, on a very thick stone, in the centre of the passage. To the right is the "Shurland" monument, with its fine feathered-canopy and finial; the feet of the figure, recumbent, on a horse's head amid the waves. On either side of the "Classic" altar-piece was discovered a niche, one with the fresco of a bishop with mitre, and in the other several figures and heads, bricked up. The church we have described is covered by a new open roof in pine, and is now benched; it is connected with the structure now to be described by an arcade of three chamfered arches, and alternate octagon and round pillars, and a single arch with floriated capitals, between the quasi-chancel of the south church and choir-inclosure of the north. This north church has the usual division of nave and choir, and though unusually lofty is somewhat narrow; the Nuns' choir is divided by a tall, early English arch, plain, with Perpendicular wood screen of the usual type; in this choir the monumental remains are most interesting, as also the wall arcades and sedilia, numbering only two, which have been uncovered, and it may be here remarked that this portion of the church is left with the plaster skinned.

Previous to the late repairs, this choir was divided half-way up the arch into an upper story, and used as a school for the village. One effigy here was dug up, years back, in the churchyard, and its date is somewhat doubtful. The whole church has been well concreted, having been riddled with offensive vaults quite lately. The roof, which was stated to be almost flat, was put on in 1846, as an inscription on one of the principals notes, and has required corbels and fresh trusses, and its leads repaired, while that portion east of the choir-arch has been close-boarded and panelled by the Ecclesiastical Commissioners. The font-cover is of the Renaissance type, carefully cleaned from coats of paint, though not perfect at its base.

The tower space opens to this nave by its entire width and height, in a Perpendicular arch, having a grand effect. The consideration of either proceeding a small distance higher, or repairing the present wooden cot on the stump of the tower, is deliberated, and alone remains to be dealt with. It should be mentioned that Saxon work is visible over the divisional arcade in the north church. Mr. Ewan Christian has been the architect. The dimensions are: South church: width, 30ft.; length, 75ft.; north church: width, 25ft.; length, including tower-space, 94ft.; without tower-space, 71ft.; porch, width, 15ft.; length, 16ft.

SOME ARCHITECTURAL ASPECTS OF THE EARTHQUAKE AT CHIOS.

AN interesting letter, by Mr. Joseph Thacher Clarke, Corresponding Member of the American Institute of Architects, and Special Corresponding Member of the Boston Society of Architects, now in charge of the explorations in progress at Assos for the Archeological Institute, appears in the *American Architect and Building News*, in which, after graphically describing the locality and results of the recent terrible earthquake at Chios, he concludes with the following remarks on some of the architectural lessons to be derived from the catastrophe.

Of the buildings destroyed upon Chios perhaps the only one individually known to architectural history was the Monastery of Nea Moneh, with a Byzantine church in the centre of its quadrangle which contained mosaics reputed to be the finest in the Levant.* These buildings were almost entirely overthrown, burying a great number of monks beneath their ruins. The plan of the church, which dates back to the age of the Empress Irene, was in many respects peculiar. To an irregular octagon, with three apses at the east, there was adjoined a narthex and an exonarthex, the ceilings of both being divided into domed compartments which were ornamented by the famed mosaics.

The direction of the first shocks is everywhere evident from the ruins, as well as from the ac-

counts of witnesses. A marked vertical upheaval preceded the usual lateral oscillations, which toppled over the masses of masonry thus loosened. The mechanical results of this upward movement are extremely remarkable. The heavy corner-stone of a roof-cornice was situated eight metres above the earth. Put in motion by the first shock, it jumped over the L of a building four metres broad, situated at a distance of three and a half metres from the cornice, and fell *twenty-one metres* from the spot where it would have dropped vertically. So at least affirms Prof. Dr. Christomanos, who was sent from the University of Athens to prepare a report upon the earthquake. The wooden upper story of a house in the suburbs of the capital was lifted off bodily, and stands upright in the garden, beside the original foundations, intact in all its constructive features. One man, who miraculously escaped without injuries of importance, was completely buried under the ruins of the local Casino by the first concussion, the debris above him being thrown aside by the succeeding shocks. The upright motion is further evident from its effect in chipping the rectangular edges of heavy and insufficiently cemented stones. The piers of the chief inn of the town were thus fractured upon all the lower corners from having been jolted up and down, while the balustrade and iron gratings between were sufficient to keep these supports from falling sideways.

It is by a consideration of such aspects of destruction that one is enabled to appreciate the marvellous perfection of stone-jointing customary in the best constructions of Greek antiquity. The drums of the shaft, and indeed every block of the unrivalled Doric and Ionic temple structures, were not merely doweled by upright pins, but were united as one stone by the grinding and polishing of each superposed cylinder. A fragment broken from the columns of the Parthenon by Revett severed elsewhere than at the joint between the drums, into which the point of the sharpest knife can nowhere be introduced. The earthquakes which have repeatedly tumbled Byzantine Athens to the ground, and have even overthrown columns of the Corinthian fane of Olympian Zeus, have not jarred a single stone of the three great buildings upon the Athenian acropolis from their normal positions. Some of the peculiar features of the later Greek wall-masonry here at Assos are only to be understood when compared to the ruins of Chios and referred to the great earthquakes during the reigns of Tiberius and Aurelius, which depopulated so many of the fairest towns upon this coast.*

Eugène, in the *Histoire d'une Maison*, who may doubtless be taken as an expositor of the views of one of the greatest architects of this century—the best trained, if not the most gifted, designer—describes ideal technical education as particularly furthered by a study of actual buildings, not those merely projected on paper. Especially did he "set himself to observe buildings that were crumbling to pieces, that he might discover in *anima rili* the causes of their ruin." And thus in Chios, though the destruction of the edifices has been brought about by a phenomenon of Nature, the principles of resistance which find application in building construction are exceptionally evident and instructive. The jarring and pounding of our manufacturing machines produce much the same ultimate effects as the shocks of the Chian earthquake; that the ruinous agency is in the former case weakened in force, and extended in action over a period seldom shorter than five years, does not in principle alter the architectural aspects of the question. From this point of consideration the first and most striking evidence of the ruins affirms the resistance offered to vibrations by wooden constructions to incomparably surpass that of the best masonry with horizontal bed-joints. In some houses by the water-side the stone walls were almost wholly overthrown, but crumbling away had left intact within them those rooms which had been inclosed by light partitions of studding and by the lathing of the outer wall, upon which the plastering had been applied to obviate its continual cracking from the settling of the badly-built masonry. It is further observable that the combinations of timbered construction with stone and lime in the building of walls everywhere insured good results, while, on the

other hand, wooden floorings of beams or joists were frequently shaken from their bearings in walls of masonry, and fell, carrying destruction from floor to floor. Vaulted ceilings remained uninjured in almost every instance; it was wonderful what poor and hasty constructions of this kind resisted the concussions. If, in the figurative language of the Orientals, "the arch never sleeps," it is the more alert against unforeseen shocks, and, by its continual tension and the varied direction of its thrust, better withstands a swaying movement, the wedge-shaped stones only being forced the more tightly together, so that the whole cannot fall as long as its supports remain unimpaired. In the lack of wood for the adoption of the *Chatmâr* and *Frenghish* methods of partial timbering, the turning of blind arches of considerable thickness in the body of the wall is to be recommended. One façade of a Chian house, thus strengthened, had been erected upon insufficient foundations, and was thrown by the earthquake bodily across the narrow side-street, where it leaned unbroken, having crushed the delicate wooden tracery of a Turkish bay-window. But when, as in these districts, lumber is so common that at least the floors are usually built of wood, it seems advisable to secure stability and safety from the constantly-recurring vibrations of the earth by putting all the beams at disposal into the thickness of the wall, and arching and vaulting the ceilings with bricks and small stones.

It is dreadful to think, while looking upon the deserted and blood-bespattered ruins of this once populous town, of the results which would be occasioned in our own great cities by only one of the fifty or more shocks which have overthrown the low houses of Chios. To assume the possibility of a destructive earthquake is of course to be regarded as a foreboder of impossible evils; but it must not be forgotten that shocks of considerable force have been chronicled almost every century, while lighter and almost unnoticed vibrations are of constant occurrence. We have been reminded that when a structure sways for some seconds in the same time and direction as the earth, the danger of overthrow from comparatively slight concussions is as great or even greater than from single severe shocks. No constructors have ever built with less regard for possibility of altered statical conditions than the master-builders of our tallest edifices. Every architect knows the haste and short-sighted economy with which many of our largest and most pretensions business-blocks and dwellings have been put up,—and can picture to himself the result of an earthquake, which need be no more severe than that which visited us in 1775 to destroy hundreds of thousands in an instant.

CHIPS.

Mr. J. E. Millais, R.A., has been appointed a trustee of the National Portrait Gallery, in place of the late Dean Stanley.

A new Roman Catholic chapel at Innerleithen was opened for worship last week. Mr. Biggar, Edinburgh, was the architect of the church, which is nearly 100ft. long inside, 25ft. wide, and to the point of the open roof 46ft. high. It is in the 14th century style of English Gothic. Mr. Robert Matheson, Innerleithen, was the builder.

The Cardinal Archbishop of Westminster recently laid the foundation-stone of a school-chapel at Tottenham. It is 90ft. long and 28ft. wide. It will be of the simplest kind—brick with stone facings, and will cost in erection £1,900. Mr. Francis W. Tasker, of John-street, Bedford-row, is the architect.

The foundation-stone of a new Primitive Methodist chapel was laid at Clarendon, Bath, on Tuesday week. The chapel will be built of Bath ashlar masonry, will seat 260 persons, and will measure 33ft. by 45ft. At the rear will be a school-room, 18ft. by 36ft., having in its basement five class-rooms. Mr. James Hicks, of Redruth, is the architect, and Mr. Bladwell, of Bath, the contractor. The cost will be £1,100.

The new town-hall at Staines is rapidly approaching completion. Mr. Johnson is the architect, and Mr. Brunnsden the contractor.

On Wednesday week the workmen employed in enlargement of the theatre royal, at Ward Ends, Halifax, were entertained at supper in celebration of the completion of the new stage. The work is being carried out by Mr. Cawderay, of London, and, when completed, the pit will be enlarged from 300 to 800 sittings, and the gallery to 1,000 sittings.

* Compare Dallaway, "Constantinople ancienne et moderne, et description des côtes et îles de l'Archipel et de la Troade," Vol. II., p. 78; etc.

* "Eodem anno duodecim celebres Asiæ urbes collapsæ nocturno motu terre."—Tacitus, *Annal.*, II., 47.

Building Intelligence.

AVENBURY.—Avenbury parish-church, an ancient structure built on the banks of the river Frome, about a mile and half above Bromyard, has been reopened after restoration. The interior restoration consisted in taking down the old lath and plaster, and cutting a new ceiling. By this the whole of the old oak timber in the roof up to the apex (and most of which is in good preservation), now stained and varnished, will be displayed to view. The old stone floor in the nave and chancel has been taken up, and the whole relaid with Godwin's tessellated tiles. New stone steps under the altar-rail from the chancel have also been put. The old oak pews, put in on the occasion of the former restoration, have also been removed, and open seats of pitch-pine have been substituted in the nave. In the chancel four new stalls have also been put in, and a new floor has been laid underneath them. There is also a new pulpit erected in the place of the old one, and the reading-desk and lectern are likewise new. They were executed in oak, from the designs of Mr. Haddon, of Hereford. The old oak screen, which was formerly partially covered with plaster and whitewash for many years, has been completely restored and varnished, with new oak gates of very good design. The entrance porch has been entirely removed, and a level entrance is now made into the church. There is also a new gate leading into the churchyard. The whole of the work has been carried out under the direction of Messrs. Haddon. The pulpit, reading-desk, and lectern were executed by Messrs. Vale and Stevens, of Hereford. The rest of the work was executed by Mr. Joseph Turbill, builder, of Church-street, Bromyard.

BRISTOL.—On Monday the foundation stone of the new chapel to be attached to Barstaple's Almshouse at the top of Old Market-street was laid. The dimensions of the new chapel will be 40ft. long by 15ft. wide. The style is Perpendicular, and the chapel will be substantially built of Pennant stone with Bath stone dressings. The total cost is about £1,000. The architects for the new structure are Messrs. Foster and Wood.

CATERHAM.—The Church of the Sacred Heart was opened on August 11th, by Cardinal Manning. The church is cruciform in plan, and consists of a nave, south aisle, north and south transepts, sanctuary, Lady-chapel, and a sacristy, with organ-chamber over. The nave is 15ft. by 21ft., the sanctuary 27ft. by 20ft. The extreme width across the transepts is 50ft. The base of a tower finished as a porch, with a gabled roof, occupies the south-west angle of the building. The seats in the nave will accommodate 200 adults. The aisle and transepts are furnished with chairs, seating another 100. Provision has been made for the addition of a north aisle when such shall become necessary. A presbytery connected with the church by a covered cloister, for the residence of the priest, occupies the upper portion of the site abutting on the main road. The church is built of Reigate stone, Bargate stone, and Box Ground stone. The work is faced externally with Bargate stone from Godalming quarries, and the whole of the quoins, strings, plinths, window-facings, &c., are of Box Ground stone. The style chosen is English Gothic of an early type. Mr. Carruthers, of Reigate, was the contractor for the whole. The architect is Mr. Ingress Bell.

GLOUCESTER. A new Primitive Methodist Chapel has been commenced at Gloucester. The style of the building will be Italian. The chapel will be 62ft. long by 19ft. broad, and the school and class-rooms, which are placed behind, will be 35ft. by 40ft. The height of the chapel wall, within, will be 32ft., and of the school-room wall 28ft., the height of the building at the highest part of the roof being 19ft. Accommodation is afforded on the ground-floor for 384 persons, and in the galleries for 256 more. The school and class-rooms are built for 400 children. The architects are Messrs. Kerridge and Sons, of Wisbech, and the builder, Mr. Wibby, of Gloucester.

KYLL. Christ Church British Schools, Rhyl, were opened on Monday. The design is carried out in brick and terra-cotta. The architect is Mr. C. O. Ellison, of Liverpool and London.

The style is the Domestic Gothic with timber gables, treated with mullions, transoms, &c., in red terra-cotta to match the red brick facing, and with enrichments in terra-cotta, made by Mr. Edwards, of Ruabon. The principal staircase walls are carried up to form a tower at one angle of the building, giving dignity to the whole structure, and grouping well with the several gables, turret, &c., and polished granite blocks built into the centre of diaper panels in various parts of the front. Messrs. Collin and Son, Warrington, are the general contractors. Mr. Hammond has been clerk of works.

SALFORD.—The foundation-stones of Primitive Methodist chapel, Trafford-road, were laid on Saturday last. The chapel measures internally 62ft. by 41ft. 6in. and 53ft. high, being ceiled at collar-beam. The number of sittings provided is 170, seats and all internal fittings will be executed in pitch-pine. The elevations to Trafford-road and West Park-street are faced with stock brick, stone strings and mullions, &c., from Matlock Bath quarries. The total cost will be about £1,700. Mr. Fell, Manchester, is the architect; and Mr. Gerrard Swinton, the contractor.

UPHOLLAND.—It has been decided, at a meeting of parishioners, to restore the ancient church of Upholland, near Wigan. The Earl of Lathom has written two letters on the subject, in one of which he hopes that the necessary funds may be found to restore the fine old church. It had always, he said, puzzled him as to what the original idea of the builders of the church could have been, and if the architect called in, Mr. Champneys, was able to clear up that point, it would help and simplify the work greatly. Mr. Champneys had prepared a report on the state of the edifice, and the repairs necessary to be undertaken. The latter he divides under three heads—first, the substantial repair of the external walls and windows of church and tower; second, the lowering of the floors to the ancient level, the rearrangement of the sittings on the ground-floor, and the introduction of a proper warming apparatus; third, the enlargement of the church eastward, continuation of the arcades and roof, arrangement for organ-chamber, &c.; the total cost being estimated at £3,290. It has been decided to proceed only with sections one and two, which work is estimated to cost £1,600, and a committee has been appointed to carry out the work as speedily as possible.

WINCHESTER.—Several improvements are being carried out on the estate of Lord Northbrook at Stratton, near Winchester. The home-stands on some of the farms have been entirely rebuilt on the most approved principles, and the farmhouses remodelled. Only one pair of cottages has at present been erected, but more are contemplated. The whole of the farm-buildings and cottages are built of bricks and local headed-flints pointed with black mortar; the cottages are covered with plain tiles and the farm-buildings with slates, with the exception of those at the East Stratton Farm, which are covered with Poole's patent tiles. The whole has been carried out by local tradesmen, from the designs and under the superintendence of Messrs. Rayabird and Sons, surveyors and land agents, of Basingstoke, who are also erecting other home-stands on the estates of Lord Templemore, at Preston Candover, near Alresford, and Mr. W. W. B. Black, M.P., of Oakley Hall.

COMPETITIONS.

SWANSEA.—After various meetings the Swansea Town Council have at last decided upon the recipient of the prize offered by them to architects for plans of proposed town improvements. In the first instance, the prize for the best plan was proposed to be divided between "Pro Bono Publico" and "Progress." The latter, however, refused to accept any such proposal, and we now find that "Progress" has been selected. The authors are Messrs. Taylor and Frame, of Cardiff.

The Newbury town council on Tuesday week appointed Messrs. H. O. Baldry and John Austie as engineers to carry out the drainage of the town on the site recommended by Messrs. Law and Chatterton, the arbitrators, who awarded to these engineers the first premium in the recent drainage competition.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

LEEDS ARCHITECTURAL SOCIETY.—On Saturday afternoon several members of the above society paid a visit to York, being one of their series of Saturday afternoon excursions, for the purpose of inspecting buildings in progress and also buildings of archaeological interest. Upon arrival in York they proceeded to view the villa residence now in course of erection at Heworth for Mr. J. Bellerby, from designs by Mr. W. G. Penty. In the unavoidable absence of the architect, the members of the society were conducted over the building by Mr. B. Priestley Shires, managing assistant to Mr. Penty, and Mr. F. Osborne, the clerk of works, who explained the various features of the arrangement and design, together with the sanitary arrangements and water supply. After leaving Heworth the party returned to the city and inspected St. Mary's Abbey, Museum and grounds of the Yorkshire Philosophical Society; they also visited the Merchants' Hall, Fossgate, including St. John's Chapel in the basement. After tea, the members visited the exhibition and spent the rest of the evening in viewing the Prince of Wales' collection illustrating the arts of India, and returned to Leeds by the last train, expressing themselves well-pleased with their excursion. It is the intention of the society to pay another visit to York in September next, when their whole time will be devoted to an inspection of the Minster, under the able guidance of Mr. George Bradley.

WELLS ARCHÆOLOGICAL SOCIETY.—On the 11th inst. the above Society, under the direction of the Rev. Prebendary Jones, visited the Manor House of Great Chalfield. Mr. Jones stated that this was one of the finest manor-houses in England, and was built by Sir Thomas Tropenell, about 1435. The Tropenell (now Trapnell) family came into possession of the Great Chalfield Estates by marriage with the Percy family, and possessed many other estates in the adjoining parishes. The lecturer pointed out the beauties of this ancient building, its slender traceried enrichments of the oriel window overlooking the banqueting hall, the "Priest's chamber window," the large carved stone effigies of men in armour, which surmounted the gables at different points of the roof, and he gave it as his opinion that these sculptures were intended for more than mere ornamentation of the elevation, and were, he thought, significant of the official position of the Trapnell family, who, for many generations, held the law-day under Government. In the little church adjoining the manor-house is the chapel built by Sir Thomas Tropenell, which chapel was at one time inclosed by the beautiful carved screen which now incloses the chancel. The walls of this chapel, which are now only whitewashed, were once decorated with frescoes of life-size, representing saints, and it was stated that they were whitewashed by order of a previous vicar, who found that the audience paid more attention to the frescoes than to his sermons. The outlines and some of the colourings are still visible; but it is, we believe, the intention of the present owner of the property, Mr. Fuller, of Neston Park, to restore them. At the conclusion of the proceedings the society visited the ancient Manor House of North Wixall.

ARCHÆOLOGICAL.

CONDITION OF STONEHENGE.—At the meeting of the Wilts Archaeological Society last week, the committee reported that, in conjunction with the secretary of the British Archaeological Association, a representation has been made to the Society of Antiquaries and the Royal Archaeological Institution of Great Britain, calling their attention to the insecure condition of certain stones in the outer circle of Stonehenge, and their imminent danger of falling. At the same time the question of re-erecting the great trilithon, which fell in 1797, and the erection of which had been so often advocated by the archaeologists, was again pressed upon the parent societies. A committee of the Society of Antiquaries, including Sir John Lubbock, had consequently visited Stonehenge last month, and made a careful examination of the stones, the result being that the whole question was to be submitted to a general meeting of the Society of Antiquaries next November. With reference

to the above, Mr. J. J. Cole, F.R.I.B.A., writes: It will perhaps be of interest to the antiquarian societies mentioned that instructions were lately given for a careful examination of the supposed insecure part of the outer circle of Stonehenge and for steps to be taken to avoid an accident. I propose to do so shortly, and also to ascertain the exact degree of inclination of the leaning stone of the central trilithon, and to test it by photographs taken 22 years ago. It is very doubtful whether any movement has taken place within this century. It is useless to urge on the owner of Stonehenge (it is often forgotten that there is an owner), Sir Edmund Antrobus, that the great trilithon which fell in 1797 should be reinstated. The late baronet would not hear of it, neither will the present one. He wrote respecting the outer circle—"To restoration I am distinctly opposed, but this might be considered in the light of preservation, not only of the monument, but of its observers."

PARLIAMENTARY NOTES.

DECORATION OF THE PALACE OF WESTMINSTER.—On Tuesday, on going into Supply, Mr. Schreiber called attention to the unfinished condition of the Central Hall, and moved a resolution calling for its immediate completion in mosaics.—Mr. C. Bentinck energetically opposed the motion, declaring that in our imperfect knowledge of mosaic art such an undertaking must be a failure; and as to the unfinished state of the Central Hall, he pointed out that none of the great monuments of art had been completed in a single age.—Mr. Shaw-Lefevre also opposed the motion, holding that in the present state of mosaic art, and the undecided state of public opinion, it would be very difficult to obtain a vote on the subject. The motion was negatived.

CHIPS.

A new church at Hutton Roof, near Kendal, erected at a cost of £2,500, was opened for worship on Monday week.

Steps are being taken to form a club in Cockermouth. The site is selected, and a plan has been prepared by Mr. W. C. Jennings, architect. The institution is to be confined to a billiard-room, reading-room, &c.

An industrial and fine-art exhibition was opened at Haslemere, Surrey, on Tuesday week. Amongst the local residents who have lent pictures are Mr. Teunynson, Mr. Birket Foster, and Mr. and Mrs. Alma-Tadema.

A new organ was opened at New-road Baptist Chapel, Huddersfield, on Sunday week. Messrs. Jas. Conacher and Sons, of the same town, were the builders.

The parish-church of Wigton was to be reopened by the Bishop of Carlisle yesterday (Thursday). The flagged floors have been replaced by others of wood blocks in nave, and of black and white marble in chancel. New free and open seats, heating-apparatus, and windows have also been put in, and the ceilings and walls have been decorated in colour under the direction of Mr. Leach, of Cambridge.

The laying out and draining of the new sewage-farm at Kidderminster have just been completed under the direction of Mr. Comber, borough surveyor. The contract amounted to £3,500.

Mr. Charles Pugh, inspector of nuisances to the Guildford rural sanitary authority, died very suddenly on Monday week. He was elected to his present office as recently as March last.

The new hotel at Loampt Vale, Lewisham, was opened last week. It has cost about £5,000 for erection, and the builders were Messrs. Crisp and Turner.

The erection of the orchestra at the west end of nave of Worcester Cathedral, for the festival of the Three Choirs, was commenced last week. Messrs. Joseph Wood and Co. are the contractors.

The very small parish-church of Over Denton, Gilsland, was reopened by the Bishop of Carlisle, after restoration and reseating, on Monday.

The foundation-stones of a new Wesleyan school-chapel were laid at North Hykeham on Monday week. Mr. W. Mortimer, of Lincoln, is the architect, and the chapel will seat 200 people, at an estimated cost of £500.

At the International Medical and Sanitary Exhibition, South Kensington, London, which closed last week, Messrs. Robert Boyle and Son, the well-known ventilating engineers, of Glasgow and London, were awarded the "highest prize," for their patent self-acting air-pump ventilators and system of ventilation, this being the only first prize awarded for roof-ventilators.

"To a practical man with a taste for mechanics, and the bump of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Two pence of all newsmen, or post free 2½d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31 TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 5s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and SIXPENCE for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 60s. 40c. gold). To France or Belgium, £1 6s. 6d. (or 35s. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Mr. CHARLES WILSON, of 13 and 15, Laidgate-street, New York City, is authorised to receive American subscriptions at the rate of 6 dollars 40c. per annum.

Mr. R. M. TUTTLE, of Titusville, Penn., U.S.A., is also authorised to receive subscriptions at the same rate. Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—A. H. W.—P. P.—C. Co.—H. and S.—H. L. B.—E. R.—H. W.—G. F. N.—A. and G.—H. B. and Co.—E. M. N.—C. E. J.—G. C.

ONE OF THEM. (1. Firstly incomprehensible. 2. They are elected by the Metropolitan Board of Works from candidates who must have previously passed the examinations held by the Royal Institute of British Architects.)

"BUILDING NEWS" DESIGNING CLUB.

"VERONESE." We shall be glad of the name, address, and age of this contributor on or before the 23rd inst.

Correspondence.

COOPER'S HILL COLLEGE AND THE ROYAL ENGINEERS.

To the Editor of the BUILDING NEWS.

SIR,—I write to deprecate the tone of the letter signed "Jaalam Smith," in your issue of 5th August.

That the first two paragraphs are overstrained to such an extent as to become untrue, every Indian official who reads J. S.'s letter will understand. I see no good whatever in drawing invidious comparisons in the public papers between R.E.'s and C.E.'s—the more so, as I believe there are quite as able men in the corps of Royal Engineers employed in India, as in the same number of civilians; in fact, I may go further, and say that numbers being equal, the majority would be found in the corps of R.E.'s.

Civilians are quite willing and ready to let them have their share of the work and its credit, or otherwise, provided they will allow them a fair proportion of the loaves and fishes.

The real cause of the animus against the corps as a body (not as individuals) is the fact that they are at the head of the administration, and reserve the very few pickings in the service for members of their own body, and are the only channel through whom complaints of civil engineers can reach Government. What civilians

ask for is better retiring-pensions, and that the Civil branches may be administered by civilians, and the military works by military men.

AN INDIAN CIVIL ENGINEER.

August 11th.

VENTILATION OF SOIL-PIPES.

SIR,—Mr. Drury's letter on p. 214, reminds me of a man who has fallen into a bog—the more he struggles the deeper he sinks. He pretends to say I do not know the price of a ventilating trap, nor of the cost of fitting it in, and adds I had omitted to include the "chamber." Now this shows he knows nothing about it, and is merely writing by guess. I have fitted in hundreds of my disconnecting ventilating traps, and built-chambers have only been put in in a few cases, viz., where the traps were deep. These "chambers" are termed "manholes" in Scotland.

Further on in his letter he struggles again, but only sinks overhead, as he tries to show that my remark that a ½ in. outlet, with a large inlet, "helps to prevent accumulation of the sewage-gas at the top of the pipe," is a sufficient reason for him continuing to affirm that the inlet is superfluous, and a ½ in. outlet ventilating-pipe quite enough for any soil-pipe.

Such foolish writing from a man who wishes the public to imagine he knows something, shows how much yet requires to be done for the protection of the public from the ignorant conceit of many tradesmen, let alone any mercenary considerations.—I am, &c.,

W. P. BUCHAN.

SANITARY PLUMBING.

SIR,—I think this will be my last communication in reference to Mr. Hellyer's lectures on sanitary plumbing. I refrained from criticising the last lecture, as some people seemed to think I was too severe and somewhat unjust. I, however, have not had long to wait for an opportunity of proving that my theory was correct and my remarks perfectly just—to wit, the discussion on Monday last at the Society of Arts rooms. Those members of the trade proper, and the professional branches of it—viz., architects, civil engineers, and so-called sanitary engineers who were present, I trust are now convinced that my arguments in favour of the U-trap are quite justified. Some w(H)ould-be plumber defied me to prove my assertions correct as to the superiority of the U over the S-trap in respect of its self-cleaning capacities. There are many in the upper walks of the building trade who have held the same opinions as this before-mentioned incognita; but when, at the discussion, I produced my working model of a "properly-constructed" U-trap and put in a good handful of pebbles, which was readily cleared from the trap by the water, these wise-aeres stood aghast. Now, "Convince a man against his will, he's of the same opinion still," which proved to be the case in this particular instance, as the quibblers said, "Oh, this may answer with pebbles, but how would it do with paper." To settle this point and intended obstacle, I put my pocket handkerchief into the trap, and, like the pebbles, it passed out as would a shot from a gun. As a further test of the efficacy of my U-trap, I filled it with ink and water, and instantly on raising the valve, the ink-and-water was seen to rush into the pail, and actually before any of the water from the supply-trap had time to mix with it. I of course could not show them how it would act with soil, but I venture to think that when, with these three totally different tests, the trap acts with equal rapidity and cleanliness, even sceptics should be convinced, and those of the trade and profession, Mr. H. amongst the number, who have said that rather than have a U-trap they would prefer to dispense with one altogether, have now altered their opinion. One of the assumed demerits of the U-trap was an assertion that it retained more water than the S. Now, in contravention of this assertion, I must tell you that the body of my U-trap was exactly half of that of a 9 in. U-trap that the dip-pipe was 1 ½ in., and that the band was only wide enough to admit the dip. I have also to-day tested, by actual measurement, which trap, U or S, held the most water, and find the U far less, hence it cannot retain (if it retains any) so much foul water as the S. I have also proved, by experiments, that the U does not require any more force of water than the S. Be it, how-

ever, distinctly understood, that these conditions apply only to \odot -traps made after my model. I cannot guarantee a badly-constructed \odot -trap, such as shown at one of the lectures, to do its work properly.

I was extremely pleased to see so numerous an attendance at this discussion, as it undoubtedly served to convince many of at least the junior members of the trade that they have been in error.

In conclusion, I think it only just to say that, although I may have commented somewhat strongly on these lectures, much praise is due to Mr. Hellyer and his condutors of the National Health Society for the great trouble and assiduity they have bestowed on ventilating so important a subject, and think that the thanks of the trade generally are due to those gentlemen. —I am, &c.,

P. J. DAVIES, Hon. Mem. A.S.P.

DESTRUCTION OF THE LANTERN OF WIMBORNE MINSTER, DORSET.

SIR,—All lovers of architecture and antiquity will be sorry to hear that another act of vandalism has been committed at this church.

The unique external Norman arcading, built of a local brown sandstone, is being repaired in white stone, destroying the whole beauty of the tower. I am at a loss to account for the use of Bath stone.

A proof that this brown stone can still be obtained and is used for building purposes, I may mention that G. E. Street, Esq., used it in the building of St. Peter's, Bournemouth, and the church at Spokes-down. —I am, &c.,

MILLS ROBINS.

Hon. Sec. of the Bournemouth Field Club.
5, St. Peter's-terrace, Bournemouth, Aug. 16.

THE SUNDAY SOCIETY.

SIR,—The recent action of the Council of the Working Men's College, in generously placing the college buildings in Great Ormond-street at the disposal of the Sunday Society, has led the Committee to organise a Loan Exhibition of Modern Paintings at that Institution.

This, the twenty-fourth Sunday Art Exhibition opened by the Society, for the instruction and recreation of the people on their leisure day, will consist of paintings which have been contributed by Vice-Presidents and other friends of the Society.

The Exhibition will be open for three Sundays, viz:—August 21st, August 28th, and September 4th. On August 21st, the admission will be by tickets, which may be obtained by all who choose to apply by letter, inclosing stamped and addressed envelope for reply, to the Honorary Secretary, 8, Park-place Villas, W. On August 28th and September 4th the public will be admitted without tickets between the hours of 1 and 6 p.m.

In order that as many as possible may be made aware of the opening of this Exhibition, we beg you to publish this letter.—We are, &c.,

THOMAS BULT, M.P., President.

W. H. CORFIELD, M.A., M.D., Chairman of Committee.

J. W. THOMPSON, Director of the Exhibition.

MARK H. JUDGE, Honorary Secretary.

9, Conduit-street, W., August 18.

The contract for the erection of the first blocks of the intended dwellings for the Manchester and Salford Workmen's Dwellings Company, Limited, has been let to Messrs. Robert Neill and Sons, of Strangeways, at a price slightly under the original estimate of the company's architect, and building operations were commenced on Monday. This experimental venture is only on a small scale, and will consist of 21 ordinary dwellings and one lodging-house. The selected site is a plot of land at Holt Town, in Ancrofts, bounded on three sides by Mellock-street, Weston-street, and Cyrus-street. There will be an open space for playground and drying-ground, having a depth of about 55ft. between the backs of houses. The weekly rent proposed to be charged for each tenement is about 2s. 6d. It is expected that the buildings will be completed and ready for occupation during the present year. The company proposed to adopt the water-closet system, but after consultation with the medical officer of health and city surveyor, have agreed to introduce the pail system.

The London and Middlesborough Archaeological Society held their annual summer meeting at Morton, near Brading, Isle of Wight, on Thursday last week. Messrs. J. E. Price, F.S.A., and F. G. Hilton Price, F.G.S., received the members, and showed the excavations of a series of Roman buildings which they have been carrying forward at Morton for many months past.

Intercommunication.

QUESTIONS.

[6621].—**Competitive Design for Bradford Town-hall.**—Who was the author of the design for the Bradford Exchange, published in the *Building News* of March 24, 1871?—HUGH.

[6622].—**Building Construction.**—Can any of your readers inform me if there is any school in Edinburgh where I can learn the above?—F. P.

[6623].—**Baptistry.**—Will any reader inform me what is the best method of forming a "baptistry" under a Communion floor? The sides are to be faced with white glazed bricks. What thickness of wall should there be, and what should be put behind to render it watertight? How should the floor be formed? Also what depth of water is sufficient for baptismal purposes? A sketch of some good example would greatly oblige.—SIGMA.

[6624].—**Traps.**—Will Hugh McLachlan, G. H. G., or some other kind correspondent, give sketch sections of the various traps \odot , \odot , \odot , and \odot , which I think would be very helpful to many readers now that there is so much said for and against the said traps.—W. K. W.

[6625].—**Drying House.**—Will any reader kindly inform me the best and most economical way of warming a drying house, at the end of a joiner's shop?—Drying-House.

[6626].—**Bakehouse Chimney.**—I have a house which is much incommoded by the smoke from a bakehouse chimney adjoining. Can anyone kindly suggest a remedy for this? Is it possible to make the chimney consume its own smoke?—A. S. S. S. S. S.

[6627].—**Photos.**—Pencil-Sketches.—I should be much obliged if some of your readers would tell me the best way of taking photos. off their mounts; and also the best way of setting pencil sketches.—IGNORAMUS.

[6628].—**Styles of Architecture.**—Will any of your numerous correspondents kindly inform me of the best books I can read on the different styles of architecture.—F. B. P.

[6629].—**Farmsteads.**—I shall be glad to know of one or two examples of the above, not far from London, which may be taken as models. Also of a good book on model farm-buildings.—TERRA.

REPLIES.

[6620].—**Reservoir.**—Thanks to Hugh McLachlan for his reply. I must say the size he recommends for filter bed took my breath away, and I hope he will excuse my asking if a 12in. by 10ft. filter will not filter more water than, say, a 2in. supply pipe from reservoir could possibly take off? Does the total depth of filtering material require to be 4ft.? How is charcoal for the purpose best made or obtained?—L. L. U.

[6629].—**Nave Roof.**—"Student" evidently knows very little about architecture at present. For English Ecclesiastical Gothic he should study the works of Sharpe, Coling, and Brandon. Gwilt's "Encyclopedia of Architecture" (the later editions only) gives much valuable knowledge on the subject, with good articles on proportion referring to other works. There is considerable difference of opinion amongst authorities on the finding of correct proportions, some believing the proportions of the middle ages to have been founded entirely on geometry, others on a correct eye and taste, discarding geometrical rules. Formerly I inclined to the latter opinion, but now to the former, aided by an educated eye and common sense. For French Gothic study the "Dictionnaire de l'Architecture" by M. Viollet le Duc, and for roofs the article "Charpente" in the same. "Student" must I think have also made a mistake as to the pitch of his roof, which is absurd. The scantlings of ridge-pieces depend on the scantlings of the common rafters and the pitch of the roof. In Early English roofs they were omitted, in the Late Gothic roofs they had large scantlings. Now they are seldom more than 1 1/2in. thick and the depth is about that of the common rafter cut across vertically. The scantlings of purlins depend on the distance apart of the trusses and the weight they have to carry; and the scantlings of rafters on their load, length and pitch of roof. To ask for a section of a roof in the "Intercommunication Column" is too much. When inner and outer wall-plates are used they are connected by cross-pieces about 6ft. apart, halved, dovetailed and pinned to them at joints. The common rafters are notched over the outer wall plates, and have short upright pieces or struts studding into the inner plate at foot of rafters over the wall. The principals are in this case set flush on the exterior with the common rafters, the purlins being studded into and secured to them with iron, the principals having extra large scantlings. The moulding of the inner plate depends on the detail of the surrounding work. There is no necessity for moulding when the remainder is also plain. Window heads inside generally have segmental drop-arches. To have the same splay as the jambs is usually a sign of what is commonly known as "barbaric" or "Gothic." The sills of aisle windows will be found varying from 5ft. to 15ft. above the floor line.—HUGH McLACHLAN.

[6630].—**Sashes and Frames. Omission.**—In the fourth line between "argued it" and "though he," &c., read "with regard to small windows."—HUGH McLACHLAN.

[6630].—**London Bridges.**—For Blackfriars railway bridge consult Humber's "Record of Modern Engineering," 1864; for the Thames Embankment, see the same work for 1865.—SIGMA.

[6630].—**Decoration.**—It is always advisable to have ceilings of a light colour, whatever may be that of the walls, since a dark colour depresses a room and apparently decreases the height. The colour may contrast to that on the walls, or be of the same shade according to the style of the decoration and the capability of the artist; both may in their proper places be correct.—HUGH McLACHLAN.

[6631].—**Flow of Water.**—This question cannot be answered unless the absolute length be given. The inclination "1 in 20" is not sufficient. Further, the mode of entry into the pipe should be stated.—C. S.

[6631].—**Flow of Water.**—The question omits to give the "head of water," which is necessary. The number "two" placed in brackets is not sufficiently explanatory, does it refer to the number of the pipes?—HUGH McLACHLAN.

[6632].—**Additions.**—If the clause relating to the referee is as worded in the question, I cannot see how the contractor can ask him to arbitrate. The clause merely names one of the parties in a supposed dispute, the contractor, and does not say therefore between whom the referee is to arbitrate. This being so, I am afraid the contractor must submit to the mercy (?) of the Board, since they do not appear to have given a legal sanction to the additions. I even expect the referee would have to give judgment in favour of the Board, if he could adjudicate.—HUGH McLACHLAN.

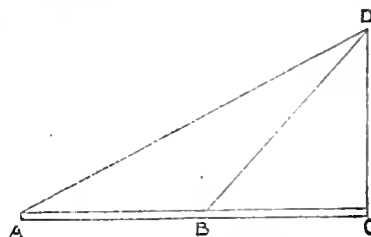
[6633].—**Ice-Houses.**—For some time past, in the United States, ice-houses have been protected with silicate cotton, or mineral wool, instead of with sawdust or an air-space, and it has been highly approved of there for that purpose. Silicate cotton is a production from blast-furnace slag, and, in the manufacture of it, the threads are caused to lie in all possible directions with relation to each other, in consequence of which there is no parallelism or common direction in them, so that the air-spaces are angular in shape and microscopic in size. Practical experience with nonconductors of heat or cold has gradually proved that the long-established principles of physics are actually true, viz., that air-confining, or porous bodies are the poorest conductors, and that the passage of heat or cold is retarded in proportion to the volume of air the insulating material holds from circulation. A simple air space of, say 2in., is only effectual as a non-conductor so long as it can be held motionless, but this has been found to be practically impossible. The silicate-cotton is also made in England at the Ties Iron Works, Middlesbrough, and is, I believe, being used for the same purpose here as in America. It should be very inexpensive, and the application is simple, being just the same as if sawdust was being made use of.—S. R.

[6634].—**Coloured Plaster.**—The best way of preparing plaster of a red tint, is to substitute for a portion or the whole of the red brick, ground fine and passed through a sieve used for sifting sand. The proportion will depend both on the colour of the bricks and the depth of the tone required.—HUGH McLACHLAN.

[6635].—**Examination for District Surveyors under Metropolitan Building Act.**—All who wish to be examined should have a good acquaintance with the construction, nature, and strength of building materials, knowledge of the Met. Building Act with Amendments, by-laws and cases on the same tried in the Superior Law Courts. They should also be able to calculate the scantlings and dimensions of structural pieces and prepare working drawings. It is advisable to study, amongst other works, Tarn's "Science of Building," Hurst's "Architectural Surveyor's Handbook" and Woolrych's "Building Act." I believe the examination has become more difficult since I passed.—HUGH McLACHLAN.

[6636].—**Vaulting.**—Draw in pencil by geometry and freehand. French curves may be used when suitable for inking in, but not centres.—HUGH McLACHLAN.

[6637].—**Measuring.**—To find the height of an inaccessible object. Let CD represent the object of which the height is to be found; at any two convenient stations A and B, in the same vertical plane with CD, observe the angles of elevation D A C, D B C, and measure the distance A B. Then, because the exterior angle D B C is equal to the two interior angles E D A, D A B, if D A B be subtracted from D B C, the angle B D A will remain. Now, in the triangle D A B, as sin. D is to sin. A, so is A B to B D;



and in the triangle D B C, as sin. C (a L.) to sin. B, so is B D to C D. Example:—The angle of elevation of a tower, at a station on the same horizontal plane was 48°, and at another station, on a level with the former, and 200 feet farther off in the same direction, the angle of elevation was 26° 45', the height from the eye being 5ft., what was the height of the tower?

$48^\circ - 26^\circ 45' = 21^\circ 15' = A D B.$

To find B D.—

$$\begin{array}{rcl} \text{S. } A D B & = 21^\circ 15' & = 9.5592338 \\ \text{S. } D A B & = 26^\circ 45' & = 9.6331975 \\ \text{S. } A B & = 200 & = 2.3010300 \\ \text{S. } B D & = 218.37 & = 2.3951037 \end{array}$$

To find C D.—

$$\begin{array}{rcl} \text{S. } C & = 90^\circ & = 10 \\ \text{S. } D B C & = 48^\circ & = 9.5710733 \\ \text{S. } B D & = 218.37 & = 2.3951037 \\ \text{S. } C D & = 184.57 & = 2.2661772 \end{array}$$

Height of the Eye = 5'

" " Tower = 189.57 feet, Ans.

—FRED. J. FREEMAN.

[6638].—**Setting Pencil-Sketches.**—No doubt the paper was badly sized at first. Sponge the paper well with alum-water when straining it, if the spotting has not gone too far, you will find this a remedy.—FRED. J. FREEMAN.

[6615].—**Deadening Sound in and Keeping Cool Temporary Buildings.**—There is a fibrous material blown from blast-furnace slag, called slag-wool, or silicate-cotton, which, when properly applied, is an effectual non-conductor of sound, heat and frost. This product is very inexpensive, and can be applied in various ways, but most usually by stuffing it under a thin wooden lagging. It can also be obtained now in the form of "felt," made into flat squares, or in frames, to facilitate its application to vertical surfaces. I believe the slag-wool is being manufactured under patent, on a very large scale, by Messrs. Whisn's, Peace and Co., Middlesbrough. —F. J. K.

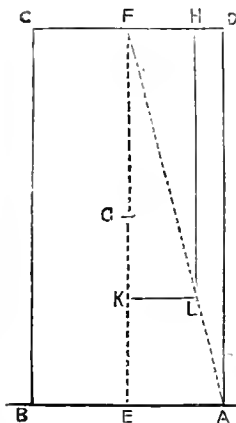
[6618].—**Painting and Gilding.**—For the paint you will require white-lead, umber, ochre, driers, linseed-oil, and turpentine. You may put the lead, ochre, umber, and driers, with a little of the oil, into a pot and stir with a stick until smooth. To cause gold leaf to adhere to tissue-paper, you must rub it (the paper) with beeswax, and lay the prepared side of the paper on the gold. In all probability you will be rather clumsy with the gold-leaf, for it requires a little practice to do it properly. —T. PEASAGE.

[6619].—**Carpentering.**—In reply to "Amateur Carpenter," let the mahogany be well seasoned and as free from knots as possible. Use ordinary glue (mixed with water), not too thick; after the easel is glued together, place it in a dry room for a day or two, so as to allow the glue to get hard, afterwards it may be glass-papered over, in order to obtain a smooth face for polishing. —FRED. J. FREEMAN.

[6619].—**Carpentering.**—"Amateur Carpenter" must trust the joiner or cabinetmaker from whom he buys his material as to its being properly seasoned. Any kind of mahogany will suit his purpose. He will find "Honduras" or "Bay" mahogany most easily worked. The person who sells him the wood will also likely be able to supply good glue and willing to show how to prepare it. Good glue is hard in the cake, of a bright amber tint, not too dark, and almost transparent. Break it as small as possible, put into inner pot, and soak with as much cold water as will cover it. If allowed to hang on fire after being heated, it will become too thick, from evaporation of the water. It ought to run freely from the stick with which it is necessary to stir it, and can be tempered to proper consistency by adding boiling-water. Use as hot as possible. —L. L. U.

[6619].—**Carpentering.**—Choose Honduras mahogany, not seasoned too rapidly; cabinetmakers sell it well seasoned. The best sorts of glue are hard, transparent, of a clear amber colour, swell very much in water, but do not dissolve, and they return to their former size when dry. Break the glue into small pieces, soak it in as much cold water as will cover it for several hours. Melt this in a double glue-pot, the outer pot fill with water, simmer for an hour or two, and add hot-water to make it liquid enough to look rosy when it runs from the brush: when the glue is done with, put more hot-water to make it thin, and cover the pot to keep out dust, &c., do not have too large a pot, freshly-made glue is best. "Amateur Carpenter" should get a mate who knows how to make a studio easel easily, to show him. I presume he is very amateur if he does not know how to melt glue, and to use the glue-pot. —W. JACKSON, JUN.

[6620].—**Building.**—In reply to "Owenz," I submit the following investigation of his question of the last issue. I have endeavoured to make it as simple as possible, so that it may be easy to follow, and show how the formula was arrived at. In what follows these particulars will be adhered to:—The wall to be standing on a horizontal surface, on which it will not slide; *a*, rectangle in any cross-section; *l*, its length; *h*, its height; *t*, its thickness; *w*, its weight per cubic foot; *G*, its centre of gravity; *P*, the overturning pressure to be found, acting horizontally at the centre of top of wall. We will first find *P* by the graphic mode (see figure) thus: Draw



section of wall to a convenient scale, find its centre of gravity, *G* (at the crossing of the diagonals). When the wall is just balanced on *A*, three forces, weight of wall, *P*, and their resultant, or reaction, must all pass through one point, the resultant also passing through *A*. Therefore, draw *EF* vertically through *G*, to cut top of wall in *F*, where *P* acts, then join *AF*; *EF*, *FD*, and *AF*, are the positions and directions of the three forces mentioned above, one of which we particularly desire to know. Mark off, by any convenient scale, along *FE*, *FK* to represent the weight of the wall; from *K* draw *KL* horizontally and *HL* vertically from *L*. Then *FHLK* is the parallelogram of the forces acting on the wall, and keeping it in equilibrium about *A*; *KL*, or *FH*, measured to the scale of forces will give *P*. The resultant *FL* has been made to pass through *A*; if it passed outside of *A* it would overturn the wall. To cause this, *P* must be very slightly increased. To find a formula, or rule,

for finding *P* we may take the moments of the weight of the wall, and the pressure *P*, both about the edge *A* of the wall, thus:

$$\text{Weight of wall} = lhtw.$$

$$\text{Moment of wall} = lhtw \times \frac{l}{2} = \frac{lh^2tw}{2}$$

$$\text{Moment of } P = Ph.$$

$$\text{When the wall is just balanced about } A \quad \frac{lh^2tw}{2} = Ph.$$

$$\text{Therefore } P = \frac{lh^2w}{2h}.$$

$$\text{Or in words, Pressure} =$$

$$\text{Length} \times \text{height} \times \text{thickness squared} \times \text{weight per c. f.} \\ \text{Twice the height.}$$

The pressure *P* to be most effective should be equally distributed along the length of the wall. It would be interesting to find the safe amount for *P*; the angle through which the wall must be tilted before it begins to fall; and other matters, but they lie outside the limit of this reply. —A. R. F. TAEW.

LEGAL INTELLIGENCE.

RAILWAY PRECINCTS AND LOCAL BY-LAWS.—The case of Wimbledon Local Board v. Ely came again before the police magistrate (Mr. Paget) at Wandsworth on Saturday week. The local board brought the test action to try the right of Mr. Ely to erect an office on railway property (at Wimbledon Railway Station) without first submitting plans to the board as the urban sanitary authority. For the defence it was contended that the fact of the building being erected on railway land exempted the builder from the ordinary law. Mr. Paget, however, decided in favour of the board, and inflicted a small fine on Mr. Ely, remarking at the same time that the action ought to have been taken earlier.

IMPORTANT TO BRICKMAKERS.—About 300 workmen at Sittingbourne, who at Michaelmas, 1880, had signed contracts to make bricks at a definite and specified price during the 1881 season, recently demanded an advance of 3d. upon every 1,000 bricks made, and upon being informed that the contract rate of payment would be adhered to they struck. A week later, however, they all returned to work, except a young man named William Dunk and three or four others, in the employ of Messrs. Smeed and Co., who went away and obtained employment elsewhere. Breaches of contract by brickmakers have hitherto been dealt with under the Employers and Servants Act; but in this instance the case was made a more serious matter, and brought before the magistrates under section 5 of the Conspiracy and Property Protection Act, 1875. The prosecutor sought to show that the defendant maliciously broke his contract, having reasonable cause to believe that the probable consequence of his so doing, either alone or in combination with others, would be to expose valuable property to destruction or serious injury. The Bench, however, held that the contracts, being for piece-work, did not come within the meaning of the Act. They also considered there was no intention on the part of the defendant to injure his employers' property. They, therefore, dismissed the summonses, but said they should have no objection to state a case upon the point.

IN RE C. B. WALKER (Before Mr. Registrar Murray).—The debtor, who had presented a petition on Wednesday for liquidation, is described as of Ranelagh-road, Willesden, and of Harrow and Barking, builder. His debts, secured and unsecured, are estimated at £56,000, and assets £2,000. Upon the application of Mr. Doria, his honour appointed Mr. W. Williams, accountant, to the office of receiver of the estate, and granted an injunction restraining various actions.

WATER SUPPLY AND SANITARY MATTERS.

BRIGHTON.—MR. ROBERT RAWLINSON, C.B., ON SEWER VENTILATION.—The Town Council of Brighton, having applied to the Local Government Board for permission to borrow the sum of £2,100 for works of sewerage and street improvements, Mr. Robert Rawlinson, C.B., C.E., held an inquiry at the town-hall, on Thursday, the 11th inst. During the inquiry the inspector opened an exhaustive discussion on the general question of sewer ventilation. The borough surveyor (Mr. Lockwood) had stated that in the formation of the new Bear-road in the north of the town he intended to trap the various gullies laid down. Mr. Rawlinson recommended that this should not be done. The late borough surveyor of Leeds, Mr. Morant, had untrapped every gully in that large borough, and the consequence of converting the gullies into so many ventilators was that the mortality was greatly reduced. He admitted sentimental objections often prevented this being done satisfactorily; but he argued that though an unpleasant odour might be experienced in the street, it was so diluted as to be practically harmless, while the thousandth part of that vapour infiltrated into a house, through the drain-pipe, was absolutely deadly. An imperfect system of ventilation would naturally give rise to

objections because it unfairly saddled the disadvantages on to one particular individual; but the greater means of ventilation the less likelihood there was of inconvenience. Having no personal interest in Brighton, Mr. Rawlinson said he felt in a position to offer independent advice according to the best of his ability. To Brighton it was absolutely essential that it should have a clean bill of health, and it was a town possessing splendid opportunities for ventilation by reason of its gradients, and the local authorities should get all the relief they could from sewer gas at the higher points. He knew from long experience that although it was not pleasing to have an opening in the street near one's house, the complaint was an imaginary grievance. Persons looked at a ventilating grating, and swore through thick and thin that it injured them, whereas experience had taught him that it did nothing of the kind, for when foul gas was liberated into the open air, the teeth of the mischief were drawn. Mr. Alderman Lester asked as to the efficacy of certain patented plans of sewer ventilation, to which Mr. Rawlinson replied that he must not be expected to express an opinion one way or the other with regard to some of the patents in vogue. The question, after all, was a very simple one, and the remedy equally simple; but he must warn people that by connecting ventilating shafts with their drains inside the house they ran great risk of attracting sewer-gas through their premises.

STATUES, MEMORIALS, &c.

ST. ANDREW'S.—Mr. Hutchison, R.S.A., has just completed a piece of sculpture, which is to be placed as a memorial to a deceased lady in the Cathedral grounds of St. Andrew's. Angelic in form, the figure stands with folded wings, which arch slightly above the head. It is 7ft. in height, the cross about 4ft., the whole composition being sculptured from a single block of Sicilian marble. A base and plinth of the same material, on which the figure will rest, will raise the height of the memorial to 9ft.

JOAN OF ARC.—The committee for the erection of a monument to Jeanne d'Arc, at Domrémy, has just entrusted the execution of the group in marble and bronze, for which a large sum of money has been subscribed. This group will comprise four statues—those of Jeanne d'Arc, and of St. Michel, St. Catherine, and St. Marguerite. The figure of Jeanne d'Arc will be the only one in marble, the other celestial personages being represented in bronze. This monumental group will be placed at a few yards from the parish-church of Domrémy, under the clock-tower of a new chapel constructed on the spot occupied formerly by the oratory to which tradition has attached the name of the Maid of Orleans.

BYRON'S GRAVE.—In the floor of the chancel of the parish-church of Hucknall Torkard, Nottinghamshire, and immediately over the coffin containing Lord Byron's remains, last week was fixed a slab of marble set for the purpose by the Byron Memorial Committee. The marble is of the kind known as "Rosso Antico," of a dull red colour, and was obtained from a quarry which, until recently, had not been worked for a very long period. The slab, which is a little more than 2ft. square, is a portion of the large block presented to the committee by the King of Greece as a pedestal for the Byron statue in Hamilton-gardens, Hyde-park.

CHIPS.

On Saturday the memorial-stone was laid of Oatlands U.P. Church, Glasgow, which has been designed by Mr. J. B. Wilson, architect, of that city. The church, which is in the Early Gothic style, will, it is estimated, cost £3,500. It will accommodate about 800 sitters, and will be provided with halls and class-rooms.

A correspondent of the *Echo* says that on visiting Hampton Court a day or two ago, he was surprised to find that the small, though highly interesting, collection of arms and armour is simply going to decay for want of a little care and attention. "The steel Cromwellian head-pieces and horse-armour are positively red with rust."

The committee of the national memorial to Lord Beaconsfield report that they have received £1,789, and £405 are promised. They have selected Signor M. Raggi to execute the statue, which, in bronze, with its pedestal, is to be completed in fifteen months for the sum of £3,150. The statue is to be placed in Parliament-square.

The parish of South Hornsey, which has a population of 14,000, is to have a town hall. The site is in the Milton-road, a thoroughfare lying between and running parallel with the Albion-road, Stoke Newington, and the Newington-road. The buildings will be of brick and Portland stone, and will cost £8,000.

Our Office Table.

AN exhibition of art productions by residents in the county of Devon was opened, in the Albert Memorial Museum, Exeter, on Monday, by the Mayor. The exhibits number about 700, and include oil-paintings, water-colours, decorative designs, carvings, models, stained-glass, photographs, lace, and embroidery. Pottery, too, will be well represented; the manufacturers of the ware at Torquay, Watcombe, Fremington, and Barnstaple having furnished specimens. Teignmouth and Torquay have especially entered into the movement. Prizes, to the amount probably of £100, will be awarded. The Exhibition will remain open for a month.

AN apparatus is said to have been invented by Herr Meydenbauer, Inspector of Buildings at Marburg, which promises to be of some value in architectural drawing. The invention appears to consist in a device for reconstructing the perspective representation given by ordinary photographs, so as to exhibit the various parts in their true geometrical relation. This is not a very difficult operation, even without special apparatus, and most students of perspective have probably amused themselves by finding the two vanishing points of an architectural photograph, and retracing the perspective processes until the two geometrical elevations were regained. The studies so made have some value, and will do more to instruct young architects in the proportions of a style than the study of those sketch-books whose authors generally care much more for effective drawing than exact representation of what they see. Herr Meydenbauer's method, if it shortens the labour of transforming converging into parallel lines, may meet with extended application.

AN American journal says: The use of elm-wood for various purposes is claiming the attention of manufacturers. The elm marketed is known as the "gray elm." Elm of any kind is rightly designated when it is called "tough," and tough it is, after the manner of tough leather. Its grain is not straight and easily separated, like oak or some other woods, but is interwoven, gnarled, knotty, and tough, as any one may learn who attempts to cut it. The elm in use is the water elm, found in high places. Until lately it was let alone and considered useless; but any farmer, where elms grow, knows the value of elm. When a new axe-handle is wanted, he does not buy the cheery and cross-grained helve manufactured to wear out speedily, but makes one by his own handiwork from an elm limb. Such a helve will outlast a dozen of the machinery-cut kind. For all kinds of farming implements elm is particularly desirable, as well as for wheel stock and any contrivance that requires strength.

AN interesting report has just been issued by Dr. Littlejohn and Mr. A. Rutherford, who, at the instance of the Scotch Board of Supervision, conducted an inquiry into the causes of a mysterious epidemic which broke out in Aberdeen in the end of March, over 300 people being affected thereby. It was satisfactorily established that in every well-authenticated instance of the occurrence of the epidemic the family affected was supplied with milk from the Old Mill Reformatory dairy; and from analysis of the water supply of the steading and samples of milk taken at the time of the epidemic it was found that both contained organisms. These were believed to result from foul cisterns; but as the samples of milk taken from the cows were found pure, how the milk was afterwards contaminated by the water the Commissioners were unable to discover. The Commissioners insist on the most perfect sanitary conditions being observed in all dairies. Pathological experiments on the lower animals had been made by experts, which showed the dangerous character of the milk contamination.

"It is of no use," writes Mr. H. W. Brewer to the *Saturday*, "attempting to bring such a serious question as the destruction of St. Alban's before the British Archaeological Association. I was present at their meeting on June 1st, but their time was too much occupied with an old dead beetle and the origin of the mermaid, to attend to the historic and religious monuments of their country! A piece of broken glass, a few beads, and a rusty nail interested them far more than a noble minster. I had no idea that archaeology was such a childish study,

or could at least be reduced to such a low level. It is evident to my mind that most of the members present did not care one straw about St. Alban's Abbey, and that several of them rather looked upon Sir E. Beckett's 'restoration' as an improvement. It is not wise, perhaps, to talk of serious things to children while they have their *toys on the table*; and I saw at once that it would be useless to speak about St. Alban's to these grown-up children, while they had their bits of broken tiles, dead beetles, beads, and jimcracks lying before them."

By the destruction of the new Bohemian (Czech) Theatre at Prague, the country has lost one of its greatest architectural ornaments; and the drama, as performed in that particular Slavonic tongue, has received a blow from which it can hardly ever recover. It was only after many years of exertion that the Czechs succeeded in obtaining the means for erecting this beautiful edifice. It was nearly ten years in building, and was only opened on the occasion of the *fetes* in honour of the marriage of the Crown Prince Rudolph and the Princess Stephanie, in the middle of May last. The theatre had, therefore, not been opened three months, and now, owing to the grossest carelessness and negligence that cannot be too severely condemned, the entire edifice has been laid in ashes. In an investigation which has been already commenced as to the origin of the conflagration, several of the witnesses examined said that they first saw flames near a workman who was occupied in fixing a lightning-conductor under the roof of the building. The calamity is simply traceable to the culpable negligence of the artisans occupied with a small furnace on the roof.

DR. SCHLIEHMANN'S new work, "Orcho-menos," has been issued by Messrs. Brockhaus, of Leipzig. In it he describes his last journey from Athens to Orchomenos, Orchomenos itself, and Copais. "There are but three towns," writes Dr. Schliemann in the preface, "which Homer has designated as 'abounding in gold,'—viz., Troy, Mycenae, and Orchomenos. The treasures I have brought to the light of day from the ruins of the first two abundantly justify the epithet of the Greek poet. In Orchomenos I did not, it is true, find any golden stores, but the treasure-chamber and the thalamos, with its elaborately carved stone ceiling, which I excavated, are mute evidences that there, too, great riches were once heaped up, and that Homer's description were equally true as regards that town."

IN the art and home handicraft sections of the Hotwells Industrial Exhibition, Bristol, is a design by Mr. Wm. Edward Hill, hon. secretary of the British and Clifton Junior Architects' Society, for artistic, healthy, and economical homes for the working classes, which has been awarded a second-class prize and certificate. These houses are designed to be erected in concrete, but may be adapted to any building material. The plan embodies good accommodation, and the sanitary arrangements are entirely separate from the domestic part. The front elevation of the house is simple, and it is claimed that the general arrangement of these dwellings would be such as to make the tenant take a pride in his home and in its cleanliness, and thus help to improve the general tone of social life amongst the working classes. The designer estimates the cost of erecting these houses in concrete at about £150 the pair.

WHILE the work of piercing the Channel Tunnel is being steadily proceeded with in England, it is followed up no less eagerly in France. The French engineer has lately had an interview with the President of the Republic, who, after having studied the plans and listened to the explanations of the engineer, promised that the matter should receive the serious attention of the Government. Another great engineering project—viz., that of inundating the desert of Sahara, has just received a rude shock from Dr. Lenz, who has just returned from African travel. He characterises the Mackenzie scheme as chimerical, in consideration of the fact that the western side of the desert is considerably above the level of the sea. In his opinion, the only practical scheme for opening up the country is by the construction of railroads; but an undertaking of this description would be both difficult and extremely expensive.

THE Water-gate of York House, it seems, according to a correspondent of the *Times*, is under nobody's care at present. In the year 1751 an Act of Parliament was granted to enable the proprietors of houses in York-buildings to make and levy a rate on themselves sufficient to answer the expense of repairing the terrace-walk and water-gate, and this was effectually done at that time; but about thirty years since, the trustees having all died, the collection of the rate for maintenance was abandoned, and the terrace and gate became neglected. In 1863, a report descriptive of designs for the Thames Embankment was presented to the Metropolitan Board of Works by Mr. T. W. Bazalgette, in which were the following observations:—"Between Westminster and Hungerford bridges would be landing-stairs for smaller craft, and here it is proposed to introduce the beautiful water-gate now situate at the end of Buckingham-street, and erected after a design by Inigo Jones." This scheme was, however, not carried out, in consequence of opposition by one of the adjoining owners. He, however, has given way, and is now willing that the Metropolitan Board of Works should raise it out of the mud cast around it.

CHIPS.

Amongst those who have died from injuries received in the recent Blackburn railway accident were Mr. John Swift, builder and contractor, of Bradford, and his wife.

The Lambeth vestry on Thursday week elected Mr. Firth Groves, of Brixton-road, as medical officer of health and inspector of nuisances for the parish. There were 39 candidates for the appointment.

A public meeting was held at the town hall, Brentford, on Friday evening, to consider the advisability of establishing schools of science and art in the town, but after the scheme had been explained, and its advantages pointed out, no one would move a resolution approving of the proposal, and the meeting broke up in confusion.

The memorial-stone of an Odd Fellows' hall for Netley was laid on Thursday week. The plans have been prepared by Sergeant Rowe, R.E., and Mr. Musslewhite, of Hound, has taken the contract for erection.

A mission-hall is about to be erected in the Grove, Crouch-end, Hornsey, from the plans and designs of Mr. John Farrar.

The tower of St. Lawrence's Church, Ipswich, has recently showed traces of weakness, and, a few weeks since, some masonry fell from the west face, breaking shop-windows on the opposite side of Dial-lane. Mr. Frederick Barnes, F.R.I.B.A., of Hatton-court, Tavern-street, Ipswich, was consulted, and scaffolding having been erected under his advice by Messrs. Pells and Sons, builders, it has been found that the condition of the steeple is worse than had been expected. A vestry meeting was held last week to consider the matter, when Mr. Barnes reported that, after consulting other architects, he was still of opinion that it could be repaired. The vicar suggested that the tower should be removed, and the nave extended over its site, and the meeting was adjourned to allow of consideration of the question whether rebuilding or demolition shall take place. The tower, although plain, is a well-proportioned fifteenth-century structure, some 93ft. in height, and standing, as it does, in the centre of the town, forms one of a group of steeples which contribute much to the picturesqueness of Ipswich as seen from a distance. The faces of the tower, originally of brick and rubble masonry, are covered with cement, now fast peeling off; at the angles are four stone urns, incongruous memorials of churchwardenism of two generations since; and, above the well-carved oaken west door, a huge and unpunctual clock projects frying-pan-wise over the adjacent narrow lane, opposite the end of which, within a score paces of the tower, is the well-known Ancient House. It would be a matter for regret if so distinctive a feature of Old Ipswich as St. Lawrence's steeple were removed for any less urgent cause than the public safety.

The new town-hall, at Hastings, illustrated in the *BUILDING NEWS* for Nov. 9, 1880, will be opened on Wednesday, September 7th. It has been built from the designs of Mr. Henry Ward, under the superintendence of Mr. Wm. Andrews, the borough surveyor, and is Gothic in style. The external walls are of a local blue stone, with Bath-stone dressings. Messrs. D. C. Jones and Co., of Gloucester, are the contractors.

An organ, built at a cost of £400, by Mr. G. Hawkins, was opened at Newton Abbot Church on Tuesday week.

THE BUILDING NEWS.

LONDON, FRIDAY, AUGUST 26, 1881.

THE BATTLE OF THE TRAPS.

ONE of the questions which the recent lectures by Mr. Hellyer on Plumbing have reopened, concerns the relative claims of the siphon and the \cup -trap. The full reports we have given of those lectures, and especially of the discussion last week (see page 227 ante) have enabled our readers to draw their own conclusions respecting the arguments brought forward by the various speakers, for the retention or disuse of either of these safeguards of our drains. We have long doubted whether these ingenious expedients have the real worth plumbers of the old school credited them with, and since recent revelations and the discussions upon them which have taken place, we are surprised to find plumbers still quarrelling over the merits of certain forms of traps.

Traps have undergone every conceivable modification in form since their introduction, and there are still in the market objectionable types. A good water-trap is one which will for the longest period insure an unbroken water-seal and which every flush makes clean. There should be no abrupt change in the direction of the flow, no sharp edges, and very quick bends are found less desirable than flutter ones. A water-seal, one authority says, ought not to be less than $\frac{3}{4}$ in., nor more than 1 $\frac{1}{2}$ in., and 1 in. is the usual depth of closet-trap seals. Generally easy bends are better than deep traps, and more likely to allow of an easy passage of matter through them. But the advocates of both the two principal types of trap, the \cup and the \mathcal{S} , have assumed a certain amount of ignorance on the part of the public and the profession, and the battle has been waged almost exclusively by patentees.

It is generally admitted that all traps are liable to "waving-out" or siphonage if not ventilated, and the remarks of Mr. E. aptage, of Margate, corroborate the opinion generally received, that both the \mathcal{S} and \cup -traps require ventilation, though the latter and the \mathcal{V} hold their seals more tenaciously. With regard to self-cleansing qualities, Mr. P. J. Davies has, to a certain extent, disproved the alleged non-cleansing property of the \cup -trap by the experiment he made with pebbles, though the form he exhibited and that generally used are somewhat different. It has been established, however, by general consent, that the siphon-trap, despite its demerits in the matter of siphonage, is the more scientific form for self-cleansing, and the profession will learn, probably with some astonishment, that even its predecessor can be made to perform the function quite as well. There are, however, \cup -traps and \mathcal{S} -traps, and it would be of some importance if the profession would decide what form and proportion of this trap are safe. Mr. Davies has, by his graphical method of striking out the form of trap he recommends, endeavoured to solve this problem, and we refer our readers to his demonstration.

The two main considerations on which the advocates of the rival traps base their claims are, first, with regard to siphonage, and second, to cleanliness. No one doubts that the \cup -trap is more secure as regards the first condition: the very form of the water-seal renders "waving-out" less easy; but we venture to think the best test of the second quality is the experience gained of two kinds in actual use. The majority of those who took part in the discussion were practical men, and they have probably seen

what many who have had any experience of sanitary work have witnessed—a gradual fouling up of the \cup -trap, owing to the flow of water not coming in contact with the upper part of the trap. As might be expected, also, the square corners become filled with gas, and promotes corrosion of the lead, a point mentioned by Mr. Buchan.

The quantity of water held by a \cup -trap is undoubtedly greater than the quantity held by a siphon, and this is a point which, to our minds, would have much to do with the cleanliness of the trap. Mr. Davies has, it appears, tested this point, and finds that less water was contained in *his* form of \cup -trap than in the siphon, or than in the 9 in. \cup -trap; but of course the question of form and size has much to do with the matter, as well as with the force of water required to cleanse a trap efficiently. Practical points of connection with the soil-pipe have operated in favour of retaining the old-fashioned \cup -trap; but we are sure that of the two forms it must gradually give way either to a modification, as proposed by Mr. Davies, or to the ventilated siphon arrangement.

The remedy for "unsiphoning" a trap is to introduce an inlet at the highest point of the bend, and connect it with a soil or air-pipe, so that when a falling column of water induces suction behind it, the vacuum may be instantly filled up and the water-seal spared. With proper care, therefore, in ventilating arrangements, the trap may be made independent of the risk of siphonage and a check of secondary importance established, while the ingenuity of inventors might be more profitably turned to the object of perfecting the flow and self-cleansing qualities of these appliances. We have already hinted that their efficiency depends much on the direction of the inlet and outlet, or, in other words, the contour of the trap. The \cup -traps still retain much of their old objectionable form, though some patentees have endeavoured to make them more perfect by doing away with corners which obstruct solid matters and produce fouling at those parts. Mr. Davies's improvements and Mr. Hellyer's patent \mathcal{V} -dip or "anti- \cup -trap" are steps in the right direction. There are no corners to become clogged up, and the water is made to exercise a scouring action upon the bottom. The seal is 1 $\frac{1}{2}$ in. The discussion which has taken place lately in our own pages on the relative merits of the two rival forms of trap, has at least indicated a desire on the part of the advocates of both kinds to perfect them, while it has also shown that with proper precautions each kind of trap can be made efficient. Even the much-praised siphon is not always constructed with due care to its efficiency. We have seen, indeed, sudden bends and deep water-seals which would make it difficult for anything to pass through. In others the fault has been an easy bend and a quick fall, the effect of which is that the momentum of the flush would drive out the water entirely, and unseat the trap. Unfortunately, however, these sanitary controversies savour too much of the *odium theologium* spirit. A blind partisanship sees nothing but perfection in a certain appliance, and any desire for improvement is often frustrated by the attempt to force the competing claims of the other side.

GABLES AND THEIR TREATMENT.

THERE are many people—those who design houses and those who live in them—who think that in an artistic house we cannot have too much of a good thing. Take, for example, the Gothic cottage *ornée* as we see it in books of designs. Every front or elevation rejoices in a gable, often two or more; and as for dormer windows, they are crowded into every blank space, unmindful of the

confusion of gutters and valleys, and of the pocket of the proprietor. According to the exponents of Gothic of this kind, a multiplicity of gables was thought to characterise the style, and these were placed without apparent motive, in every position available. We had gabled porches, gabled bays, gabled projections and dormers, as if to signalise more emphatically the departure from flat roofs and parapets. It not only complicated the roof, but rendered necessary an addition to the ironmonger's bill for stack-pipes and ornamental heads of cast iron; while the plumber derived his share of profit from a roof which demanded all the skill of the lead-worker to make it perfect. Followers of the Late Domestic architecture now in vogue, cannot be said to be more discreet in learning where to place their gables. We occasionally see two or three jostling one another in a small front, as if they were all contending for supremacy, or so various in their composition that we doubt whether the architect really has left out something in one or two of them, or had exhausted all his resources upon the other. If a plan or elevation turns out poorly, gables are the only means present to the mind of such an architect of improving the grouping, and they certainly add to the picturesqueness of a house. Introduce a gable or two, and the elevation is made; it is easily done and makes the house presentable, at least on paper. Now the gable naturally arose from the necessity of finishing the ends of a span roof; it was a necessity springing out of plan and roofing. All the most telling examples of gable architecture to be found in Warwickshire, Worcestershire, and other counties have arisen in this way, and the best examples of the structural gable will be found in 15th and 16th century buildings. In these instances we find them to be the ends of independent roofs joining one another at right angles, or intersecting, and seldom mere gables stuck on in front of a roof for the sake of appearance. In later examples it became a more adventitious feature as we notice in many of the half-timbered houses of Kent—at Chiddingstone, for instance, where we have three timbered gables, with their ridges, meeting a high-pitched roof. In this house, however, the two extreme gables are wide, and project over the bays below with carved brackets, and were constructed to give additional rooms in the upper story. The smaller centre gable crowns a projecting room or landing carried by wooden posts in front of the entrance, thus forming an open porch. At Meer Hall (illustrated last week) a series of gables are placed between the more prominent gables of the wings, all stopping against a roof at the ridge-level. We rather desire, however, to point to earlier work, of Domestic Gothic character, for types of the feature. In these the commonest plans have one block crossed by a single wing, or by two wings, each gabled at the ends. Arrangements of this sort sometimes show a balanced arrangement; in others cases they do not. In the Manor House at Pershore Abbey (see illustration in Mr. W. Niven's etching, reproduced by us last week) the gables are honestly and simply grouped; they are, in fact, all structural, and we seldom find more than three gables in one front. To take another extreme instance, Morton Hall, Cheshire, we find low-pitched gables in exuberance over the bays, and their roofs made to intersect round the octagon-sided windows; but we feel they have been overdone, in spite of the charming carved detail and mouldings.

Generalising from a few of the most agreeable examples of gable treatment, we may point out a few principles which have been followed with the most pleasing artistic results. It will generally be found that plan has been mainly consulted in the distribution of gables, or, to make our

meaning clearer, the gable has been the outgrowth of a projecting part of a building, or has been introduced for the sake of simplifying the roofing. Doubtless the artistic value of the feature was always present, but it was never the leading motive in the best examples. They appear to grow out of the building naturally, without an effort. Sometimes, as we have seen, an additional room in the roof suggested a gable to obtain height. Another readily-understood principle is that as roofs generally were placed with their axes at right angles, gables appeared on at least two adjacent fronts, and a gable was generally, therefore, seen in conjunction with a roof slope. It almost follows, from these considerations, that the number of gables in a building should bear some proportion to its size, and that a balanced arrangement is only suited for an important front. In a small villa one prominent gable may dominate and be placed at one end, or divide one wing from a more receding portion. If another gable appears it is better to be made a subordinate one. Two gables of the same or similar size near or close together seldom group well, and a central and two small gables have a rather formal appearance only appropriate to large houses or buildings of public character. Aston Hall has three on one front, but they are well grouped. One often meets with a house with a central tower over the porch and a gable on each side; scarcely any arrangement is less pleasing, the tower and the gables cut up the roof-line and quarrel for mastery, and it does not mend matters to make one on a different plane to the other. There is in short an art of grouping which only can be learned by careful observation combined with artistic instincts, and it will be found the ablest masters of the art are content with taking the plan and working out their roof with the least intention of making a display of their gables. On the other hand, we find all sorts of restless fidgety attempts made by some designers, who are never satisfied till they have crowded as many gables as they can in the frontage. These are generally of various heights and levels, cutting awkwardly against eaves and hips, and rising to different heights instead of trying to preserve a common ridge-level. Not content with these irregularities, they vary the faces of the gables. Some are brick, others tile-hung, one is half-timbered, and another is a mixture of timbering and tile-work. The stranger seeks in vain for a *raison d'être*, but he sees none, and probably if he examined the interior he would still be left to ponder over this medley of fancies of the modern builder. Wherever we go we find the gable mania to be again in the ascendant, though this time without the spikes and finials. If economy were the motive one might not wonder; but we should like to know in how many instances the gabled roof has been adopted for the sake of giving a room or two in the roof, and it ought to be remembered, a phalanx of gables is more costly than the addition of another story covered in a plain, unostentatious manner.

It must not be thought we are raising any objection to an architectural feature which has given so much charm and poetry to Continental buildings. We are only protesting against the fashion of multiplying the feature in small houses. We cannot even go so far as to admire the architecture of such streets as that in Landshut, Bavaria, referred to by Mr. J. J. Stevenson, where the houses of most varied and picturesque detail are all gabled, and we can fully understand, despite their diversity and quaintness, that the gutters between the houses do not contribute to their comfort. No artist can deny the picturesqueness of the gabled houses seen in the Low Countries, Belgium, or Brussels; but this kind of architecture has

its limit, and it will be acknowledged that, apart from the interest of the gable giving an opportunity for timbering, parget-work, and carving, the beauty and value of the gable is enhanced when it is used sparingly, and with an endeavour to give it a functional rather than a superficial character.

PLASTER-WORK.

THE subject of decorative plastering has recently taxed the knowledge of architects, and details of the methods used by the old plasterers are eagerly sought after. It is, however, not a difficult matter. The methods of making "coarse stuff" and "fine stuff," "gauge stuff," the selenitic cement mortar, Keene's and Parian cements, rough-casting, and other processes are well known, and the modern plasterer can probably turn out as good plaster-work if he likes as the old plasterer in the days of the Stuarts. Under the modern contract system, the plasterer has become a vastly different artificer to the workman who executed the panel and enriched ceilings of the Elizabethan and Stuart periods. He is now seldom an artist, though he can model any amount of enrichments of the stock patterns. The history of the trade is one intimately related with the progress of art in this country for the last three hundred years. Not to speak of the ancient Romans, who were noted for their mortar and plaster incrustations, the Medieval architects never had that distaste for plastering their interiors which some have imagined. Everyone who has carefully examined any of the old monastic buildings and churches, will have found abundant evidence to the contrary. A close examination of the walls will disclose fragments of plaster in either thin or thick coats, and the rubble walls of many of our ruined abbeys have pieces still adhering to the stonework, often coloured. One writer alludes to a thin layer of plaster at Little Braxted church, Essex, a building of Transitional Norman character, on the rubble walls; and Mr. Buckler, in his "Churches of Essex," mentions some plastered brick windows. Many of the groined vaults of the old abbeys, as at Netley, were plastered, and the cathedral of Rochester shows plastering between the wooden ribs. We are tempted to mention examples of Medieval plastering, but we pass on to notice the parget-work of the 16th and following centuries, which has lately found imitators.

This kind of plastering was used externally, and instances of it occur in Essex, Norfolk, Suffolk, Sussex, Hampshire, and other counties where timbered houses are found. Ornamental parget-work was generally employed between the studs of timber houses in the Tudor and Stuart times. The ornament was often of figures and foliage raised or in relief, as we find in some old buildings at Ipswich, Maidstone, &c., and more frequently of patterns incised or sunk in the plaster, such as may be seen in a few old houses in Newark, Shrewsbury, Coventry, and in many places in Essex. We have found little information respecting the composition of such plaster-work; but there is no doubt that the devices were either cut, modelled, or impressed upon the plaster when wet. The *modus operandi* was doubtless the following:—A board of the size of the panel or ornament was obtained, in which were stuck pins in the shape of the device, and this was pressed on the wet plaster, and completed by hand.

Many of these timbered houses are filled in with rough-cast, a plaster in which sharp stones are mixed, or these are thrown forcibly from a trowel against the wet plaster. We find on many of the old manor-houses dating from Tudor times, "rough cast," and this appears to have been made of lime, hair, and coarse sand, with small pebbles intermixed. Glass

and brick fragments are often found in lieu of the pebbles. This kind of plaster was very durable, and has lasted to our day in tolerable preservation. Many recent attempts have been made to imitate the rough-cast panelwork of the period to which we have been referring, though we question if the modern work will stand so long. Rye-straw has been found in specimens of old plastering, and there is no doubt fibre of some kind was mixed in it.

The ceilings of the 16th, 17th, and 18th centuries have long been the theme of admiration, and in spite of our *papier maché* and *carton pierre*, few modern ceilings equal those of earlier date. The Italian designs, introduced in the Stuart period, no doubt brought with them Italian stuccoists who were equal to the occasion. The Adams, Chambers, and Wyatt led the way for the light, tasteful relief-ceilings we have lately been reproducing in our buildings, and the acme of ceiling-decoration appears to have been reached by these later artists. It must not be overlooked that these examples were worked chiefly by hand. Casting in plaster-moulds followed, and a revolution quickly set in. Casts of original ornaments and figures superseded hand-carving, and plastering became a mere mechanical art. Even in this art of casting in plaster changes have crept in which have deteriorated the quality of the enrichments. The "jelly mould," as every plasterer knows, does not produce such sharp relief as plaster or lead moulds did, which were in several portions, though we have seen many ceilings executed in *carton pierre* which, for sharpness and relief, equal hand-work. The worst of stamped and moulded work is that a spiritless kind of repetition is apt to be followed, and we find very many of the newly-built houses with parquet work overdone with commonplace devices. It is perhaps to be regretted our architects do not follow the plaster-work found in Italy and Spain, and Mr. Street, writing on the subject in his "Gothic Architecture in Spain," alludes to the tracery patterns of Late Gothic, which are repeated to produce a diaper in the Alcazar at Segovia, and other buildings. All the Moorish decorative work was executed in plaster of fine quality, but cut and carved, so there is, as the same authority remarks, endless variety. We have another kind of decorative plaster "*sgraffito*," an instance of which will be seen in the paneling at the National School for Music, near the Albert Hall, at South Kensington; but we are inclined to think the experiment will not be soon followed. This kind of incised ornamentation is exceedingly obtrusive, and we are disposed to prefer the less decided relief of the plaster itself to such glaring panel treatment. The subject is one intimately bound up with the future of cement concrete.

THE SUNDAY SOCIETY'S LOAN EXHIBITION.

AS intimated in our columns last week, the committee of the Sunday Society have organised a loan exhibition of modern paintings in the rooms of the Working Men's College, Great Ormond-street, which have been generously placed at the disposal of the society. This makes the twenty-fourth Sunday Art Exhibition opened by the Society for the working classes, and it is intended to keep the exhibition open free for the following two Sundays—namely, the 28th of August and the 4th of September. Last Sunday admission was by tickets obtained by those who cared to avail themselves of them, and on the two following Sundays the public will be admitted without tickets between the hours of one and six p.m. The present loan exhibition, through the exertion of its committee and the director, is worthy of the object in view, and the pictures, which com-

se oil and water-colour paintings and monochrome drawings, have been collected from a variety of sources. We recognise many of them as having lately graced the walls of the Grosvenor Gallery, the Royal Academy, the Suffolk-street and Dudley Galleries.

Glancing round the commodious rooms placed at the service of the Society, we find paintings by H. H. Cauty, Phil. R. Morris, A.R.A., P. Naitel, C. Marshall, S. Hill, L. P. Smythe, Alf. W. Williams, Rooke, W. Holman Hunt, Frank Holl. R.A., Walter Crane, Professor W. B. Richmond, F. Smallfield, A. Goodwin, Clara Montalba, &c. "The Last of a Ruined Home," by H. H. Cauty, is a touching incident painted in the artist's best style. The figures are introduced with much dramatic power: the brick wall and iron gates about being closed, the entrance to the once comfortable house and grounds, tell tale to the disconsolate group seated on the roadside, which the painter has forcibly presented. A birch grove, by J. H. Bell, is tenderly painted and truthful, and the portraits of J. M. Rooke are masterpieces of vigorous execution. The admirer of a more pleasing kind will find nothing to recall the enjoyment of real life in L. P. Smythe's scene, a girl reposing meditatively on a grassy margin — "Down by the River" — the grass and water of which are very feelingly rendered, and with the finished execution of the artist. Very cleverly and tenderly-painted is a small object by P. R. Morris, "Homeward Bound," two girls with a younger brother passing a common with a bundle of wood. The low key of colour and the handling exhibit masterly study; and just below it is a small piece, in low tone, vigorously tinted, of foliage and landscape (No. 27). No. 3 (by L. P. Smythe) is vigorous in the tures, and "A Sermon on the Simples," by A. Goodwin, is a dexterous study of pine scenery and atmosphere. We notice, in the same room, "Slyhead Pass" (No. 12), a large painting of a rocky valley, by A. W. Hunt, in which the artist has represented, with much power, one of the grandest scenes of scenery in Cumberland. Characteristic and evincing much power, is the head of a "Swabian Peasant Woman," by Charlotte J. Weeks. "Near Munich" (22), by Swengauer, is a pleasing sunset; and other bright sunny landscape, painted by Walter S. Lloyd, called "A Quiet Nook," draws attention for the thoroughly English sentiment and truthful handling of the trees and pool. We may also glance at landscapes by G. Howard (16, 17), "Autumn on the Surrey Hills," by C. P. Slocombe; "A Woman of Jerusalem," by W. Holman Hunt — a study in chalk, "Sands of Calais," by W. L. Wyllie; and a vigorously-executed portrait by Mr. John Collier of that artist's wife (15), to show that variety of subjects has been obtained. Of large works we find two decorative pieces, painted by Walter Crane, which we have seen before at the Grosvenor. One is in a low key of colour, but executed in a luminous and half-hazy style, not altogether useless in the drawing of the figures. The "Fate of Proserpina," by the same artist, is a more solidly-painted subject, and thoroughly pre-Raphaelite in manner and treatment. The large study of "Still Life," by Otto Scholderer (46), is bold and masterly in grouping and tone, and another picture showing "Luther on his Way to the Diet of Worms," by Teschendorfer, will be gazed on with interest. But the greatest modern work of oil exhibited is hung in the lecture-room, and is entitled "Behold! the Hidegroom Cometh," by Professor W. B. Richmond, a work which occupied the place of honour in the last Grosvenor Gallery exhibition, and upon the merits of which we

have previously spoken. This large painting is well hung as regards light, and the grace and beauty of some of the virgins, and the skilfully-managed atmosphere of the piece will be scanned again with probably more interest than they were in the Grosvenor.

In another room is a collection of water-colour drawings. We note in this part of the exhibition two Hampshire views by R. A. K. Marshall—one of Hurstbourne Park, and the other a village, both in the valley of the Test; they are highly finished. "Waterside Weeds" (103) is pretty. We must notice also one or two charming poems in colour we have seen elsewhere, by Clara Montalba; one, a View under Cannon-street Bridge. (No. 112), by W. Hall, is a skilfully manipulated drawing; P. Naitel sends "The Playing Fields at Eton" (131); No. 111, "Venetian Boats," by H. Darval is clever in grouping and colour; and we mark No. 115, by Frank Murray, and "Puck and the Fairy," by Ernest Wilson, besides two clever drawings by Alf. W. Williams, highly finished and truthful in their patient elaboration of foreground and mountain. Some Welsh scenery by C. P. Slocombe; landscapes by C. Marshall; "Views from Rome," by Walter Crane; and studies of heads by F. Smallfield are among the works contributed. Portraits are never very instructive; but a few are to be seen in the museum-room, by L. Dickenson, of some merit. Those of the visitors who care to study the work of deceased masters of the English water-colour school will be interested in a very valuable representative collection, embracing works by T. Gainsborough, David Cox, Copley Fielding, Peter de Wint, J. Varley, J. M. W. Turner, J. S. Cotman, T. F. Wheatley, E. Dayes, J. Flaxman, A. Penley, the younger Pugin, J. Holland, and others. These paintings and drawings have been willingly contributed by the artists or owners of them, without the expression of a hostile opinion, showing that a liberal spirit is beginning to manifest itself on the Sunday question. Such exhibitions as these must tend more to instruct than to do harm, and we hope many of our artisans and workmen may be induced to spend their Sunday leisure here, rather than in more objectionable haunts.

THE WATER QUESTION.—XV.

INNER SLOPE OF AN EARTHEN EMBANKMENT.

THE safety of a reservoir embankment does not depend upon one thing only, as upon the perfection of the puddling, but equally upon several others, chief amongst which is the consolidation of that part of the bank which lies within the puddle wall, and into which, therefore, water would penetrate if not prevented, and this prevention depends chiefly upon the thickness of the layers of earth with which the embankment is raised. Thin layers are always desirable: but the maximum thickness which may be allowed depends on the material and the means by which it is deposited in the bank. A heavy and dry material may be deposited in thicker layers than one of less specific weight, with equal effect in both cases in forming a solid bank. The thickness allowable has been variously stated at 6in., 12in., 15in., and 2ft. Where the chief consideration has been the urgent progress of the work to meet a demand for water, as was the case when, in order to meet the demands of the approaching summer, the embankment of the reservoir, on the Dale Dike at Bradfield, was urged forward by the Sheffield Waterworks Company, in the early part of the year 1864, and which burst in March of that year; the earth forming the bank on each side of the puddle wall has been tipped from rail-waggons at a height of 5 or 6ft., and more; but few waterworks engineers would sanction that,

except for the outer part of the bank, and even for that part it is too high, because the large and small rock are not evenly mixed; the large lumps roll to the bottom of the tip and form a layer there of themselves; the finer stuff laying together upon the coarse layers; whereas, to prevent slipping, which is one great object of all the precautions, the large and the small should be as evenly mixed as is practicable, except in those parts where material is purposely selected to be deposited, fine in one part and large in another, for different purposes. If the material tipped into the bank were all stone, the rolling of the large lumps into a separate layer would be less objectionable; and, indeed, with stone for the material it might even be an advantage that the layers should be so arranged, for the one would drain the other, and the bank, as a whole, would retain less water than it otherwise would do; but with other materials, such as shale, blue bind, or, indeed, any material but stone, the same object would not be effected.

In making the inner part of the embankment of a reservoir the object is to make it as compact as possible to prevent the water reaching the puddle wall, and, therefore, the material should be small and clayey; but in the outer part of the bank dryness and stability are the chief objects, for which larger and harder material is more suitable. The inner slope of an embankment is usually made flatter than the outer slope, as 3 to 1 inside and 2 to 1 outside, for the inner part of the bank is more liable to slip than the outer. When the water-level in the reservoir is reduced, if the inner part of the bank has been penetrated by water and become partially saturated, slips are more likely to take place, and the flatter slope meets this tendency; but outside, with dry materials, 2 to 1 is as good a slope as 3 to 1 inside. As a further precaution against slipping it is desirable to keep up the outer parts, next the slopes, higher than the inner parts next the puddle wall.

If rail-waggons be used at all, it is desirable that they should be of small size, to hold, say, not more than one cubic yard; but if waggons be allowed, there will always be a tendency on the part of everyone concerned to make the tips high and the layers thick, to avoid much shifting of the rails if possible, and especially by the use of side-tip waggons; but if the instruments for carrying the stuff into the bank be confined to barrows, dobbin-carts, and common one-horse carts, it does away with this tendency in a great measure. When large waggons are advocated, it is asserted that the greater weight and the heavier rails compensate for the greater height of the tips, and so an equally good consolidation of the earth is effected. The degree of consolidation, by the weight of the instrument by which the earth is transported, admits of proof. In respect of any one square yard near the middle of the bank, lengthwise, the consolidation of the one immediately preceding it may be shown as follows:—Premising that whatever the thickness of the layers, variation in weight of the different kinds of earth, or time of construction, the degree of consolidation by the weight of the carrying instrument must be in the inverse ratio of the weight carried each journey, the weight of the instrument being reckoned twice going full and returning empty.

Thus, if w = weight of earth carried, and W = weight of instrument carrying it.

$$\frac{W}{w} = \text{degree of consolidation.}$$

The actual weights of different kinds of earth vary much; but, for the purposes of comparison, an average weight of 2,600lb. per cubic yard may be taken, or 96lb. per cubic foot, and the effect of the carrying instrument may be stated thus:—

meaning clearer, the gable has been the outgrowth of a projecting part of a building, or has been introduced for the sake of simplifying the roofing. Doubtless the artistic value of the feature was always present, but it was never the leading motive in the best examples. They appear to grow out of the building naturally, without an effort. Sometimes, as we have seen, an additional room in the roof suggested a gable to obtain height. Another readily-understood principle is that as roofs generally were placed with their axes at right angles, gables appeared on at least two adjacent fronts, and a gable was generally, therefore, seen in conjunction with a roof slope. It almost follows, from these considerations, that the number of gables in a building should bear some proportion to its size, and that a balanced arrangement is only suited for an important front. In a small villa one prominent gable may dominate and be placed at one end, or divide one wing from a more receding portion. If another gable appears it is better to be made a subordinate one. Two gables of the same or similar size near or close together seldom group well, and a central and two small gables have a rather formal appearance only appropriate to large houses or buildings of public character. Aston Hall has three on one front, but they are well grouped. One often meets with a house with a central tower over the porch and a gable on each side; scarcely any arrangement is less pleasing, the tower and the gables cut up the roof-line and quarrel for mastery, and it does not mend matters to make one on a different plane to the other. There is in short an art of grouping which only can be learned by careful observation combined with artistic instincts, and it will be found the ablest masters of the art are content with taking the plan and working out their roof with the least intention of making a display of their gables. On the other hand, we find all sorts of restless fidgety attempts made by some designers, who are never satisfied till they have crowded as many gables as they can in the frontage. These are generally of various heights and levels, cutting awkwardly against eaves and hips, and rising to different heights instead of trying to preserve a common ridge-level. Not content with these irregularities, they vary the faces of the gables. Some are brick, others tile-hung, one is half-timbered, and another is a mixture of timbering and tile-work. The stranger seeks in vain for a *raison d'être*, but he sees none, and probably if he examined the interior he would still be left to ponder over this medley of fancies of the modern builder. Wherever we go we find the gable mania to be again in the ascendant, though this time without the spikes and finials. If economy were the motive one might not wonder; but we should like to know in how many instances the gabled roof has been adopted for the sake of giving a room or two in the roof, and it ought to be remembered, a phalanx of gables is more costly than the addition of another story covered in a plain, unostentatious manner.

It must not be thought we are raising any objection to an architectural feature which has given so much charm and poetry to Continental buildings. We are only protesting against the fashion of multiplying the feature in small houses. We cannot even go so far as to admire the architecture of such streets as that in Landsbut, Bavaria, referred to by Mr. J. J. Stevenson, where the houses of most varied and picturesque detail are all gabled, and we can fully understand, despite their diversity and quaintness, that the gutters between the houses do not contribute to their comfort. No artist can deny the picturesqueness of the gabled houses seen in the Low Countries, Belgium, or Brussels; but this kind of architecture has

its limit, and it will be acknowledged that, apart from the interest of the gable in giving an opportunity for timbering, parget-work, and carving, the beauty and value of the gable is enhanced when it is used sparingly, and with an endeavour to give it a functional rather than a superficial character.

PLASTER-WORK.

THE subject of decorative plastering has recently taxed the knowledge of architects, and details of the methods used by the old plasterers are eagerly sought after. It is, however, not a difficult matter. The methods of making "coarse stuff" and "fine stuff," "gange stuff," the selenitic cement mortar, Keene's and Parian cements, rough-casting, and other processes are well known, and the modern plasterer can probably turn out as good plaster-work if he likes as the old plasterer in the days of the Stuarts. Under the modern contract system, the plasterer has become a vastly different artificer to the workman who executed the panel and enriched ceilings of the Elizabethan and Stuart periods. He is now seldom an artist, though he can model any amount of enrichments of the stock patterns. The history of the trade is one intimately related with the progress of art in this country for the last three hundred years. Not to speak of the ancient Romans, who were noted for their mortar and plaster incrustations, the Medieval architects never had that distaste for plastering their interiors which some have imagined. Everyone who has carefully examined any of the old monastic buildings and churches, will have found abundant evidence to the contrary. A close examination of the walls will disclose fragments of plaster in either thin or thick coats, and the rubble walls of many of our ruined abbeys have pieces still adhering to the stonework, often coloured. One writer alludes to a thin layer of plaster at Little Braxted church, Essex, a building of Transitional Norman character, on the rubble walls; and Mr. Buckler, in his "Churches of Essex," mentions some plastered brick windows. Many of the groined vaults of the old abbeys, as at Netley, were plastered, and the cathedral of Rochester shows plastering between the wooden ribs. We are tempted to mention examples of Medieval plastering, but we pass on to notice the parget-work of the 16th and following centuries, which has lately found imitators.

This kind of plastering was used externally, and instances of it occur in Essex, Norfolk, Suffolk, Sussex, Hampshire, and other counties where timbered houses are found. Ornamental parget-work was generally employed between the studs of timber houses in the Tudor and Stuart times. The ornament was often of figures and foliage raised or in relief, as we find in some old buildings at Ipswich, Maidstone, &c., and more frequently of patterns incised or sunk in the plaster, such as may be seen in a few old houses in Newark, Shrewsbury, Coventry, and in many places in Essex. We have found little information respecting the composition of such plaster-work; but there is no doubt that the devices were either cut, modelled, or impressed upon the plaster when wet. The *modus operandi* was doubtless the following:—A board of the size of the panel or ornament was obtained, in which were stuck pins in the shape of the device, and this was pressed on the wet plaster, and completed by hand.

Many of these timbered houses are filled in with rough-cast, a plaster in which sharp stones are mixed, or these are thrown forcibly from a trowel against the wet plaster. We find on many of the old manor-houses dating from Tudor times, "rough cast," and this appears to have been made of lime, hair, and coarse sand, with small pebbles intermixed. Glass

and brick fragments are often found in lieu of the pebbles. This kind of plaster was very durable, and has lasted to our day in tolerable preservation. Many recent attempts have been made to imitate the rough-cast panelwork of the period to which we have been referring, though we question if the modern work will stand so long. Rye-straw has been found in specimens of old plastering, and there is no doubt fibre of some kind was mixed in it.

The ceilings of the 16th, 17th, and 18th centuries have long been the theme of admiration, and in spite of our *papier maché* and *carton pierre*, few modern ceilings equal those of earlier date. The Italian designs, introduced in the Stuart period, no doubt brought with them Italian stuccoists who were equal to the occasion. The Adams, Chambers, and Wyatt led the way for the light, tasteful relief-ceilings we have lately been reproducing in our buildings, and the acme of ceiling-decoration appears to have been reached by these later artists. It must not be overlooked that these examples were worked chiefly by hand. Casting in plaster-moulds followed, and a revolution quickly set in. Casts of original ornaments and figures superseded hand-carving, and plastering became a mere mechanical art. Even in this art of casting in plaster changes have crept in which have deteriorated the quality of the enrichments. The "jelly mould," as every plasterer knows, does not produce such sharp relief as plaster or lead moulds did, which were in several portions, though we have seen many ceilings executed in *carton pierre* which, for sharpness and relief, equal hand-work. The worst of stamped and moulded work is that a spiritless kind of repetition is apt to be followed, and we find very many of the newly-built houses with parquet work overdone with commonplace devices. It is perhaps to be regretted our architects do not follow the plaster-work found in Italy and Spain, and Mr. Street, writing on the subject in his "Gothic Architecture in Spain," alludes to the tracery patterns of Late Gothic, which are repeated to produce a diaper in the Alcazar at Segovia, and other buildings. All the Moorish decorative work was executed in plaster of fine quality, but cut and carved, so there is, as the same authority remarks, endless variety. We have another kind of decorative plaster "*sgraffito*," an instance of which will be seen in the paneling at the National School for Music, near the Albert Hall, at South Kensington; but we are inclined to think the experiment will not be soon followed. This kind of incised ornamentation is exceedingly obtrusive, and we are disposed to prefer the less decided relief of the plaster itself to such glaring panel treatment. The subject is one intimately bound up with the future of cement concrete.

THE SUNDAY SOCIETY'S LOAN EXHIBITION.

AS intimated in our columns last week, the committee of the Sunday Society have organised a loan exhibition of modern paintings in the rooms of the Working Men's College, Great Ormond-street, which have been generously placed at the disposal of the society. This makes the twenty-fourth Sunday Art Exhibition opened by the Society for the working classes, and it is intended to keep the exhibition open free for the following two Sundays—namely, the 28th of August and the 4th of September. Last Sunday admission was by tickets obtained by those who cared to avail themselves of them, and on the two following Sundays the public will be admitted without tickets between the hours of one and six p.m. The present loan exhibition, through the exertion of its committee and the director, is worthy of the object in view, and the pictures, which com-

prise oil and water-colour paintings and monochrome drawings, have been collected from a variety of sources. We recognise many of them as having lately graced the walls of the Grosvenor Gallery, the Royal Academy, the Suffolk-street and Dudley Galleries.

Glancing round the commodious rooms placed at the service of the Society, we find oil-paintings by H. H. Cauty, Phil. R. Morris, A.R.A., P. Naftel, C. Marshall, J. S. Hill, L. P. Smythe, Alf. W. Williams, J. Rooke, W. Holman Hunt, Frank Holl, A.R.A., Walter Crane, Professor W. B. Richmond, F. Smallfield, A. Goodwin, Clara Montalba, &c. "The Last of a Ruined Home," by H. H. Cauty, is a touching incident painted in the artist's best style. The figures are introduced with much dramatic power: the brick wall and iron gates about being closed, the entrance to the once comfortable house and grounds, tell a tale to the disconsolate group seated on the roadside, which the painter has forcibly represented. A birch grove, by J. H. Snell, is tenderly painted and truthful, and the portraits of J. M. Rooke are masterpieces of vigorous execution. The admirer of *genre* of a more pleasing kind will find something to recall the enjoyment of rural life in L. P. Smythe's scene, a girl reposing meditatively on a grassy margin — "Down by the River" — the grass and water of which are very feelingly rendered, and with the finished execution of the artist. Very cleverly and tenderly-painted is a small subject by P. R. Morris, "Homeward Bound," two girls with a younger brother crossing a common with a bundle of wood. The low key of colour and the handling exhibit masterly study; and just below it is a small piece, in low tone, vigorously painted, of foliage and landscape (No. 27). No. 3 (by L. P. Smythe) is vigorous in the figures, and "A Sermon on the Simphon," by A. Goodwin, is a dexterous study of Alpine scenery and atmosphere. We notice, in the same room, "Slyhead Pass" (No. 12), a large painting of a rocky valley, by A. W. Hunt, in which the artist has represented, with much power, one of the grandest pieces of scenery in Cumberland. Characteristic and evincing much power, is the head of a "Swabian Peasant Woman," by Charlotte J. Weeks. "Near Munich" (22), by Swengauer, is a pleasing sunset; and another bright sunny landscape, painted by Walter S. Lloyd, called "A Quiet Nook," draws attention for the thoroughly English sentiment and truthful handling of the trees and pool. We may also glance at landscapes by G. Howard (16, 17), "Autumn on the Surrey Hills," by C. P. Slocombe; "A Woman of Jerusalem," by Mr. Holman Hunt — a study in chalk, "Sands at Calais," by W. L. Wyllie; and a vigorously-executed portrait by Mr. John Collier of that artist's wife (18), to show that variety of subjects has been obtained.

Of large works we find two decorative pieces, painted by Walter Crane, which we have seen before at the Grosvenor. One is in a low key of colour, but executed in a luminous and half-hazy style, not altogether faultless in the drawing of the figures. The "Fate of Proserpina," by the same artist, is a more solidly-painted subject, and thoroughly pre-Raphaellesque in manner and treatment. The large study of "Still Life," by Otto Scholderer (46), is bold and masterly in grouping and tone, and another picture showing "Luther on his Way to the Diet of Worms," by Teschendorffer, will be gazed on with interest. But the greatest modern work of oil exhibited is hung in the Lecture-room, and is entitled "Behold! the Bridegroom Cometh," by Professor W. B. Richmond, a work which occupied the place of honour in the last Grosvenor Gallery exhibition, and upon the merits of which we

have previously spoken. This large painting is well hung as regards light, and the grace and beauty of some of the virgins, and the skilfully-managed atmosphere of the piece will be scanned again with probably more interest than they were in the Grosvenor.

In another room is a collection of water-colour drawings. We note in this part of the exhibition two Hampshire views by R. A. K. Marshall — one of Hurstbourne Park, and the other a village, both in the valley of the Test; they are highly finished. "Waterside Weeds" (103) is pretty. We must notice also one or two charming poems in colour we have seen elsewhere, by Clara Montalba; one, a View under Cannon-street Bridge. (No. 112), by W. Hall, is a skilfully manipulated drawing; P. Naftel sends "The Playing Fields at Eton" (131); No. 111, "Venetian Boats," by H. Darval is clever in grouping and colour; and we mark No. 115, by Frank Murray, and "Puck and the Fairy," by Ernest Wilson, besides two clever drawings by Alf. W. Williams, highly finished and truthful in their patient elaboration of foreground and mountain. Some Welsh scenery by C. P. Slocombe; landscapes by C. Marshall; "Views from Rome," by Walter Crane; and studies of heads by F. Smallfield are among the works contributed. Portraits are never very instructive; but a few are to be seen in the museum-room, by L. Dickenson, of some merit. Those of the visitors who care to study the work of deceased masters of the English water-colour school will be interested in a very valuable representative collection, embracing works by T. Gainsborough, David Cox, Copley Fielding, Peter de Wint, J. Varley, J. M. W. Turner, J. S. Cotman, T. F. Wheatley, E. Dayes, J. Flaxman, A. Penley, the younger Pugin, J. Holland, and others. These paintings and drawings have been willingly contributed by the artists or owners of them, without the expression of a hostile opinion, showing that a liberal spirit is beginning to manifest itself on the Sunday question. Such exhibitions as these must tend more to instruct than to do harm, and we hope many of our artisans and workmen may be induced to spend their Sunday leisure here, rather than in more objectionable haunts.

THE WATER QUESTION.—XV.

INNER SLOPE OF AN EARTHEN EMBANKMENT.

THE safety of a reservoir embankment does not depend upon one thing only, as upon the perfection of the puddling, but equally upon several others, chief amongst which is the consolidation of that part of the bank which lies within the puddle wall, and into which, therefore, water would penetrate if not prevented, and this prevention depends chiefly upon the thickness of the layers of earth with which the embankment is raised. Thin layers are always desirable; but the maximum thickness which may be allowed depends on the material and the means by which it is deposited in the bank. A heavy and dry material may be deposited in thicker layers than one of less specific weight, with equal effect in both cases in forming a solid bank. The thickness allowable has been variously stated at 6in., 12in., 18in., and 2ft. Where the chief consideration has been the urgent progress of the work to meet a demand for water, as was the case when, in order to meet the demands of the approaching summer, the embankment of the reservoir, on the Dale Dike at Bradfield, was urged forward by the Sheffield Waterworks Company, in the early part of the year 1864, and which burst in March of that year; the earth forming the bank on each side of the puddle wall has been tipped from rail-waggons at a height of 5 or 6ft., and more; but few waterworks engineers would sanction that,

except for the outer part of the bank, and even for that part it is too high, because the large and small rock are not evenly mixed; the large lumps roll to the bottom of the tip and form a layer there of themselves; the finer stuff laying together upon the coarse layers; whereas, to prevent slipping, which is one great object of all the precautions, the large and the small should be as evenly mixed as is practicable, except in those parts where material is purposely selected to be deposited, fine in one part and large in another, for different purposes. If the material tipped into the bank were all stone, the rolling of the large lumps into a separate layer would be less objectionable; and, indeed, with stone for the material it might even be an advantage that the layers should be so arranged, for the one would drain the other, and the bank, as a whole, would retain less water than it otherwise would do; but with other materials, such as shale, blue bind, or, indeed, any material but stone, the same object would not be effected.

In making the inner part of the embankment of a reservoir the object is to make it as compact as possible to prevent the water reaching the puddle wall, and, therefore, the material should be small and clayey; but in the outer part of the bank dryness and stability are the chief objects, for which larger and harder material is more suitable. The inner slope of an embankment is usually made flatter than the outer slope, as 3 to 1 inside and 2 to 1 outside, for the inner part of the bank is more liable to slip than the outer. When the water-level in the reservoir is reduced, if the inner part of the bank has been penetrated by water and become partially saturated, slips are more likely to take place, and the flatter slope meets this tendency; but outside, with dry materials, 2 to 1 is as good a slope as 3 to 1 inside. As a further precaution against slipping it is desirable to keep up the outer parts, next the slopes, higher than the inner parts next the puddle wall.

If rail-waggons be used at all, it is desirable that they should be of small size, to hold, say, not more than one cubic yard; but if waggons be allowed, there will always be a tendency on the part of everyone concerned to make the tips high and the layers thick, to avoid much shifting of the rails if possible, and especially by the use of side-tip waggons; but if the instruments for carrying the stuff into the bank be confined to barrows, dobbin-carts, and common one-horse carts, it does away with this tendency in a great measure. When large waggons are advocated, it is asserted that the greater weight and the heavier rails compensate for the greater height of the tips, and so an equally good consolidation of the earth is effected. The degree of consolidation, by the weight of the instrument by which the earth is transported, admits of proof. In respect of any one square yard near the middle of the bank, lengthwise, the consolidation of the one immediately preceding it may be shown as follows:—Premising that whatever the thickness of the layers, variation in weight of the different kinds of earth, or time of construction, the degree of consolidation by the weight of the carrying instrument must be in the inverse ratio of the weight carried each journey, the weight of the instrument being reckoned twice going full and returning empty.

Thus, if w = weight of earth carried, and W = weight of instrument carrying it,

$$\frac{W}{w} = \text{degree of consolidation.}$$

The actual weights of different kinds of earth vary much; but, for the purposes of comparison, an average weight of 2,600lb. per cubic yard may be taken, or 96lb. per cubic foot, and the effect of the carrying instrument may be stated thus:—

One indeed is a splendid example of Gothic, the other is a very poor one, and so the comparison is hardly fair. But still I would ask the younger members of the association, when they visit Pershore, after inspecting the Abbey Church, to go also into the other parish-church close to it, and to believe, what we older ones can assure them of, that many a parish-church they now enter with artistic pleasure, if not with antiquarian interest, was but little better, say, in 1810, than that which seems now so strange. And since these questions of restoration or preservation chiefly refer to our churches, it is impossible to forget that they are not merely monuments of antiquity serving for the delight of the archaeologists: they are buildings intended for use—for a most important, a most sacred use. If they are now less interesting as monuments, they are much more beautiful, more suited to the purposes of devotion as churches. There is no reason why both objects should not be attained to. It is usually from ignorance or carelessness—it may be of the architect, it may be of the builder, it may be of the restoration committee—that the old and interesting features have disappeared, when the important work of restoration has been carried out. The Cathedral of Worcester is perhaps one of the finest examples of restoration you can anywhere meet with. I had almost said of over-restoration, but had I done so I might have been misunderstood. The interior of the Cathedral is one of the finest I am acquainted with; I may say, the very finest, considering its size. From the old engravings and from what I am told, it must be far finer now than it was before the work was begun. The outside of much of the building is terribly new, and no doubt much less picturesque than it was. But in an archaeological point of view, what has been lost? The whole of the outside stone had largely perished, in the beginning of the 18th century, from the ravages of the weather upon its surface. Mouldings and other delicate features could scarcely be traced. Then came the hand, not of the restorer, but of the men who wished to make it neat and new and tidy. They pared down the moulding lines, and reduced each stringcourse to what they look upon as a more perfect condition; they put on the top of the pinnacles "neat" spires, formed like that of St. Andrew's Church, in Worcester city; they repaired the tracery of the east window, according to their notions of what we should now call Late Gothic. Was all this worth keeping? Is it not far better that our east window, which we see so much from the interior, our pinnacles outside, our drip-mouldings and stringcourses should be renewed to something like their original Early English character, even though this involved some newness of appearance for a few years? The walls were dangerous. Unsightly modern buttresses supported them. Nothing short of rebuilding would suffice. The internal stonework was replaced, stone by stone, as far as possible. The outside stone was going again as it had gone before. Was it not wise to substitute for it a casing which would stand the weather, and put the Early English Cathedral of Worcester again before our eyes? So far, then, I think the restoration of Worcester Cathedral was wisely and well carried out. Still, in some respects, I think the restorers went too far. The large lancet windows of the eastern portion of the building had, in some cases, been subdivided by a mullion, and their heads filled with tracery at a later period of Gothic art. These portions, not being original, were removed at the restoration; and I regret it, both as they were part of the history of the building in the period of our greatest architects, and also because it seems to me that we have really lost some beauty by this change. I am told, indeed, that this tracery was of a very poor and mean character; and perhaps had I seen it, I might have regretted it less than I do. The loss of the Guesten Hall we all regret; but we cannot justly blame the Dean and Chapter, who, although at the time engaged on the costly work of the Cathedral, offered to find £5,000, one-half of the estimated expense needed for the Guesten Hall, if those who desired its preservation would raise the rest—and received one promise of £5 towards it. But may not both systems, both restoration and preservation of ancient buildings, be objected to from another point of view? Are not both alike the result—may not both alike be in some

degree the cause—of a great want of originality in the present day? Who can imagine either the one or the other in the times of our great architects, whether we take William of Sens, or William of Wykham, or Christopher Wren? It was not in every case a Danish robber, or accidental fire, or bad foundation that destroyed our fine early churches. Scarcely was the Norman and semi-Norman Cathedral of Worcester—begun in 1084—completed and consecrated in 1218, when the Bishop laid the first stone of the Early English choir and chapels (1224). Plenty of money was coming in; and so it was at once resolved to make the building much larger and much more beautiful, as they considered it. They did not think the stonework so valuable that it must be preserved at any cost. Later on we do indeed find the men of the 15th century proud of their noble Norman chapter-house, and carefully and skilfully preserving it from the danger it then was in of becoming a ruin. But still they worked freely in their own fashion. They tried to save its walls, so they put into them what we call Perpendicular windows. They added buttresses outside—buttresses in the Perpendicular style. They left traces of the Norman, perhaps from antiquarian motives, more probably to save trouble; but they did not hesitate to put in a Perpendicular doorway. All this they did as a matter of course. It was their way of building. What is ours? Have we any style at all? If what we build now lasts 500 years, will there be anything in it to tell in what century it was built? This want of originality may be partly the effect—perhaps also partly the cause, of our treatment of ancient buildings—whether we treat them after the fashion which began some forty or fifty years since, "restoring" them as far as we can to the designs of their original builders; or, according to the new plan, of "preserving" every scrap of work older than ourselves, without thinking much of the present use or object of the building. Such careful and minute study of old work seems likely to check any freshness of artistic thought. It is quite true that in the period of the Renaissance the artists and architects did most carefully study and copy the works of the Romans; but they were using them for new purposes. But the extraordinarily rapid deterioration of this style seems to show that it was not based on sound principles. The copying of the ancient forms and ancient decorations seems to have had, not immediately, but ultimately, the effect of destroying style altogether. And now we have again taken to this copying; and I fear the result will be even worse than before. Men of artistic taste will now, as ever, design and erect buildings true and beautiful. And is there no remedy, no hope of improvement? I see none. Some of the elements of advance in architecture, considered as a fine art, undoubtedly are present. New materials, or at least new methods of treating the old materials—iron and other metals, glass, artificial stone—ought to give rise to something beyond the past. There is also a fair demand for new buildings; and not a few men of ability, of good artistic taste, embrace the profession of architect. But all this has been true for the last fifty years; and nothing has come from it which may be considered as characteristic of the present day. I am aware that even if the practical effects archaeological studies have had upon our architecture are to blame in some measure for its want of originality, they are not the only cause of it. For a long time "perfection of workmanship," in the sense of neatness and finish, combined with cheapness, has been the object of Englishmen, beauty being left out of the question, or looked upon as an occasional extra; and the natural result has been to throw much of our energy into the form of engineering, rather than into the fine art of architecture. Still I think archaeology is partly to blame. But we cannot help it. The study—for I will not call it a science—the study our association is devoted to is far too interesting, far too valuable to be checked by the thought that in some ways it may do, or may have done, mischief. I suppose we must of us pursue it simply for its own sake. But if asked what use it is of, we may fairly answer that it is the hand-maid of history; that it helps us to fill up the outlines given us by the chroniclers of old times; that further back it is the only source of such historical knowledge as we possess; and that it is by its means that we may perhaps hope eventually to solve the great questions of the

unity (or non-unity) of the human race, of the original condition of man in respect of what, for shortness, we express by the words civilisation and morality.

The members then proceeded to the *Priory Church*, where Mr. W. Jeffrey Hopkins, F.R.I.B.A., of Worcester, read a paper. The Abbey of Malvern was, he remarked, founded in the 11th century, according to Dovecot in 1085, but there had previously been an oratory of St. Werstan, at the place near St. Anne's Well, still known as the Hermitage, and where bones, coffin-lids, and other proofs of interment have been dug up. Of this St. Werstan, to whom the Priory as well as the oratory was dedicated, we knew little except that he fled from Deerhurst to Malvern in the time of Edward the Confessor, and was martyred here about 1056. No mention of Werstan existed in the Calendar, and the only record of him was the miracles depicted on the shattered glass of a much more recent date, still to be seen in this church. The earliest part of the structure around them was built by Prior Alwyne, a monk, who had served under Wulstan, of Worcester. Alwyne founded this, with the aid of thirty monks of the Benedictine order, to which belonged the great neighbouring abbeys of Worcester, Pershore, Tewkesbury, and Gloucester. There were grounds for believing this priory church, like all the others just mentioned, had a double apsidal eastern termination—a very rare feature in England, and probably imported from the banks of the Loire. The clerk of works engaged in the restoration of Malvern Priory under Sir Gilbert Scott, found that although the eastern end was now square, there were foundations of a semicircular aisle prolonged into an apse, and Mr. Nott and others now present had seen these remains. Beneath the chancel were remains of a crypt, and it was a singular coincidence that all the Norman towers erected over the crossings of great abbey churches, with crypts to the east of them, fell at about the same time from the failure of the range of columns, in each case crushing the eastern part of church. Winchester tower fell in 1079, Worcester in 1084, Gloucester in 1080, and Canterbury in 1096, while this one also failed about that time, and at the present time they could see the tower piers leaned to the east, especially on the north side. Mr. Hopkins asked the audience to look around them and picture the great Norman church as it appeared when completed eight centuries ago. The great circular piers and arcading of the nave and aisles still remained, but there was then no lofty clerestory as at present, but a low roof; the tower piers, although recessed, and the transepts—the southern one—largely restored, yet existed, and also the outline of the eastern portion except its apse. The walls were not bare as now, but covered with distemper paintings. Yet while the Norman fabric could be reconstructed internally with little difficulty, a hasty observer would say that the exterior was entirely Perpendicular, except the Norman door on south side of nave. They might notice that the western portion of nave was of a slightly later date than the three eastern ones; the piers, instead of having a plain chamfer, had sub-bases and bases composed of a torus and hollow moulding. One or two traces of Early English existed in the capitals at the crypt entrance, below the east window, and of the Decorated period there were worked into the same blank arch a series of bosses, still gilded in places, and probably removed from groined roof of the former Lady-chapel, and the tiled floor might still be seen projecting from the east end, but the remains of this period were poor in character. Coming to the Perpendicular period, they saw extensive works excellent in their style, and the dates 1453 to 1456 on the tiles set in the east wall above altar, and the fact that the high altar and six other altars were reconsecrated in 1460, gave a very probable period of completion. The soffits of the great lower arches on Norman piers showed great judgment and skill in the architect who altered them, but the same could not be said of the great nave clerestory lights, and he was inclined to think another man must have carried them out, from the unsightly interval of bare walling left between the arcade and clerestory—possibly intended to be decorated with paintings. In the choir they saw vaulting piers and springers carried up to receive groining never added except in wood. At the back of altar, between it and east window, was a

singular raised passage, semicircular in form, and with the wall pierced by four deeply-splayed squints, two of which looked into the former Lady-chapel, and the others into the north and south aisle eastern chapels. The glass in this church was not excelled anywhere in England in its skilful arrangement of cusped panelling and disposition of lights in connection with blank panelling, especially in the west window of the south chapel. The fragments of many windows were, however, jumbled together, and although it might be best to let them be, he would suggest that they might be restored if careful tracings or drawing in colours were made of every light, and the copies then cut up into subjects, and sorted like a child's puzzle until the corresponding pieces were properly rearranged. Of the abbey buildings, which all lay to the south, few traces remained. The line of the cloister-roof could be seen on south side of nave; the priory-gate, occupying a corresponding position to that at Bristol, still existed, and so recently as 1841 the beautiful refectory, which had long been used as a barn, was wantonly destroyed by a builder; drawings of the roof were now on view at the College Hall. This church was that of the priory, not the old parochial one, which was dedicated to St. Thomas, and measured about 92 ft. by 36 ft.; a few remains existed. This priory church was bought soon after the Dissolution for a parish-church, and in 1788 it was reported ruinous—the result of wanton folly, ignorance, and neglect. Boys were allowed to use the windows as targets; the roofs went to decay; the parson used a portion of the fabric as a dovecot, and the room over the great north porch was a servants' hall. In 1812 the fabric was partially repaired, and again in 1815, and recently it had been thoroughly restored by the late Sir Gilbert Scott.

Mr. E. P. Loftus Brock, F.S.A., added a few architectural explanations, remarking that an apsidal plan for an eastern end was not so rare in early churches as Mr. Hopkins had supposed, and was common to all churches having a Roman origin; thus, in the little church of St. Pancrace, Canterbury, of the time of the Roman occupation, just unearthed, they found this plan. It was interesting to note that in Malvern, Tewkesbury, Gloucester, and other Norman buildings of this district, the capitals, like the piers, were circular, and not square or octagonal—a mode of construction not introduced into the east, south, or north of England till the 13th century. Thereconsecration, in 1239 at Malvern, Tewkesbury, Pershore, &c., was not necessarily due to structural alterations, but was in obedience to an order from the Pope's legate in London that all churches which had been rebuilt within the past century or two should be reconsecrated.

A hurried perambulation of the building was then made, the grotesquely-carved misereres under the stalls (which have been picked out in chocolate colour upon the naturally-blackened oak ground), the dated tiles in choir, the passage behind altar, the alabaster altar-tombs to John Knottesford, his wife, and daughter, and the confused stories in the stained glass receiving most attention within, while outside the traces of conventual adjuncts on the south side, and the re-settings of Decorated fragments in the east wall, provoked some discussion.

In the evening the members dined together at the Imperial Hotel, under the presidency of the Dean.

TUESDAY.

The day's excursion, begun and ended by a railway journey, included visits by carriage to several village churches of Early character, and to Tewkesbury Abbey, and in the evening, at the first meeting for the reading of papers, on account of the heavy showers in the morning, the programme had to be curtailed.

RIPPLE,

the first village visited, still possesses on the green the shaft and base of the cross, raised upon a modern pedestal of three stages of brick and stone; the shaft is of oolite stone, and the head, now missing, is supposed, from a similar example removed from the adjacent village of Upton, to have been of iron. Close by are the parish stocks, still in good condition. The Church is a cruciform building with lofty transepts, and large central tower, finished by an Italian balustrade between the Decorated pinnacles. The church is chiefly of Early English

character, having arcades carried by piers of four-clustered circular shafts, with scalloped caps of semi-Norman character. In the chancel is Late plate tracery to the windows, and a series of misereres, carved with spirited representations of peasants dressed in smocks, engaged in harrowing, reaping (one with a scythe), sowing, driving a pig, sheep-tending, &c.; they are larger than the stalls, above which they are inappropriately nailed to the walls, and are supposed to have been brought from some large church—tradition says Worcester. Beyond these stalls the chancel is quite bare, and some faded Christmas decorations on the pulpit and across chancel-arch attracted some attention. The rector, the Rev. R. Holmes, read a paper giving the history of the church and the adjacent monastery, which existed in Saxon times, and of which a few remains exist at the rectory. The church was restored 20 years since, when a beautiful thurifer, of beaten copper, was found at the east end. This, Mr. L. Brock pronounced to be an excellent example of Middle 14th-century period; it has on the cover a model of a cruciform church, pierced by holes for the hanging chains. In the south transept arch the rector showed a Bible, Psalter, and Service, of the closing years of Queen Elizabeth's reign. Having seen the shaft of a second cross in the churchyard, the carriages were resumed, and crossing the Avon at Twining, by chain ferry,

BREDON CHURCH

was seen. This, like the last, is a cruciform edifice, but has a lofty spire upon the tower at the intersection, and contains, as Mr. Brock said, an assemblage of the characteristic features of the churches in this district. The nave is Transitional-Norman, the three entrances being under round-headed arches, and to the south a chapel or quasi-aisle of two bays was thrown out about 1230; the two-light windows have two plates of trefoil cusping, the inner one supported by Purbeck marble shafts. The chancel was rebuilt in the Decorated period, and a little later a second quasi-aisle, with flowing tracery to windows and clustered piers and shallow mouldings to arcade, was thrown out on north of nave. The west window and spire are Perpendicular additions, and in the south chapel, which has a piscina, is a sumptuous mural monument, adorned with obelisks, scrolls, and other Jacobean ornaments; it is to the memory of Giles Reede, A.D. 1611. In this chapel are also three low recesses, two containing floriated stone coffins, and the third a shield, having upon it two forearms and hands bearing a heart. In the south side of chancel are three 14th-century sedilia, and next them, set upright, is a coped tombstone, having upon it a carving of a crucifix, above the arms of the cross being a pair of doves, and the busts in high relief of a man and woman. The risers as well as the treads of the altar-steps are paved with 15th-century tiles, similar in character to those in Malvern Priory, but having armorial bearings. At the foot of the steps is a brass to John Prideaux, Bishop of Worcester, who, after the sequestration of his See, returned to this parish and died here in great poverty. Mr. Brock remarked that during a restoration in 1842 the sedilia was pierced for purposes of ventilation, and as it now resembled a low side window its position might furnish a crux for future archeologists unless the fact were recorded.

The well-known tithe-barn at Bredon was afterwards visited. It much resembles one at Avebury, Wilts, in which this Association dined on one of the Congress days last year, but has outer-walls of stone, and a roof of thin slabs of stone. The interior, some 135 ft. long, is divided into a nave and aisles, with projecting double porches or transepts, by massive timber supports: in each of the nine bays of the main roof a pointed arch supports a collar and curved struts, and is itself tied in by a second collar, and the aisle-bays are also of single-pointed arches with cross-ties in the transverse section. On the north side is an upper chamber, having a good octagonal stone chimney, with pyramidal cover, supported by little shafts. The immense original key is still preserved, and has double wards on either side. The barn is a highly interesting and at present singularly perfect specimen of the larger kind built about 1450, but the roof admits the rain in several places, and requires the proverbial "stitch in time."

OVERBURY CHURCH

was next inspected. Here was a third cruciform structure, in this case with a central tower of Perpendicular character, having a richly carved and perforated stone belfry. Inside, the original Transitional Norman aisles to nave have been replaced by wider ones of modern Decorated type, so that the deeply-splayed Norman clerestories now open on their outer faces into the aisles. The piers are circular and very low, the caps being square, with deep chamferings; on the nave faces are label mouldings, that on south side being broken up by a double wave-ornament. The west end has a good Early English transept, and the chancel windows are good specimens of Early English work. The rector, the Rev. Chas. Glynn, stated that the church had just been restored by Mr. R. Norman Shaw, R.A., to whom was due the stone groined roof which now covered the chancel. Considerable discussion took place with reference to the font, which has a tapering cylindrical bowl (on a 14th-century base), rudely carved in high relief. Some local sculptor has restored it in ludicrous fashion in cement, the missing side of a bishop being reproduced with a second staff in right hand. Several contended that this bowl was coeval with the present church—and of 11th century—but others held that it was as early as the Confessor's date, and called attention to the model of Christ held in the hand of a priest's figure, and the costume, as corroborative of this opinion. Prebendary Ingram contended it was Danish in origin. At

TEWKESBURY

the Abbey was visited after luncheon, the members being received by the vicar, the Rev. Hemming Robeson, M.A., for whom an elaborate descriptive paper was read by Mr. J. R. Sergeant. At the conclusion of the paper Sir J. Allanson Picton, F.S.A., proposed a vote of thanks to the author and reader, remarking that the manner in which this noble abbey church had been restored reflected high credit on all concerned in the work. The Abbey was so fully described on the occasion of the Architectural Association's visit, in the BUILDING NEWS of the 12th inst., when the south-east front of the Abbey was illustrated from a new drawing, that it will now be sufficient to refer to that issue. The members, having divided into sections and inspected the whole of the interior of the Abbey, visited the 17th-century bowling-green attached to an inn, which is surrounded by old yews, and some of the picturesque half-timbered houses in the town.

In the evening a meeting was held in the council-room of Malvern College, under the chairmanship of Rev. Prebendary Smith, Vicar of Malvern. Mr. J. Tom Burgess, F.S.A., of Worcester, delivered an address on—

"THE ANCIENT ENCAMPMENTS OF THE MALVERNS,"

illustrated by a series of plans and sections, drawn by Mr. H. H. Lines, of Worcester. Having first shown the direction of the lines of fort drawn, as Tacitus tells us, in an oblique direction across England, along the banks of the rivers Nene, Avon, and Severn, by the Roman general Ostorius, Mr. Burgess said that the bold range of hills below which the Congress was being held, marked the disputed boundary-line where the Belgic wave ceased and the Celtic began. Every crest and hill in the line of the Malverns, from the Bristol Channel to the banks of the Dee, was still crowned by the earthworks and encampments used by the Silures and Ordovices, the two kinds being distinct from each other in their traces at the present day. Those in the immediate neighbourhood he presumed to be Silurian defences, and when these were formed the fertile cultivated plains now at the eastern foot of the Malverns were marshy districts, often flooded, and the outcropping hills were then easily-defended islands. The entrenchments at Meon Hill, on the opposite side of the eastern plains covered some 30 acres, and in them had been found Roman javelins, now distributed in the Warwick, Worcester, and Sir Henry Dryden's collections, while close by was a tumulus which had yielded undoubtedly British remains. The hill seemed to have been held alternately by the opposing forces. On Bredon hill, still nearer, was a camp of somewhat different character, and a third island in the plain of Evesham, Elmby, contained also the Medieval earthworks

thrown up by the Beauchamps. Two years since he aided in carrying out excavations, with Mr. F. G. Hilton Price, F.G.S., at the great remains on the Herefordshire Beacon. The fortified area involved the whole summit of this great hill and the adjacent one of Midsummer, and consisted of an oval deep ditch, with rampart round it, having a circumference of 6,800 yards, the longest diameter being 932 yards. The ditch was 7ft. deep, and broad enough for one chariot, and there was but one ancient entrance, that to south, although a modern one injured the line at the N.E. point. In the centre was a strongly-fortified citadel, and outside and below this other and larger walled-in spaces. All over the area were pit-like depressions, which appeared to be permanent dwellings, averaging 15ft. by 9ft., and 6ft. deep; outside the citadel, at Hallow-Bush, were walled inclosures, which may have been for cattle-pounds in times of danger, and others for sheep; and within the protected area was "St. Anne's well," as it was now termed. Amongst the remains found were many specimens of red pottery of the 15th and 16th centuries, some dated, and below these, flint flakes, bone stones, iron tiles, a bronze ferrule, broken bones of the pig and other domestic animals—enough to prove the continued occupation and use of these dwellings. The so-called Druids' sacrificial stone appeared to be a boulder, removed by natural means to its present site, and the traditional earthen Druids' seats were but rabbits' burrows, which had occasioned several of the minor irregularities of the surface. Mr. Brock read a letter upon this chain of events, written by Mr. M. H. Bloxam, who was unable to be present through ill health, and added that it was to the patient investigations of Mr. Rouch-Smith, Mr. Price, Mr. Burges, and others, that archaeologists had been able to establish that these earthworks were no mere summer encampments hastily thrown up and abandoned, but the permanent dwelling-places of races of people, who dwelt in pits on the hill-tops, and kept flocks and herds, folding them on the sides of the hills when danger threatened. Mr. G. R. Wright, hon. congress secretary, referred to the hardship and waste of archaeological spoils occasioned by the existing barbarous law of treasure-trove; and Mr. Burges, in his reply, said that he had been a victim of this absurd law of Edward III.'s time, for the silver and gold ornaments found in a Saxon lady's grave were seized by the Treasury authorities, who paid 25s. compensation for value of metal, not to the explorer, nor to the owner of the soil, but to the labourer who actually dug them up, and then sold them to the British Museum trustees for ten guineas. Such injustice led, as Mr. Wright had said, to the melting up of priceless antiquities by the finders.

THE GLASS IN MALVERN PRIORY CHURCH.

Mr. John Nott, of Malvern, read a paper upon this subject. Fifteen windows of the church still, he said, contained portions of the old painted glass, which was of three distinct periods—fourteenth century, middle of fifteenth century, and beginning of sixteenth century. The oldest was that in the south chapel, that of St. Anne, the eastern window showing, in graphic manner, the Creation of the World, in nine compartments; the middle window, the history of Noah, and events in Abraham's life; and in the western window showed Our Saviour's Passion; and several other incidents in the Trial and Crucifixion were illustrated in other windows. Of the second or Perpendicular period were the great east and west windows and the north clerestory lights of choir, the latter including the famous series of illustrations of St. Werstan's legends, executed for Prior John of Malvern, who was said to have written the scraps of Latin by which we have identified and interpreted them. These were greatly damaged and confused, many of the pieces having been lost and others transposed. Of the latest period was the great north transept window, the date of which was 1591 or 1595, and which was said to have been given by Henry VII.; it still contained portraits of Prince Arthur and Sir Reginald Bray; but those of Henry VII., his Queen, and the Princess Elizabeth, although known from descriptions to have existed, had quite disappeared. A short discussion followed, in which the chairman, Mr. J. Cope, Colchester, Mr. Brock, Mr. G. R. Wright, Rev. — Taylor, and others took part, the foreign or English origin of the painters of much of our mediæval stained

glass being warmly disputed. The former theory had, in many cases, tradition to support it, but it was stated that the alleged Flemish woodwork, works of Dutch artists, and Italian sculpture, had often been shown to be purely native workmanship, and that the same thing was probably true of glass.

WEDNESDAY.

Of this day's excursion the ancient town of Ledbury made the centre, several of the neighbouring village-churches being visited by carriage from it. Leaving Malvern by special train, a party of about eighty members left Ledbury at 10 a.m. by carriages for *Bosbury*. The church is remarkable for a massive detached square tower standing some 180ft. to the south of the church, much resembling that at West Walton, North Norfolk, visited by the Association in 1878. The church is chiefly of Transitional Norman character, with a Tudor chapel with fan tracery at east end of south aisle. The rood-screen still retains its position, and is Late 15th-century in style, with fan coying above the open work supporting a heavy cornice. The pulpit contains four carved panels representing the Adoration; Flight into Egypt; Crucifixion and Resurrection of our Lord; these are said to have been brought from Flanders. The font in use is square, with shallow bowl supported on five columns, the whole being of a local conglomerate, and about 1230. At the west end of church is a second font, dug up near, of much earlier character, rudely sculptured. The vicar, the Rev. S. Bentley, read an exhaustive paper in the church, in which he mentioned that the tower was one of seven detached ones existing in Herefordshire, and from its narrow windows and thick walls seemed to have been used as a place of refuge.

In the churchyard is a perfect specimen of a cross, of red sandstone, 12ft. high, and an oaken lych-gate. The vicar afterwards showed the remains of the palace of the Bishops of Hereford, now part of a farmhouse, which has just come back into the possession of the bishops. The only original portion is a panelled room, crossed by heavy beams. Near by, in the out-buildings, is the 14th-century gate-house described by Mr. J. H. Parker in his "Domestic Gothic Architecture." The outer face is of stone, and the inner one has two large oak beams carried the whole height of structure as an ogee arch, and filled in with masonry. The Crown Inn, formerly the residence of the Harford family (two of whose Elizabethan monuments had been seen in the chancel of church) was next seen. The principal room has oak panelling surrounding the wall, and at the intersections of beams in ceiling and over the fireplace are oak shields, carved in relief with armorial bearings. Some other houses and foundations on site of Knights Templars' house were seen, and the party returned to *Ledbury*, where the Market House and Church* were seen, the members peeping into one of the picturesque 17th-century half-timbered cottages which line the Church-lane, to find that the beautiful oak carvings on the walls had been concealed by cheap coloured religious and sporting prints. At the parish-church, a very large and lofty edifice kept in admirable repair, but still retaining low pews, the vicar, the Rev. John Jackson, read a descriptive paper upon its architecture, which he showed included specimens of every style from Middle Norman to Tudor, while the upper part of tower and spire was added to the detached steeple about 120 years since, and the ceilings to north aisle and the chancel were put up a century ago. A few years since, the church was restored under the direction of Mr. Allen, of Hereford. Mr. Loftus Brock followed, remarking that the church seemed to have been a model and architectural school for the district, noting that the narrow proportions, the great height of windows, the simple mouldings, the ball-flower ornamentation, and other features of many periods were to be found repeated in the neighbouring village churches. He also referred to the peculiar form of the chancel arch, which was beginning to fail from want of abutment on the south side, and suggested that early attention should be given to it. Sir Charles Boughton was glad that the vicar had shown himself so fully alive to the beauties and requirements of the fabric in which he served. Col. Bramble explained the

* Illustrated from measured drawings by Mr. E. J. May in the *Building News* for Dec. 14, 1877.

upright effigy on the south wall of St. Catherine's Chapel as that of a priest of the 13th century.

After luncheon at the Feathers Hotel, carriages were resumed to *Much Marele Church*, which, with its alabaster monuments, was described by Mr. G. H. Piper, F.G.S., of Malvern, Hellen's House, the seat of Mr. R. D. Cooke, being visited *en route*. Kempley Church, where a number of interesting mediæval frescoes still exist in good condition, was shown by the rector, the Rev. J. Crowley Weaver; and the members, after seeing Preston Court, the residence of Mr. W. Hardland, returned to *Ledbury*. Malvern was reached by special train soon after 7 p.m., and in the evening a crowded meeting was held at Malvern College, when papers were read on "The Ecclesiastical State of the Diocese of Worcester During the Episcopate of John Carpenter—1444-76," by the Rev. Canon Winnington Ingram; and on "The Antiquity of the Game of Golf," by Mr. Chas. F. Compton, of London.

THURSDAY.

Yesterday (Thursday) the members were to drive from Malvern by road through *Castle-Morton* to *Birt's-Morton Court*, a fine specimen of the moated house of the 14th century, and the adjoining erections, and thence to *Payne's-place*, where Margaret of Anjou took shelter after the battle of Tewkesbury. After luncheon at the *Mess House*, the party were to proceed to *Upton-on-Severn*, and to *Severn End Manor House*, returning through *Blackmore-park* to *Malvern*.

Friday's (to-day's) programme is devoted to visits to *Kidderminster*, *Bewdley*, and *Stourport*; that of Saturday to *Little Malvern Church* and *Council House*, the encampments on the *Herefordshire Beacon* and *Midsummer-hill*, and the Norman stronghold *Branshill Castle*, and a specimen of the modern antique at *Eastnor Castle*. Three extra days are arranged for next week: Monday and part of Tuesday to be spent at *Worcester*, and Wednesday to *Cheltenham* and *Thirlestane House*. We shall continue our report next week.

WIND-PRESSURE ON RAILWAY STRUCTURES.

THE following is the report of the Committee on July 29, 1880, to consider the question of wind-pressure on railway structures. It is published in a Blue-book, with appendix and diagrams:—

"To the Right Honourable the President of the Board of Trade.

"London, May 20, 1881.

"Sir,—In compliance with the instructions from the Board of Trade (a copy of which is given in the appendix) to consider the question of wind-pressure on railway structures, and to report to them on the subject, we have made such inquiries and procured such information on the subject referred to us as we deemed necessary, and have now the honour to report the conclusions at which we have arrived.

"It was necessary in the first instance to ascertain as accurately as possible from the sources which were accessible to us what the highest pressures of the wind in this country amount to. With this object we obtained from those observatories and stations where the pressure or velocity of the wind is measured the statements which we give in the appendix. In order to exhibit the action of the wind during heavy storms, we have also appended lithographed copies of wind-diagrams taken by means of self-registering apparatus at *Bidston*, *Glasgow*, and *Greenwich*. At some of the stations from which we have obtained returns the wind-pressures are measured directly by Osler's self-registering pressure anemometers, at others the velocity only of the wind is measured by Robinson's rotating anemometers, the velocity of the wind being taken at three times the velocity of the revolving cups. For some stations the only published information is the run in miles of the wind during each hour. There can obviously be no more than a general accordance between this and the greatest pressure experienced during the hour. To utilise for our purpose observations taken at stations where the velocity only of the wind is recorded the records

of the Bilston Observatory, where both elements are recorded, have been employed as furnishing a means of connection between the two. In the case of high winds, with which alone we have to deal, it was found that the greatest pressure recorded in an hour was tolerably well-proportional to the square of the mean velocity during the hour, and that the empirical formula $V^2 \cdot 100 = P$, where $V = \text{maximum run in miles of the wind in any one hour}$ and $P = \text{maximum pressure in pounds on the square foot at any time during the storm to which } V \text{ refers,}$ represented very fairly the greatest pressure as deduced from the mean velocity for an hour. We have accordingly given in the appendix a table calculated from the above formula for deducing *maximum* pressures from observed velocities. In addition to the tables obtained from English, Irish, and Scottish stations, with are those only that are strictly applicable to our inquiry, we give as matter of information a summary of strong winds registered at stations on the Continent and in India.

"It will be seen, on reference to the tables, that the wind-pressures vary greatly at different stations. This, no doubt, mainly arises from difference of exposure of the stations to the action of the wind, in consequence of the geographical and local circumstances of their position, but may in some cases be partly caused by differences in the instruments used for measurement. Thus, at Glasgow, the highest recorded pressure per square foot is 47lb., while at Bidston, near Liverpool, the indicated pressure on one occasion amounted to 90lb., and on another occasion to 80lb. But the pressures at Bidston seem very abnormal, being much beyond what have been noticed at any of the other stations. The conformation of the ground on which the Bidston Observatory stands is such that the velocity of the wind there might be greatly intensified. It will be noticed in the lithographs that the records of exceptionally high pressures indicate a very brief duration. From inquiries we have made we are satisfied that these records are not referable to instrumental error, depending on the recording instrument being carried by its momentum beyond the position of equilibrium under the wind-pressure acting at the moment, but represent a real phenomenon. But whether the exceptionally high velocities to which such pressures are due extend over a considerable space in a lateral direction, or, on the other hand, are extremely local, is a point on which we have not been able to find experimental evidence.

"The differences of the wind-pressures observed at different stations lead us to consider whether there were any other modes of approximately ascertaining the force of the wind for our purpose. There are many buildings, tall chimneys, ship-building sheds, &c., which probably would not withstand pressures so extreme as those we refer to; but in most cases the contour of the adjoining ground, and the obstruction to wind by adjoining buildings, trees, and other surrounding objects, would render conclusions drawn from such cases unreliable. It occurred, however, to us that some useful information might be drawn from another source—viz., from railways themselves. It is obvious that on existing railways that have been long in use a series of experiments, if we may apply such an expression to them, have for many years been carried on, for over them trains have been running at all times of the day and night on high and unsheltered embankments and along other spaces exposed in many cases to very strong winds. Now, a wind-pressure varying from 30lb. to 40lb. per square foot is sufficient to overturn the ordinary railway-carriages that have been in use during the last 25 or 30 years, and we thought it useful to inquire from the different railway-companies for cases where railway-carriages have been overturned by the force of the wind. The only cases of this kind that have been brought to our knowledge are appended to this report.

"From the information thus acquired, from the inquiries we have made, and from the consideration we have given to the subject, we are of opinion that the following rules will sufficiently meet the cases referred to us:—

"(1) That for railway-bridges and viaducts a *maximum* wind pressure of 56lb. per square foot should be assumed for the purpose of calculation.

"(2) That where the bridge or viaduct is formed of close girders, and the tops of such girders are as high or higher than the top of

a train passing over the bridge, the total wind pressure upon such bridge or viaduct should be ascertained by applying the full pressure of 56lb. per square foot to the entire vertical surface of one main girder, only. But if the top of a train passing over the bridge is higher than the tops of the main girders, the total wind-pressure upon such bridge or viaduct should be ascertained by applying the full pressure of 56lb. per square foot to the entire vertical surface from the bottom of the main girders to the top of the train passing over the bridge.

"(3) That where the bridge or viaduct is of the lattice form, or of open construction, the wind-pressure upon the outer or windward girder should be ascertained by applying the full pressure of 56lb. per square foot, as if the girder were a close girder, from the level of the rails to the top of a train passing over such bridge or viaduct, and by applying, in addition, the full pressure of 56lb. per square foot at the ascertained vertical area of surface of the ironwork of the same girder situated below the level of the rails, or above the top of a train passing over such bridge or viaduct. The wind-pressure upon the inner or leeward girder or girders should be ascertained by applying a pressure per square foot to the ascertained vertical area of surface of the ironwork of one girder only, situated below the level of the rails or above the top of a train passing over the said bridge or viaduct, according to the following scale, viz:—

"(a) If the surface area of the open spaces does not exceed two-thirds of the whole area included within the outline of the girder, the pressure should be taken at 28lb. per square foot; (b) if the surface area of the open spaces lie between two-thirds and three-fourths of the whole area included within the outline of the girder, the pressure should be taken at 42lb. per square foot; (c) if the surface area of the open spaces be greater than three-fourths of the whole area included within the outline of the girder, the pressure should be taken at the full pressure of 56lb. per square foot.

"(4) That the pressure upon arches and the piers of bridges and viaducts should be ascertained as nearly as possible in conformity with the rules above stated.

"(5) That in order to insure a proper margin of safety for bridges and viaducts in respect of the strains caused by wind-pressure, they should be made of sufficient strength to withstand a strain of four times the amount due to the pressure calculated by the foregoing rules. And that, for cases where the tendency of the wind to overturn structures is counteracted by gravity alone, a factor of safety of two will be sufficient.

"With regard to the eighth paragraph of the report of the Select Committee on the North British Railway (Tay-bridge) Bill, to which you have drawn our attention, we beg to observe that where trains run between girders they will generally be sufficiently protected from the wind, the degree of protection afforded by the girders depending on the extent to which the girders are open or close; where the girders are so open as to afford insufficient protection, or where trains run, as in some cases they may do, on the tops of girders, we assume that the engineer will provide a sufficient parapet; but we are indisposed to go further into detail on this subject, as it might tend to stereotype modes of construction, which we think is undesirable.

"In conclusion, we beg to point out that the velocity of wind, like that of every other moving body, is more or less retarded by friction, and will be affected, therefore, by the character of the surfaces over which it has to pass, which may be rough, smooth, or irregular. It will follow, therefore, that, other things being the same, greater velocities will be attained at higher altitudes than at low ones, the wind at higher altitudes being further removed from retardation by friction. Though we are of opinion that no bridge or viaduct is likely to be built in such a situation as to expose it to wind-pressures equal to those which have been occasionally indicated by the disc on the Bidston Observatory, yet, even if that were possible, a bridge or viaduct constructed according to the rules we have given would not be subjected to strains nearly equal to its theoretical strength. On the other hand, there will be many structures of small altitude or in sheltered situations which never can be exposed to the wind-pressure we have assumed, and where the application of the rules we have given would require modification.

Some modification of the rules may also be required in the case of suspension or other bridges of very large span, but such cases will be of rare occurrence, and we recommend that they should be specially considered when they arise.

"We have the honour to be, Sir, your most obedient servant.

"JOHN HAWESHAU,
"W. G. ARMSTRONG,
"W. H. BARLOW,
"G. G. STOKES,
"W. YOLLAND.

"We, the undersigned, concur in the above report so far as it goes, but we think the following clause should be added—viz.:—

"The evidence before us does not enable us to judge as to the lateral extent of the extremely high pressures occasionally recorded by anemometers, and we think it desirable that experiments should be made to determine this question. If the lateral extent of exceptionally heavy gusts should prove to be very small, it would become a question whether some relaxation might not be permitted in the requirements of this report.

"W. G. ARMSTRONG.
"G. G. STOKES."

A NOVELTY IN RAILWAY-CONSTRUCTION.

THE Darjeeling Tramway or Himalayan Railway is a novelty in railway construction, and will be justly regarded as one of the engineering sights of India. In his speech at the opening Sir Ashley Eden claimed for the enterprise the merit of having "solved problems never before solved in the history of railway undertakings." "We know," he said "of no other line which ascends 7,400ft. in 50 miles, mounts gradients of 1 in 21, and comes round curves of 70ft. radius." The line is described as presenting to the eye the appearance of "a snake winding up into the clouds." The tramway, which is 50 miles long, enables the journey from Calcutta—361 miles—to be performed in about 24 hours. Its terminus at Darjeeling is 7,690ft. above the level of the sea. The capital of the Darjeeling Tramway Company is stated to have been raised entirely in India. The line was originally to have been completed within 18 months, but this period has been exceeded. The first rail was laid in May, 1879, and the contractors, Messrs. Mitchell Ramsay, succeeded in laying down the last between Jore Bungalow (7,800ft. of elevation) and Darjeeling (about 7,400ft.) in June last. The gauge is 2ft. The rails are manufactured of toughened steel, and about 24,000 have been used in the construction of the entire line. Sleepers are laid at intervals of 2ft. 6in., extra sleepers being laid below the rail-joints; altogether above 100,000 sleepers have been used up. Bearing plates have been placed under the outer rails of all curves of 120ft. radius and under, so as to preserve the rigidity of the outer rails. Taking the entire ascent, which commences at about the ninth mile from Silliguri beyond Lukna, at the edge of the Terai, the ruling gradient is 1ft. in 25, but in isolated steep places, the gradient is 1 in 20. From the ninth mile the line curves and recrosses the road frequently; as a rule, however, keeping to the in or hill-side of the roadway. The first distinct deviation from the ascending road occurs at a place locally known as either the Horse Shoe, the Trestle Bridge, or as Agony Point, where the line simply beetles over the edge of the *khud*, and where the trains for safety's sake slacken speed. Above Tendoria, at the nineteenth mile, the train passes through a narrow bridge and slowly describes a loop of some 640ft. in length and then recrosses the same bridge. From the loop onward the line gradually ascends, bearing away to the right, with the *khud* below to the right of the train; while on the left rises a crumbling steep hill-side, looking very threatening, with enormous boulders of disintegrated rock, some of which have already given much trouble to the line-watchers and authorities of the company. The line doubles to the leftward near Mahanuddy and its tea-garden, and then runs parallel, but in the reverse direction, above the road which the train has just traversed. The ascent continues gradually to Kurseong, some 5,200ft. above the sea, and thence onward past some

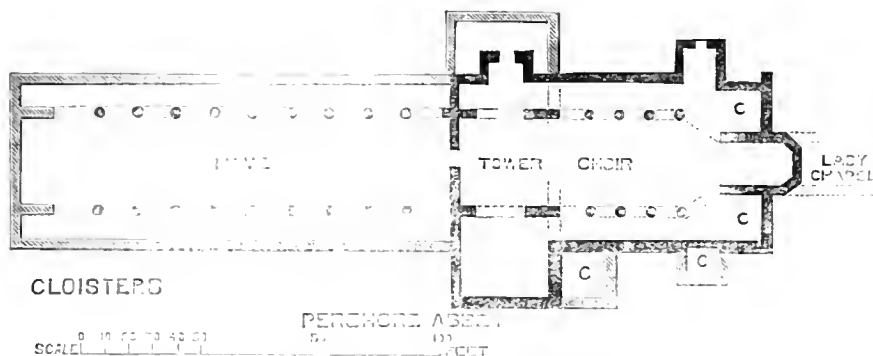
very troublesome and equally unsafe hill-sides towards Sonada. Thence on to Jore Bungalow. From Jore Bungalow the line descends from the saddle, circling round with deviations towards Darjeeling proper, which is reached in about seven hours, run through from Silliguri, provided no landslips or other obstacles bar the way. The engines at present used are tiny tank ones, the carriages like open tramcars of the roughest and most uncomfortable description. As regards the engines, they are just like ordinary level-line locomotives trusting in the descent to very powerful brakes.

THE ARCHITECTURAL ASSOCIATION AT WORCESTER.—III.

THE Abbey Church of the Holy Cross at Pershore was the first building visited by the Architectural Association excursion party on Wednesday, the 17th inst., when Mr. Aston Webb, in a few words, pointed out the several features and historical points of interest. The plan, which we give herewith, shows by the

on the site of the south transeptal Norman chapel is also gone. The present chancel apse is a very shocking specimen of modern building, the windows being about the most unhappily proportioned lancet windows we have ever seen. Sir Gilbert Scott's work in restoring the choir and tower is in every way conservative and good. The clearing away the ceiling in the Tower, and showing there the beautiful interior arcade and lantern, is a great improvement, though the curious diagonal-placed ringing-stage looks hardly in keeping. The tower-roof is an old one. The decoration at the west-end of the church is a good sample of Messrs. Clayton and Bell's work, and the choir-stalls were designed by Sir Gilbert Scott. The parish-church of St. Andrew's, hard by the Abbey building, is a quaint though sadly bewet and wretched structure now, though once evidently the work of a master hand. It was built by the Abbey of Westminster for the use of their Pershore tenants, in consequence of the feud between the two houses. Now that the Abbey Church is used for the Pershore parish, St. Andrew's is, in one sense, not wanted, the charity funds and other sums

illustrated the week before last. Norton Manor has a well-designed entrance gateway in stone, like the house, with delicate cornices and strings, and the main structure contains two or three very good examples of grouping. The adjoining barn and buildings complete a thoroughly Old English picture, backed as they are by the well-wooded slopes of Wolves or Woollers-hill. Unfortunately, the rain, which had gradually become more continuous, now came down in drenching style, and lasted throughout the remainder of the day. The visit, therefore, to the almost unique old timber church at Besford was much delayed, and sketching there was quite out of the question. The church consists of nave and chancel, south porch, and vestry. The main structure is entirely of wood construction, and in the restoration last year, Mr. Hopkins, the architect, has shown great skill. Every care was taken to replace all the timbers in their original position, and the interspaces have had the modern plasterwork removed, and enriched with plaster diapers, similar to those on Besford Court-house, and this work was executed by one man, and is very admirably carried out. The interior is a great success excepting the new east window, which, though said to be on the line of the old window, is too low for good effect. The richly-carved roof-loft has been lifted up somewhat and repaired, the old carvings being refixed and made good where wanting. The pulpit and lectern, like the nave-pewing, are new, the old high-pannelled pews being now used as a dado to the nave, with good effect. The old triptych is carefully preserved at the end of the Harewell monument. We hope soon to illustrate this very interesting church. The only other timbered church now remaining in the county is at Kington, and this building is as yet unrestored. The timber church of St. Lawrence, at Newlands, was taken down by Lord Beauchamp a few years ago, when Mr. Hardwick built the new stone church there. The old timber chancel was, however, rebuilt as a lych-house in connection with the surrounding almshouses and buildings. Besford Court-house was not seen as intended, the rain having delayed the proceedings so considerably. The transeptal tithe-barn was also missed. The Court-house retains the greater part of the ancient building erected in the reign of Henry VIII., but the timbers are now hidden by plaster and rough-cast. The old pewing at the church, now used there for the dado as already described, was taken from the court-house old staircase, which was removed to make room for the new wing of the mansion. The courtyard retains its old character, though in consequence of continued alterations there is not much of architectural importance to be seen there. Thursday's visit opened with a two hours' stay at Huddington Court, of which we give a view to-day from the drawing of the president, Mr. Aston Webb. This house has lately been de-poled of nearly all its interior fittings, which were till very recently in an almost complete state of preservation. They were taken down to be refixed in the proprietor's house elsewhere. Externally the building has been untouched since the days of Elizabeth, and is in every way an admirable specimen of a timber manor-house. It was the old moated manor of the Winters, who, owing to their connections with Gunpowder-plot, in 1606, were obliged to leave this residence, and have not resided here since. To this circumstance no doubt the escape of the house from alterations is due, and the recent removal of its internal woodwork, including the richly-treated chimney-pieces of oak, which bore the date of 1534, is much to be regretted. The building is enriched by the finest stack of elaborately-moulded brick chimneys to be found in the county, and the solid staircase, opposite the entrance, deserves mention. The church stands hard by, and it is certainly in a most abominable condition—dirty, neglect, and weather all actively combining in their work of destruction. That a church in this county should be allowed to remain in such a condition hardly seems credible. The chancel, for instance, is papered with some recent numbers of the *Worcester Chronicle*, and some of the pews are littered with straw like a stable. The responds of the Transeptal Chapel are covered with wet, green slime, and the font is grained with filth, and occupied by cherry-stones and a huge piece of rough rock. Not long ago, the church was rich



blackened-in walls the portion of the building now remaining, the etched-in parts indicating the original distribution of the chapels and length of nave. These were destroyed about the time of the Reformation. No less than six structures, more or less entirely new, have been erected upon the site of the present Abbey building, as may be seen by reference to the history and architectural proofs, which can be tested. The first church was by Oswald, nephew of Ethelred, King of Mercia; another by Egil Wulf; the third was by Odda; the fourth, built about the close of the 11th century. The fifth was of 13th-century date, consisting of the present choir, erected by Abbot Gervaise and his successor, and, lastly, the tower, which is of early 11th-century date, said by Sir Gilbert Scott to have been the work of the architect who designed Salisbury Cathedral spire.

A drawing of the upper stages of the tower, showing Sir Gilbert Scott's new pinnacles, was given in the "Spring Garden Sketch-book" some short time ago, and drawn by Mr. G. Gilbert Scott, M.A. The south transept at Pershore is probably the earliest part remaining, judging from the masonry and mortar-joints, though Mr. Penrose questioned the evidence alluded to. It is, however, to be observed that the chancel-arch at Wyre Piddle, which is considered the only true example of Saxon work, or rather ante-Norman work in the county, corresponds very singularly with the Pershore south transept arcade and masonry in question, and the work is said to be due to Duke Odda, about fifteen years previous to the Conquest. Mr. Fowler contended, at Tewkesbury, that the caps of the nave arcade there, like those seen on the responds of Pershore tower (which latter show what the nave arcade proportions were) were left as intended for carving, but this notion seems hardly to be correct, inasmuch as precisely the same detail is also given to the caps in every exact particular, both here, at Tewkesbury, and at Glaston, as well as in Great Malvern Abbey, the Glaston work being that of Abbot S. Rio, and dedicated in 1109. Comparative plans of Glaston, Tewkesbury, and Pershore are given in a paper published a few years ago by Mr. Hopkins, in the "Associated Architectural Societies' Reports." Nash gives the length of the Norman nave to have been 180ft. The Early English Lady-chapel no longer remains, and the Decorated chapel built

being equally distributed with those of the mother church. In its present condition it is a disgrace; but the question of dealing with such a building is by no means an easy one to treat with, as the one church is now equal to the needs of the parish, while the income from both livings is not sufficient to allow of its being divided. The party were here photographed by Mr. J. L. Robinson, architect, of Dublin, who, throughout the excursion, took views of the buildings visited, in the same notable way that he did last year, about 130 photographs being thus secured. A new wooden lych-gate, of poor design, has just been erected, under the direction of Mr. Woodyer, architect. The Manor House of Pershore, which we illustrated last week, at Broadway, near Gresham, about ten miles from the Abbey itself. The building is now used as cottages. Leaving Pershore by a beautiful drive along the incline of Bredon Hill, the party soon reached the romantic situation occupied by Woollas Hall, the estate once held by Sir Richard de Mueghros, who left a memorial of his piety here by erecting a chapel in the reign of Henry III., and which he dedicated to St. Catherine. No traces of this building remain, though Mr. Thomas Drew, R.H.A., who conducted the excursionists over the present Hall, thought some of the walls might contain part of the chapel referred to. The house contains a beautifully proportioned hall, with its richly-carved Jacobean screen and gallery over, while the double-storied bay at the other end of the apartment gives size and dignity to the whole. The fronts are constructed of stone, and the house is of admirable design, with a good entrance porch, which bears the date of 1611. A chapel was formed in the upper bedrooms, but is now used for the latter purpose. Some very fine lead stackpipes heads remain of rich workmanship. Mr. Hunsford-Flood, the present proprietor, received the party, and a hospitable tea was provided forthwith by his daughters. The house contains some fine old furniture. The drawing-room is at present incongruous with the rest of the house, but we understand that a new wing is likely soon to be added from the designs of Mr. Drew: a view, showing this was exhibited at the last exhibition of the Dublin Academy. Norton Manor House, now used as a farm-residence, is situated, like the last-named building, in the parish of Eckington, the church-tower of which we

with painted glass, but this was destroyed or stolen. The over-grass-grown churchyard has no pathway, and the grass in the well-detailed old timber porch bears no imprint of worshippers' feet, while the deal form on which an harmonium is balanced against the altar-rails runs right across the chancel, and suggests the idea that the altar, with its moth-eaten cover, can very seldom be used. The archdeacon attended to meet the excursionists, and though he admitted the scandal, seemed hardly equal to the task of bringing about a better state of things. A little soap-and-water and a comparatively small sum judiciously expended in repairs would restore this interesting little building. As it is, such a church is a disgrace to the Church of England. The living is a rectory, and is held with that of Crowle, which church was restored not long ago by Mr. Preedy, after it had been allowed to remain in such a state as to nearly fall down. Mere Hall, of which we gave a little view last week, was now reached, and a most hearty welcome was awarded to the excursionists by the hospitable proprietor. The house is in Hanbury parish, and is reached through a notably fine avenue of ancient elm-trees. The entrance front faces the park, and is separated from it by a fine pair of elaborately-wrought iron gates, brought here from Hanbury Hall. Two well-designed and quaintly-roofed summer-houses of Queen Anne character occupy the corner of the quadrangle, one on either side of the large gateway. The building is very much done up, being very black and white, and a good portion of the rear buildings, built by Mr. M. Habershon in 1828, are in brick, painted over in white and black, to imitate timber-framing, and the carpenter's Gothic sashes hardly do justice to the taste of the author of the best-known book on "Timber Houses." The row of five gables, with range of small windows, form a notable feature in the front elevation, and these seem original. The date below of 1336 is evidently a redistributed use of the same figures. Leaving Mere Hall by one o'clock, a sharp drive of an hour's length brought the excursionists to Droitwich, an uninteresting and smoky town, celebrated for its saltworks.

St. Peter's Church, outside the town, was the object of the visit, but beyond the quaint Elizabethan monument in the south transept, there is little of interest. The chancel arch, however, has mouldings in it similar to those in the crypt of Worcester Cathedral, upon which we remarked last week. The church was re-peared in 1825, and restored by Mr. P. C. Hardwick in 1853. A short stay only was made here, as two hours were next to be occupied in seeing and sketching the celebrated mansion of the Pakingtons at Westwood Park. We gave three views of the house and its gateway in our last number. The main or central block of the house was erected by the "Lusty John Pakington" of Queen Elizabeth's Court, and was used as a shooting-lodge and banqueting-house, the residence of the family being at Hampton Lovet, built in Henry VIII.'s time. Originally, a small Benedictine Priory stood here in connection with the Abbey of Ponteverault, dedicated to the Blessed Virgin, but Henry VIII. gave the place to the first Sir John Pakington, who died worth no less than thirty-one manors. The four towers or wings at the angles, which form now so conspicuous a portion of the mansion, were added at the Restoration.

The position of the angle pavilions with reference to the older square plan presents some difficulty of communication between the rooms, the large central hall, which is 60ft. long, being also at a lower level than the apartments in the towers. The English Renaissance Portico is perhaps the best detailed part of the fabric, which, in other respects, is rather coarse in scale. The original roofs to the towers, with their series of small dormers, have given way to those of lower pitch which we now see, and these latter lose much of their character by the use of large blue slates, which quite destroy the scale. The two detached garden towers which remain of the four built opposite the angle pavilions, have the original quay-shaped small slates, much to their advantage. The gate-house, of which Nash, in his "Mansions of the Olden Times," gives a view, is of the same period as the main building; but modern stables have taken the place of the old ones. The house contains much rich tapestry and elaborate decoration, with many fine old pieces of furniture and historical paintings. The chapel is cold and bare, neglected

and never used. Of the mansion and its surroundings, to quote Nash, "the richness of the wood, combining with the stateliness of the edifice, forms a picture of ancient magnificence unequalled by anything in this country." The church and Court-house at Salwarpe concluded the buildings visited on Thursday—

"High on a grassy hill the old church stands,
Apart from human dwellings, grandly lone;
Eternal vigil o'er the valley lands,
Keeps the grey tower of lichen-covered stone."

The chancel was rebuilt by Mr. Pickering, of Durham, in 1848, and the roofs were renewed in 1857. Mr. Preedy has also done some work here, including the erection of the south porch; and Mr. Hopkins improved the chancel in 1864. The manor or court-house is a large half-timbered building, now used as a farmhouse. The entrance-door and bargeboards figure in Habershon's "Half-Timbered Houses," where a view of the charming bay at the end of the house is hardly done justice to. The house is situate on the banks of the Salwarpe, and it was here that Richard Beauchamp, Earl of Warwick, was born, 1361.

On Friday morning the excursion party were graciously entertained to breakfast at Madresfield Court by Earl and Countess Beauchamp. The greater portion of the house is nearly new, and is the work of Mr. Hardwick, though some parts of fairly-designed Tudor remain. The mansion is surrounded by a moat, and is approached by a drawbridge, and is considered by Parker, in his "Domestic Architecture," to have originally inclosed the outer bailey of a castle of much greater extent. The church hard by, within the park, is a well-designed building, with tower and spire, by Mr. Preedy. The beautiful entrance-lodge is one of Mr. Norman Shaw's characteristic works, and so is the charming pigeon-cote or tower adjoining the farm-buildings. The new stone church of St. Lawrence, already referred to, built from the designs of Mr. Hardwick, was next visited at Newlands, and its elaborate and well-executed decoration, executed by Messrs. Clayton and Bell, formed a striking contrast to the church at Huddington Court seen yesterday. Great Malvern and Little Malvern churches were next seen, and here two hours were well spent at the former celebrated building (of which we shall give some particulars when we record the visit of the Archaeological Association held there this week) when Mr. Hopkins read a paper on the fabric. The day concluded by a visit to Ledbury, where the old timber market-house, which stands detached at the end of the street, forms so important a feature. We gave some carefully-measured drawings of this building a short time ago by Mr. E. J. May. The old Grammar School and St. Catherine's Hospital were also seen, as well, of course, as the spacious and important church of St. Michael. The tower and spire, like the one at Bosbury, are quite detached from the church, the spire being of good proportion and erected during the middle of the last century. The chancel is Norman, of 1080 date, arcaded only half of its length, the wide gable-roofed aisles, of late 14th-century work, being continued as chapels on either side, with a large hagioscope on the north side, the angle of which seems to indicate that the high altar originally stood several feet from the east wall. The chancel arcade is curious, inasmuch as the square bases or plinths are much higher than the cylindrical columns which they support. The circular clerestory windows occur over the piers. The fine south arcade to the nave is of good Early 15th-Century style, and that on the north is a poor copy of it, erected in the early part of the 17th century. The Decorated north transept, or baptistery, was very badly restored by Sir Gilbert Scott in 1852, when the present dreadful glazing was inserted. There is a good marble tomb in the chancel, with a handsome canopy, and series of figures dated 1631. The west front is of Early English date, with Transitional doorway and side turrets, giving a cathedral character to the building. Mr. Richard Coad is about to restore the north aisle, and it is to be hoped that the hideous gallery there, and the opera-box pew of the Biddulphs, will then be removed. The final dinner of the excursion was held on Friday evening at the "Star" Hotel, Worcester, the headquarters of the party, when the usual toasts were recorded.

On Saturday, the proceedings concluded by

visits to the churches of St. Andrew (illustrated by us a year or so since, and cleverly restored by Mr. Aston Webb), St. Alban's, in Fish-street, and the new Church of Holy Trinity, at Shrub Hill, built from the designs of Mr. Hopkins. We publish a drawing to-day, giving a section of the Guesten Hall roof, as rebuilt over this church.

The Guildhall, of which we also give a drawing, was likewise seen. It was built from the designs of Thomas White, a native of Worcester, who served his apprenticeship to a stone-cutter in Piccadilly, and afterwards became a pupil of Sir Christopher Wren. He also assisted in the preparation of the plans and drawings for St. Paul's Cathedral. The Guildhall was erected in 1721 at a cost of £3,727, the wings being built some few years later. The building, after a series of competition squabbles and reports submitted by Mr. Waterhouse and Sir Gilbert Scott, Mr. Hopkins and Mr. Day, Mr. Rowe, the City surveyor, and Mr. Bidlake, was restored by Mr. Henry Rowe in conjunction with Sir Gilbert Scott, R.A., the wings being entirely rebuilt. These latter are not quite like those shown in our drawing, which gives them as at first designed by Sir Gilbert Scott. In execution a less number of windows have been used. Mr. Dixon was the contractor, and the cost of the restoration was about £22,000. Mr. W. H. Letheren, of Cheltenham, restored the beautiful iron entrance-gates.

THE STONE FOR TRURO CATHEDRAL.

A MEETING of the Truro Cathedral committee was held last week at Bishop Phillpott's Library, Truro, for the purpose of receiving a report as to the stone to be used in the building of the Cathedral, to sanction progress, to instruct the architect and invest in him such powers as might be necessary and proper. The report of Col. Cocks and Mr. Warrington Smyth, who have been engaged for several weeks past, with the assistance of Mr. Bubb, the clerk of works, in making investigation as to the relative merits of various stone quarries in the county, including Polyphant, in the parish of Lawanick; Tartendown, in the parish of Landrake; the two quarries of Wild Duck, in Wendron; Garlain, also in the parish of Wendron; Pentewan; Lantewy, in the parish of St. Neot, and also at some granite-works in Penryn, was presented. The object of this investigation was to assist Mr. Pearson in the selection of stone best suited for the building of the Cathedral. A conversation took place as to the desirability of publishing this report at present; but under all the circumstances it was thought better to withhold its publication for a few weeks until the committee held another meeting, at which both the Earl of Mount Edgcumbe and the Bishop of the Diocese may be present, and the matter more fully discussed. The committee recommended certain varieties of Cornish granite and elvans for use in the exterior and interior walling, as well as the introduction of other Cornish stone in some interior details; but any final decision is deferred until the next meeting which will probably be held in about six weeks. In the mean time the architect has been authorised to proceed with the building of the crypt up to the floor of the choir with the material now in use, the exterior wall being of granite. Rapid progress is now being made with this work, the walls and most of the piers being already up to the springing for the vaulting of the crypt; but there is sufficient work in hand to keep the architect and men fully engaged until the committee again meet, and definitely determine the question of the stone to be used in the building of the Cathedral.

A merchants' house is being erected at Royal Exchange-place, Dundee, from the designs of Mr. J. Murray Robertson, architect, of that town. The contracts, which amount to about £1,800, have been let as follows:—Masonry, Mr. Alexander Duncan; joinery, Messrs. W. and R. Brownlee; plumbing, Mr. David Brown; slating, Mr. Storrer; plastering, Mr. Ovenstone; glazing, Messrs. Lindsay and Scott; and iron columns and girders, Mr. David Keay, Hillbank Foundry.

Mr. Brannon, C.E., of Westminster, is making preliminary surveys for a projected line of railway to connect the watering-places of Walton-on-the-Naze and Harwich.

CONTENTS.

The Battle of the Traps	253
Cables and their Treatment	253
Plaster-Work	254
The Sunlay Society's Loan Exhibition	254
The Water Question.—XV.	255
The British Museum and Architecture	256
The British Archaeological Association at Malvern	257
Wind-Pressure on Railway Structures	260
A Novelty in Railway Construction	261
The Architectural Association at Worcester.—III.	262
The Stone for Truro Cathedral	263
Our Lithographic Illustrations	264
Newcastle-on-Tyne	264
The New North Dock at Liverpool	264
Specifications	277
Malogany	277
Carleion	277
Practical Notes on Plumbing.—XI.	278
Tests for Stones	279
Motifs for Panel Decoration	279
The American Society of Civil Engineers	279
Somersetshire Archaeological Society	279
Our Commonplace Column	280
Competitions	281
Building Intelligence	281
To Correspondents	281
Correspondence	281
Intercommunication	283
Parliamentary Notes	283
Legal Intelligence	283
Water Supply and Sanitary Matters	284
Stained glass	284
Our Office Table	284
Tenders	285

ILLUSTRATIONS.

NATIONAL HOSPITAL FOR THE DEFORMED.—OLD WROUGHT-IRON GATES, &c., GUILDHALL, WORCESTER.—THE OLD GUESTEN HALL ROOF, WORCESTER MONASTERY.—HUDINGTON COURT HOUSE.—THE GUILDHALL, WORCESTER.—CHATEAU IN THE ALBAN SLA.

OUR LITHOGRAPHIC ILLUSTRATIONS.

NATIONAL HOSPITAL FOR THE DEFORMED, GREAT PORTLAND-STREET.

OUR illustration, taken from the drawing in the last Academy Exhibition, shows the building for the deformed about to be erected in Great Portland-street, and extending in rear to Bolsover-street, designed by Mr. George Vigers, 4, Fredricks-place, Old Jewry. The brickwork of the two fronts will be gauged-work: the walls of the internal areas will be faced with glazed white bricks. The roofs of the two street blocks will be covered with Broseley tiles, the connecting wing being kept at a lower level and covered with lead, and will have a surrounding rail supported on strong balusters. The plans show the accommodation provided. The wards and other rooms are to be heated with Galton's ventilating stoves. Cold fresh air is to be taken to the rooms by flues under the windows and other convenient places, and discharge from upright pillars with regulating covers. Flues, alongside the smoke flues, are provided for the extraction of vitiated air. The builders are Messrs. Colls, Moorgate-street.

WORCESTER GUILDHALL FENCING.

THE whole of the ornamental portion has been repolished, the old being past repair. The old work has been correctly copied, and the character kept up. It is no doubt the finest specimen of Old English ironwork in existence. The repolished work is worked in a peculiar manner from sheet-iron one-sixteenth thick, and the edges being turned down to make it look considerably thicker. The shields have the city arms worked in relief. These are new. The old ones were in cast iron. The scrollwork on top of piers is new, and replaces the old sheet-iron ones, and are so arranged to carry lamps, which was not in the original. The whole of the work has been carried out under the direction of Mr. Rowe, architect, Worcester.

HUDINGTON COURT HOUSE.—THE OLD GUESTEN HALL ROOF, WORCESTER.—THE GUILDHALL, WORCESTER.

THESE sketches are described in our concluding report of the excursion of the Architectural Association on p. 2.

CHATEAU IN THE ALBAN SLA.

FROM the site of this building, magnificent views are obtained over the island-dotted sea and the

mainland of Asia Minor; but, "though every prospect pleases," it is a land of earthquakes, and unfortunately, the works at the chateau have been suspended, owing to the dreadful calamity which has recently fallen upon the district. The building is intended for the residence of an English lady of exalted rank. It is to be built of local white stone, the hall, staircase, &c., being lined and paved with marbles. The hall is a large apartment about 25ft. high, with panelled ceiling, having galleries on two sides, giving access to the rooms surrounding it on first floor, and to the turret staircase leading to roofs, &c. With the exception of sanitary apparatus, painted windows, &c. (which will be supplied by English firms), the whole of the work will be executed by native labour. The architect is Mr. Edwin T. Hall, A.R.I.B.A., of 57, Moorgate-street, London.

NEWCASTLE-ON-TYNE.

A GREAT scheme of town improvement is now being carried on at the east end of the town by the Corporation of Newcastle. The aim of its promoters has been to bring the rising traffic of the east end into more direct communication with the centre of the town, and to open out for the inhabitants of the increasing villages lying at the riverside between Newcastle and North Shields more convenient thoroughfares in their entrance to and egress from Newcastle than they have hitherto possessed. The formation of three new streets or roads to branch off from a thoroughfare commencing at Pilgrim-street, comprises the main portion of the Corporation project, and about three months ago the task of property-demolition was commenced. The route of the new roads will extend from Pilgrim-street, at a spot a little to the south of the Royal Arcade, over the Manor Chare, past the front of the Jesus Hospital, and to a distance beyond the Skew Arch underneath the railway company's lines. Here a junction of roads will be formed, the principal one of which will run in a south-east direction to the south side of Sallyport Gate, at the foot of the Causey Bank, where it will join the present New Road and the head of the Milk Market. The second road will run in an easterly direction to Melbourne-street, and will form a straight thoroughfare from the Skew Arch to the spot near which the newly-erected Church of St. Cuthbert now stands; while the third road—which may be properly classed as a branch one, will extend in a north-east curve from the junction to the arch nearly immediately underneath the Manors Station, and leading into Trafalgar-street. The work extends over 63 acres of ground, and considerable progress has now been made by the contractor. A viaduct of thirteen arches will be made from Pilgrim-street to the Manor Chare. This will be built of brick and stone, and already a portion has been constructed. The road will be carried over the Manor Chare by means of an iron arch about 18ft. high, 50ft. wide, and with a span of 45ft. The contractor for the scheme is Mr. C. W. King, of Gateshead, who has at present about 300 hands hard at work at various parts of the route, and the engineer is Mr. Alfred M. Fowler, borough engineer. The total cost of the undertaking—including the purchase of old property, the erection of the viaduct, buttresses, and the carrying out of the entire scheme, is estimated at £112,000. The whole of the roads are to be 50ft. wide throughout, and are to be fully completed according to contract in November next year. The work is one of the greatest engineering undertakings ever commenced in Newcastle, and the growing demand made for mere quay room and the contemplated establishment of a foreign-cattle sanitarium at the Ouseburn by the Council should, it is thought, cause the new thoroughfares in the future to rank amongst the busiest and most thriving in Newcastle. Building-sites for shops and other business premises will be provided all the way from Pilgrim-street on the south side to the Milk Market, on a level with the new road to that place, and on each side of the other road, from the Skew Arch to Melbourne-street, similar provision will be made. Both of these circumstances, it is anticipated, will in time improve the rateable value of the town to a considerable extent, and ultimately amply repay the present investment.

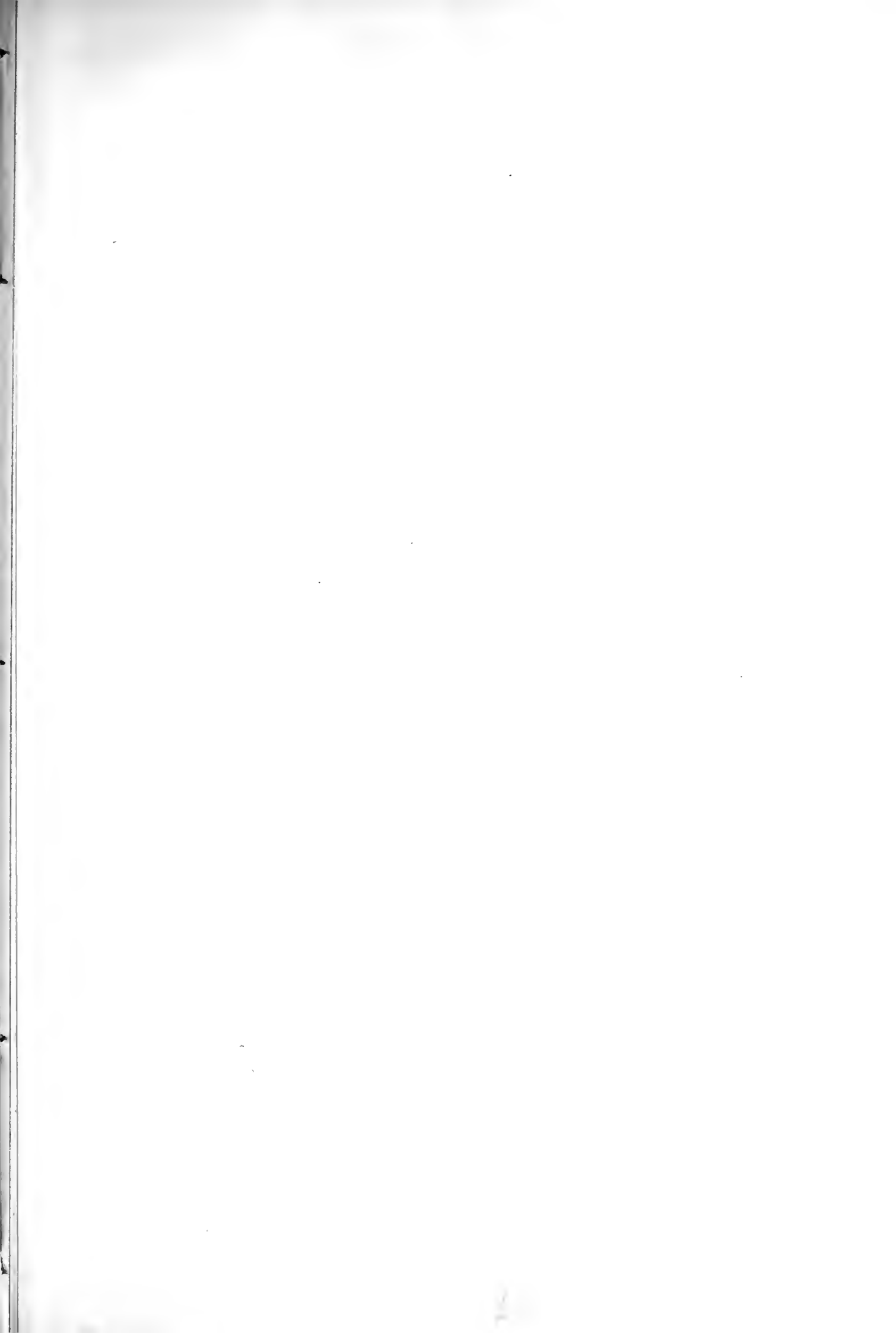
THE NEW NORTH DOCKS AT LIVERPOOL.

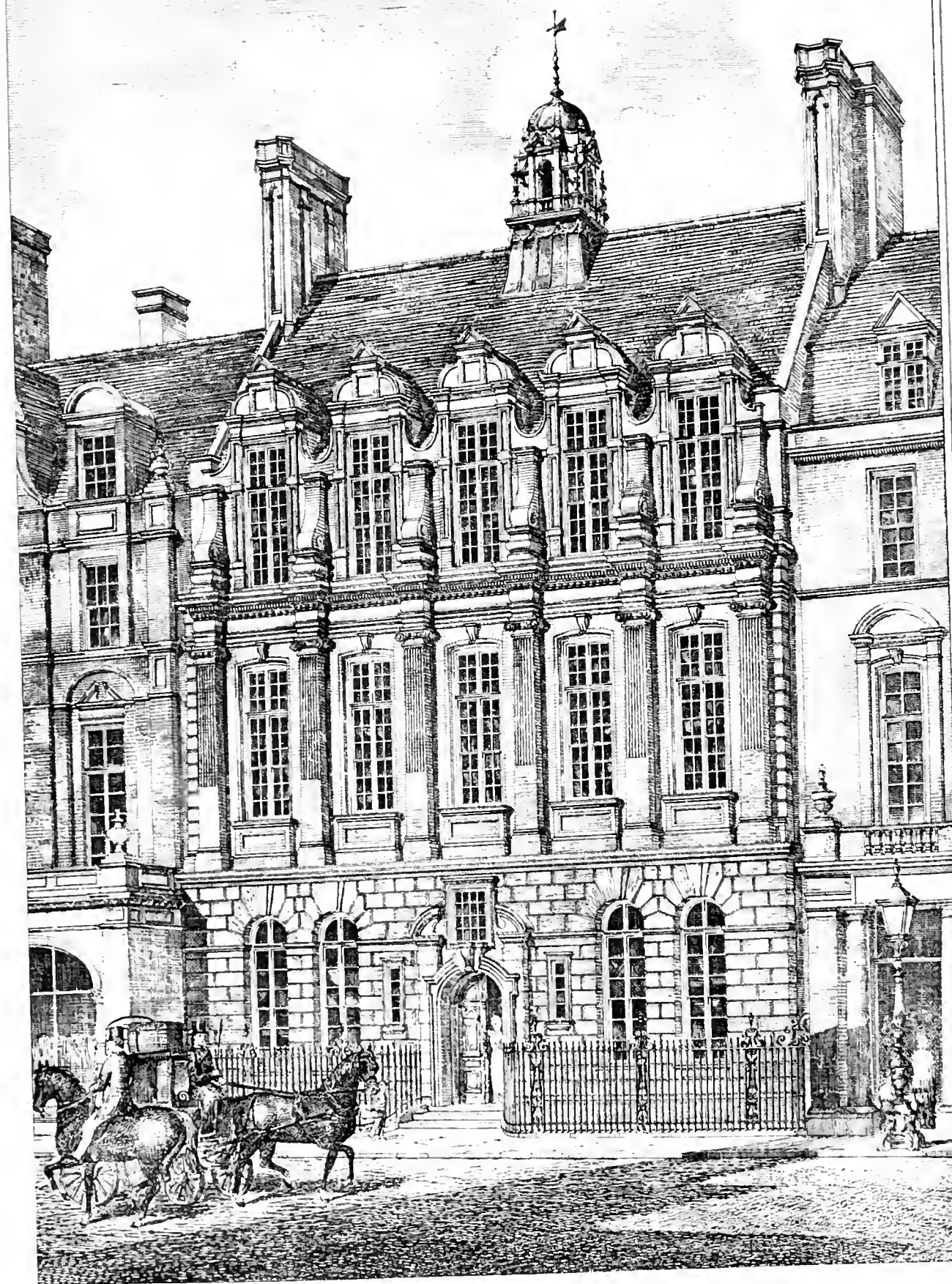
THE new docks, which the Prince of Wales is to open on the 8th prox., are situate to the north of Liverpool, in the borough of Bootle, and at the estuary of the Mersey, immediately facing the Rock Fort and the village of New Brighton. The works were commenced in October, 1873. The scheme consisted of an enlargement and alteration to the form of the present Canada basin, with a double entrance 65ft. on its north side, leading into a half-tide dock of 18 acres. This dock is formed somewhat in the shape of the letter L, and from its eastern extremities, or the top of the letter, there runs a branch dock of three acres, and two graving docks of 950ft. each in length. These are subdivided by intermediate gates into lengths of 500ft. and 450ft. respectively, and are provided with powerful pumping machinery of the Turbine type. This half-tide dock also communicates, by means of a passage 50ft. in width, with the Brocklebank dock. In its north-west angle a double passage, 60ft. in width, leads to the steam-dock, which is specially adapted for the requirements of the largest class of steamers which frequent the port. The form of this dock is somewhat peculiar, the design being particularly adapted to the trade in question, which requires a minimum of water-space, combined with a maximum of quay. The main body of the dock, 1,600ft. in length, and 50ft. in width, runs parallel to the river, and at right angles to this portion run three branches in an inland or easterly direction, averaging about 1,370ft. in length, by 300ft. in width. The total area of this dock, with its branches, is 43 acres, and the lineal quays are 11,000ft. All the quays will be flanked by sheds 95ft. in width, and on the west quay of the half-tide dock called the Langton dock, there is a shed 1,500ft. in length, and 80ft. in width, as well as one of 900ft. in length, and 96ft. span, on the north quay of the Langton branch. On the north side of, and leading out of, the steam dock, by a passage 50ft. wide, is another dock of 18 acres, capable of affording accommodation which it may be found desirable to locate here. The most interesting features in the design and construction of these works are, doubtless, connected with the construction of the main entrances. In order to maintain the approaches and sills of these entrances free from the silty matter with which the troubled waters of the Mersey are heavily laden, a gigantic system of sluicing has been carried out, which presents many entirely novel features, and is probably quite unique in the history of hydraulic engineering. As an instance of its magnitude, the dimensions of the feeding culverts may be mentioned. The largest of these are 15-ft. by 13-ft., and 12-in. by 12-in., while at the depth of 15ft. below the level of low water of spring tides, as many as four lines of pipes, 8ft. in diameter, have been laid, which will enable the sluicing power to be brought to bear on all portions of the basin, no matter how far from the side walls. Over four and a half million cubic yards of material have been excavated, and 450,000 tons of gravel or shingle; 75,000 tons of Portland cement were employed in the concrete work, and six and a half million bricks were used in the erection of sheds and other buildings. The available depth of water at the main entrance is 33ft. The aggregate area of water-space is 82 acres, and the total lineal quays 20,000ft. The Parliamentary estimate for the scheme was £2,691,000.

The Duke of Devonshire will visit Carlisle on the 6th prox. to lay the foundation-stone of the new grammar-school about to be erected at a cost of £10,500.

The modern parish church of Clacton-on-Sea was consecrated on Wednesday week after enlargement by the addition of two transepts, chancel, vestry, and organ-chamber. About 200 additional sittings have been provided. The east window is filled with stained-glass, by Messrs. Clayton and Bell, of Regent-street, London; the subject is the Lord's Supper. Ventilation is provided on a new principle suggested by Dr. Wallace, of Colchester. The alterations have been carried out under the direction of Mr. John B.ys, by whom the chancel and chancel-arch are to be decorated in colour when funds permit.

The Derbyshire Archaeological Society, numbering about 80 members, visited on Saturday week Chesterfield, Bolsover Castle, and Hardwicke Hall.





Third Floor

Measuring
over 5

A detailed architectural floor plan of the second floor. The plan shows a central corridor with several rooms branching off. On the left side, there are rooms labeled '10', '11', '12', and '13'. On the right side, there are rooms labeled '14', '15', '16', and '17'. The central corridor is labeled '18'. The plan also shows various doors, windows, and structural elements like walls and columns.

Polson et al. • 2003

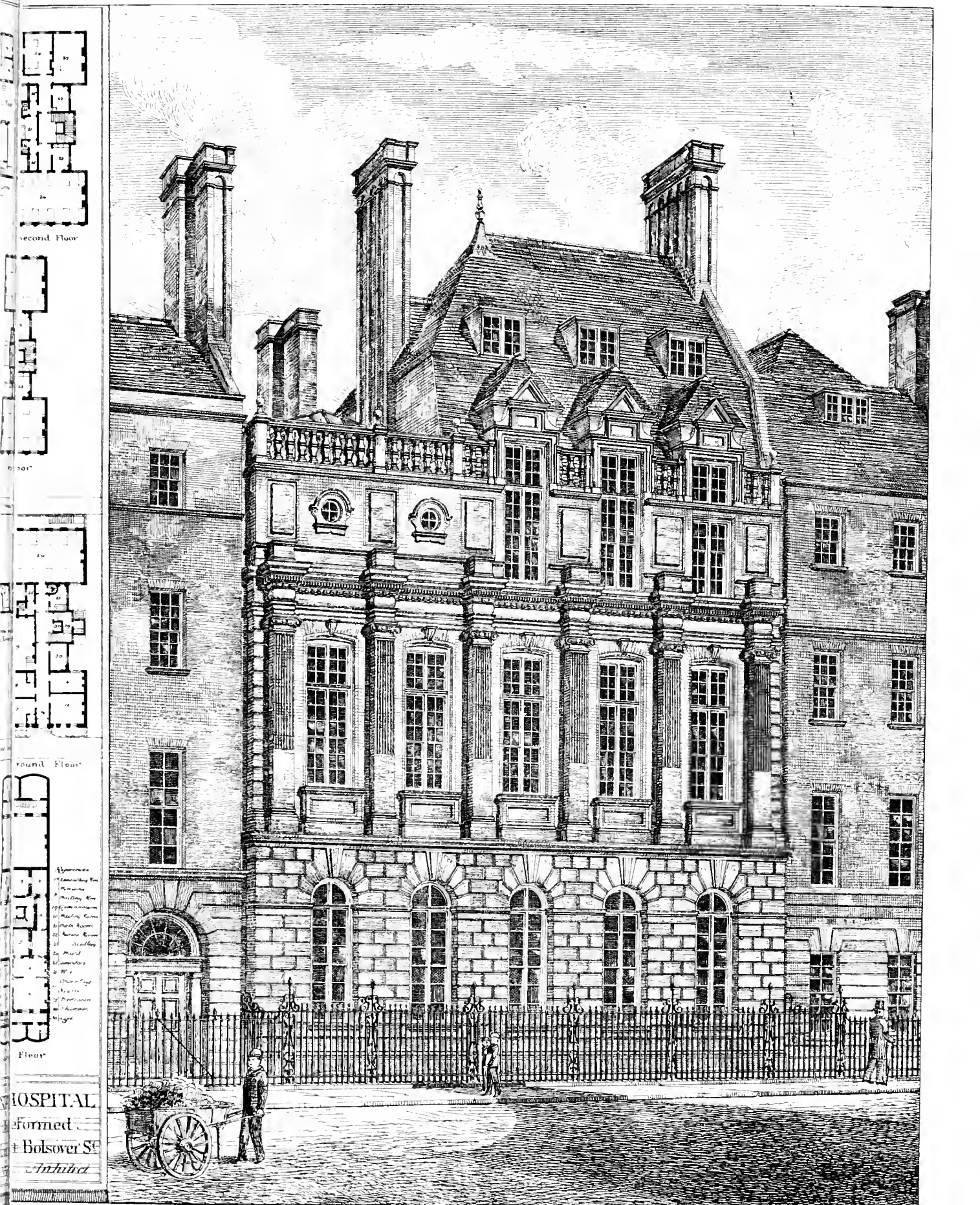


Bath & West of England Society

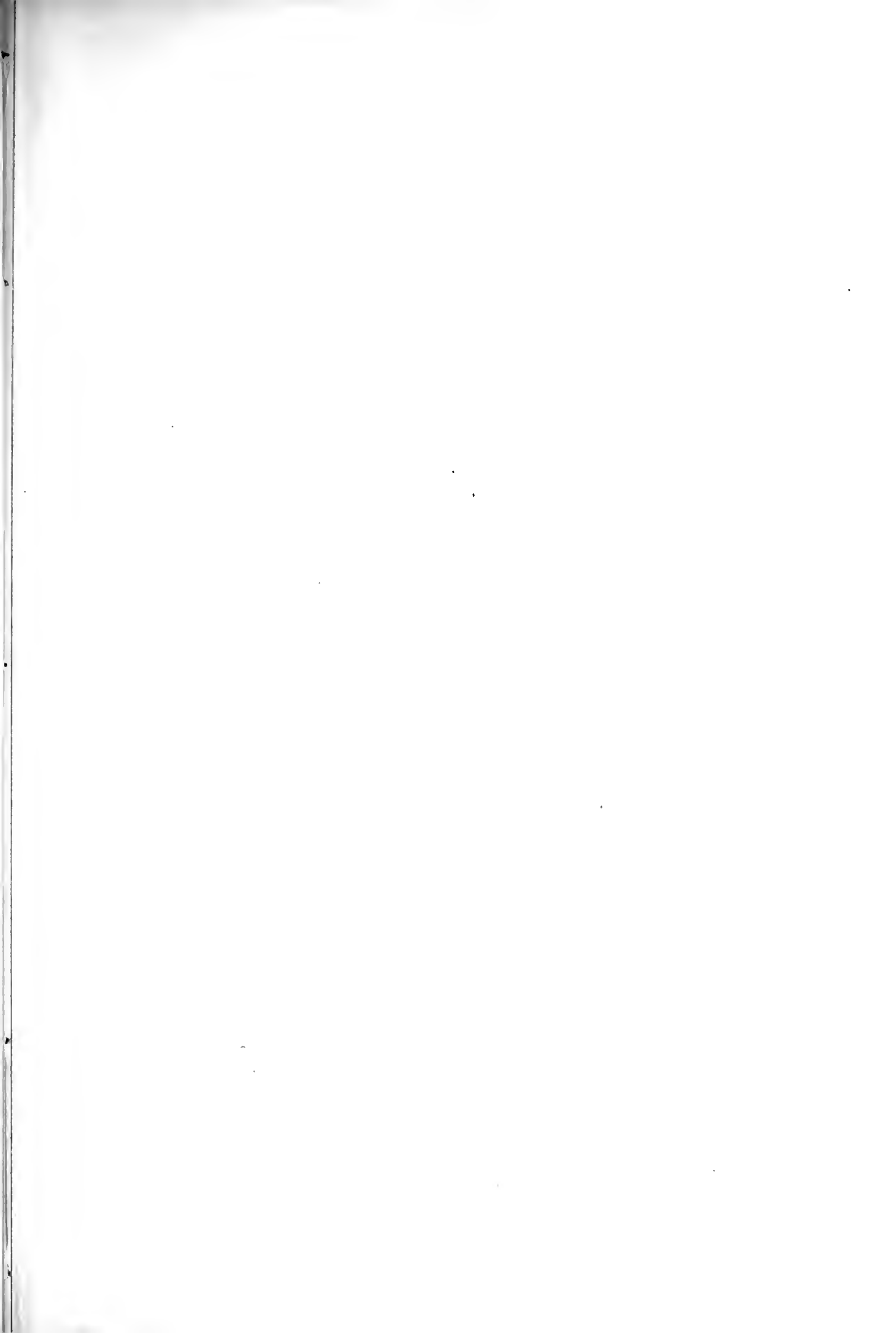
64. *Prothyma* *gracilis*

1. *Amphispiza bilineata*
 2. *Amphispiza bilineata*
 3. *Amphispiza bilineata*
 4. *Amphispiza bilineata*
 5. *Amphispiza bilineata*
 6. *Amphispiza bilineata*
 7. *Amphispiza bilineata*
 8. *Amphispiza bilineata*
 9. *Amphispiza bilineata*
 10. *Amphispiza bilineata*
 11. *Amphispiza bilineata*
 12. *Amphispiza bilineata*
 13. *Amphispiza bilineata*
 14. *Amphispiza bilineata*
 15. *Amphispiza bilineata*
 16. *Amphispiza bilineata*
 17. *Amphispiza bilineata*
 18. *Amphispiza bilineata*
 19. *Amphispiza bilineata*
 20. *Amphispiza bilineata*
 21. *Amphispiza bilineata*
 22. *Amphispiza bilineata*
 23. *Amphispiza bilineata*
 24. *Amphispiza bilineata*
 25. *Amphispiza bilineata*
 26. *Amphispiza bilineata*
 27. *Amphispiza bilineata*
 28. *Amphispiza bilineata*
 29. *Amphispiza bilineata*
 30. *Amphispiza bilineata*
 31. *Amphispiza bilineata*
 32. *Amphispiza bilineata*
 33. *Amphispiza bilineata*
 34. *Amphispiza bilineata*
 35. *Amphispiza bilineata*
 36. *Amphispiza bilineata*
 37. *Amphispiza bilineata*
 38. *Amphispiza bilineata*
 39. *Amphispiza bilineata*
 40. *Amphispiza bilineata*
 41. *Amphispiza bilineata*
 42. *Amphispiza bilineata*
 43. *Amphispiza bilineata*
 44. *Amphispiza bilineata*
 45. *Amphispiza bilineata*
 46. *Amphispiza bilineata*
 47. *Amphispiza bilineata*
 48. *Amphispiza bilineata*
 49. *Amphispiza bilineata*
 50. *Amphispiza bilineata*
 51. *Amphispiza bilineata*
 52. *Amphispiza bilineata*
 53. *Amphispiza bilineata*
 54. *Amphispiza bilineata*
 55. *Amphispiza bilineata*
 56. *Amphispiza bilineata*
 57. *Amphispiza bilineata*
 58. *Amphispiza bilineata*
 59. *Amphispiza bilineata*
 60. *Amphispiza bilineata*
 61. *Amphispiza bilineata*
 62. *Amphispiza bilineata*
 63. *Amphispiza bilineata*
 64. *Amphispiza bilineata*
 65. *Amphispiza bilineata*
 66. *Amphispiza bilineata*
 67. *Amphispiza bilineata*
 68. *Amphispiza bilineata*
 69. *Amphispiza bilineata*
 70. *Amphispiza bilineata*
 71. *Amphispiza bilineata*
 72. *Amphispiza bilineata*
 73. *Amphispiza bilineata*
 74. *Amphispiza bilineata*
 75. *Amphispiza bilineata*
 76. *Amphispiza bilineata*
 77. *Amphispiza bilineata*
 78. *Amphispiza bilineata*
 79. *Amphispiza bilineata*
 80. *Amphispiza bilineata*
 81. *Amphispiza bilineata*
 82. *Amphispiza bilineata*
 83. *Amphispiza bilineata*
 84. *Amphispiza bilineata*
 85. *Amphispiza bilineata*
 86. *Amphispiza bilineata*
 87. *Amphispiza bilineata*
 88. *Amphispiza bilineata*
 89. *Amphispiza bilineata*
 90. *Amphispiza bilineata*
 91. *Amphispiza bilineata*
 92. *Amphispiza bilineata*
 93. *Amphispiza bilineata*
 94. *Amphispiza bilineata*
 95. *Amphispiza bilineata*
 96. *Amphispiza bilineata*
 97. *Amphispiza bilineata*
 98. *Amphispiza bilineata*
 99. *Amphispiza bilineata*
 100. *Amphispiza bilineata*

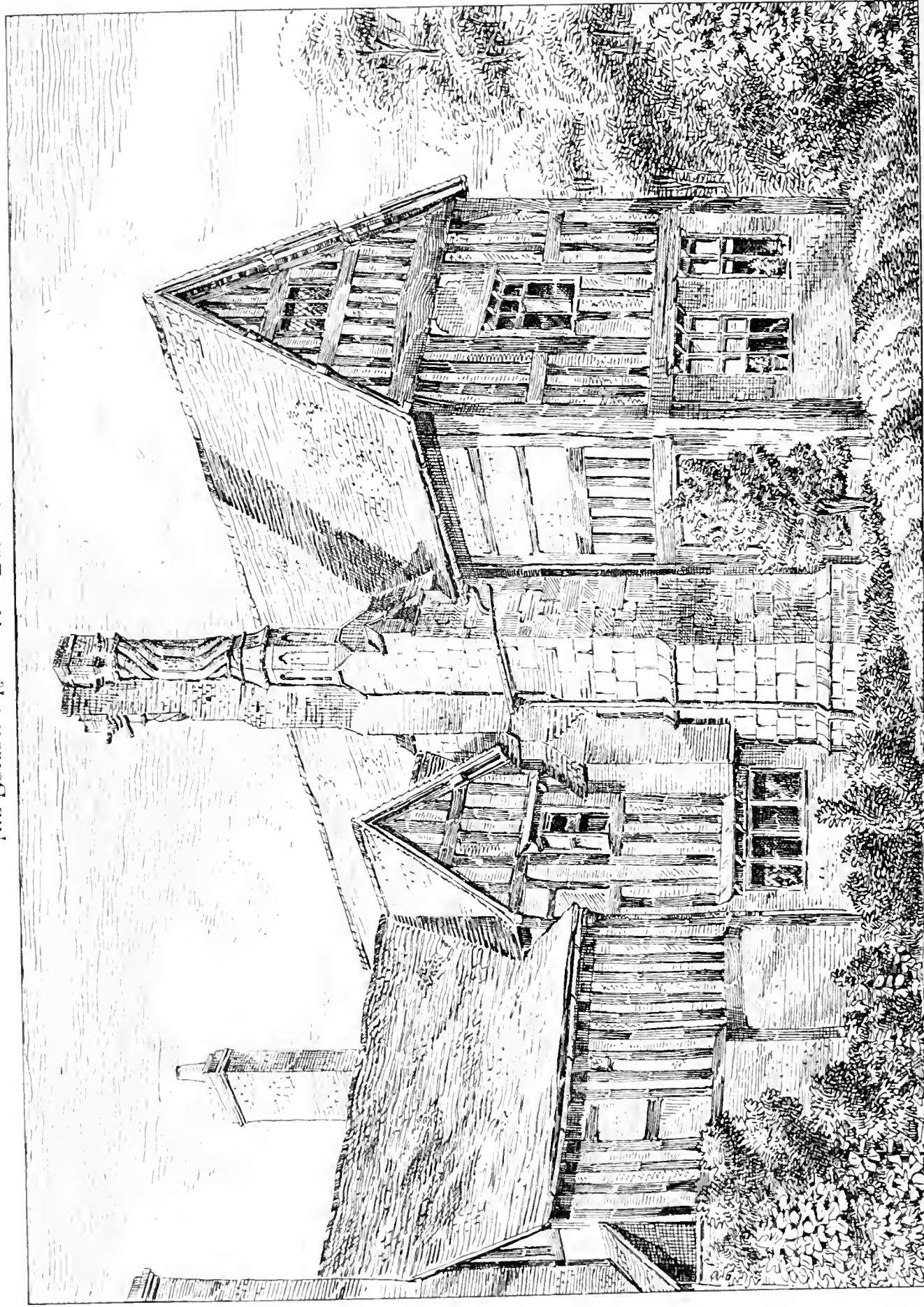
NATIONAL
For
G. Portland
Gen: 2







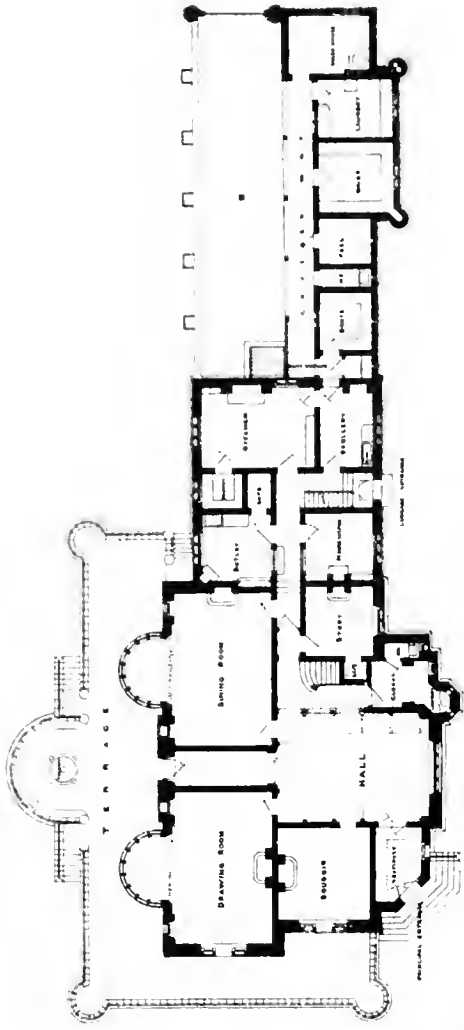
THE BUILDING DEWS. AUG. 26, 1881.



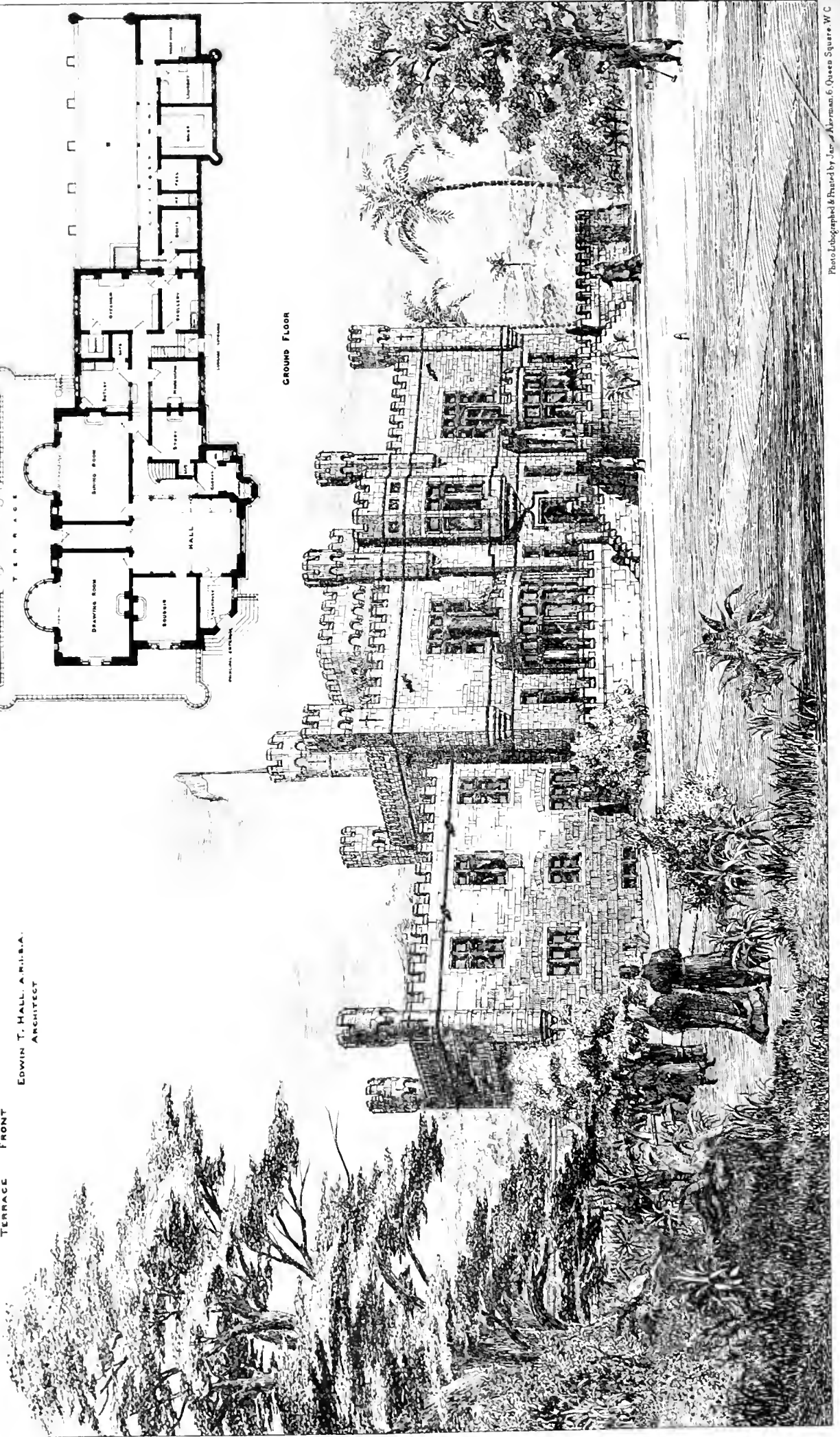
THE BUILDING DEWS. AUG. 26. 1881.

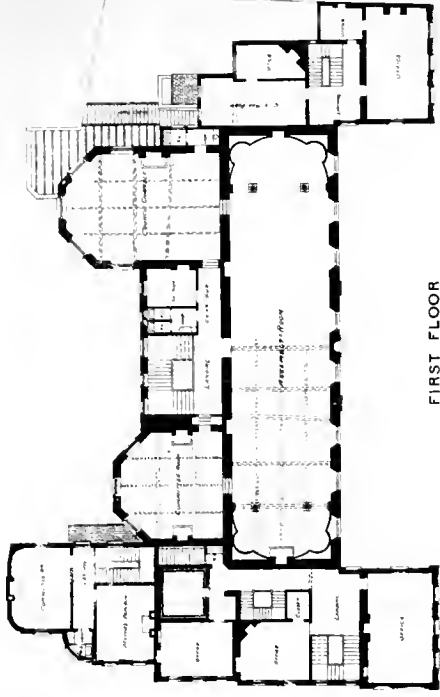
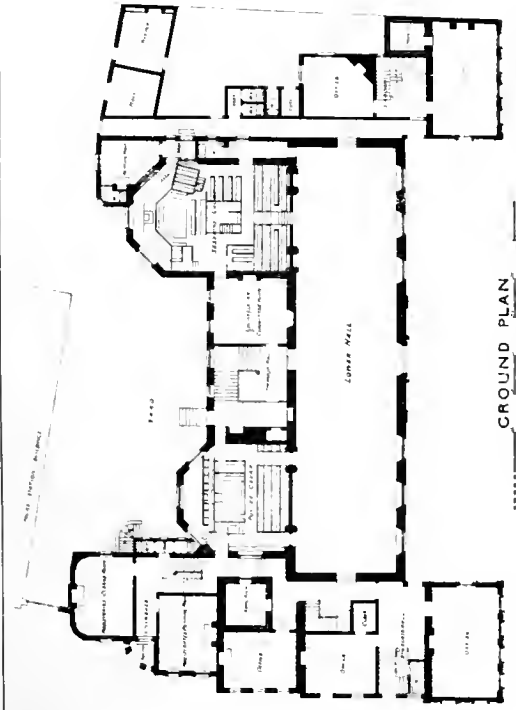
CHATEAU IN THE AEGEAN
TERRACE FRONT

EDWIN T. HALL, A.R.C.B.A.
ARCHITECT

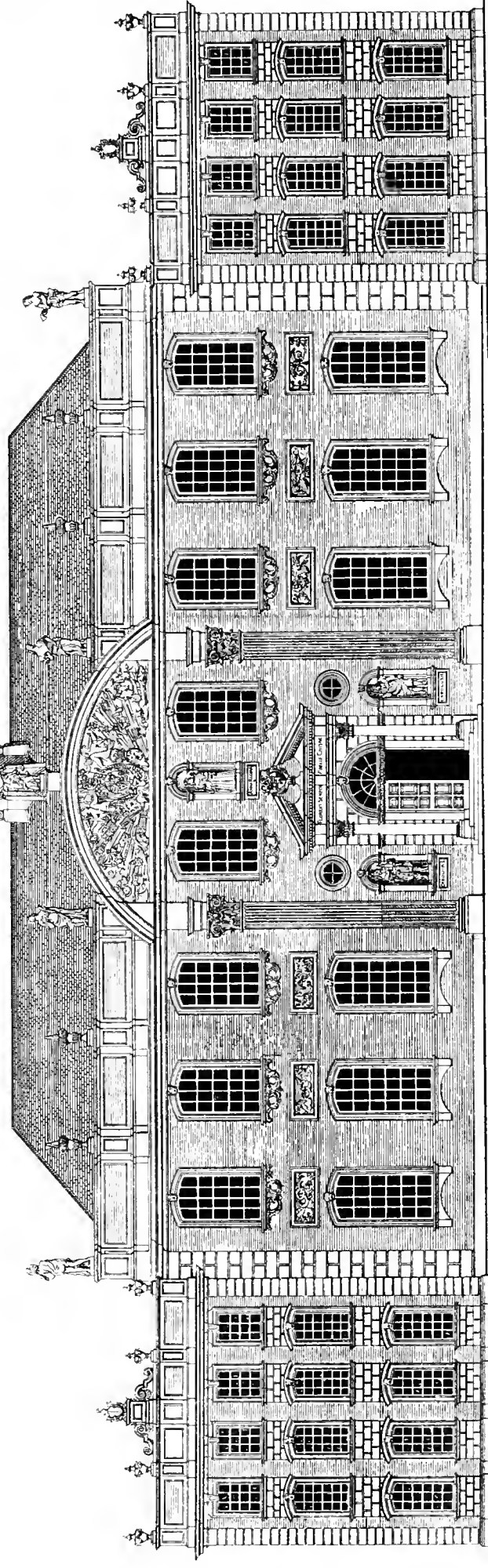
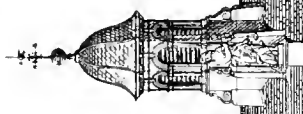
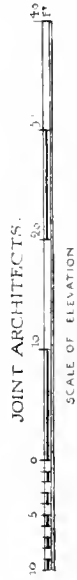


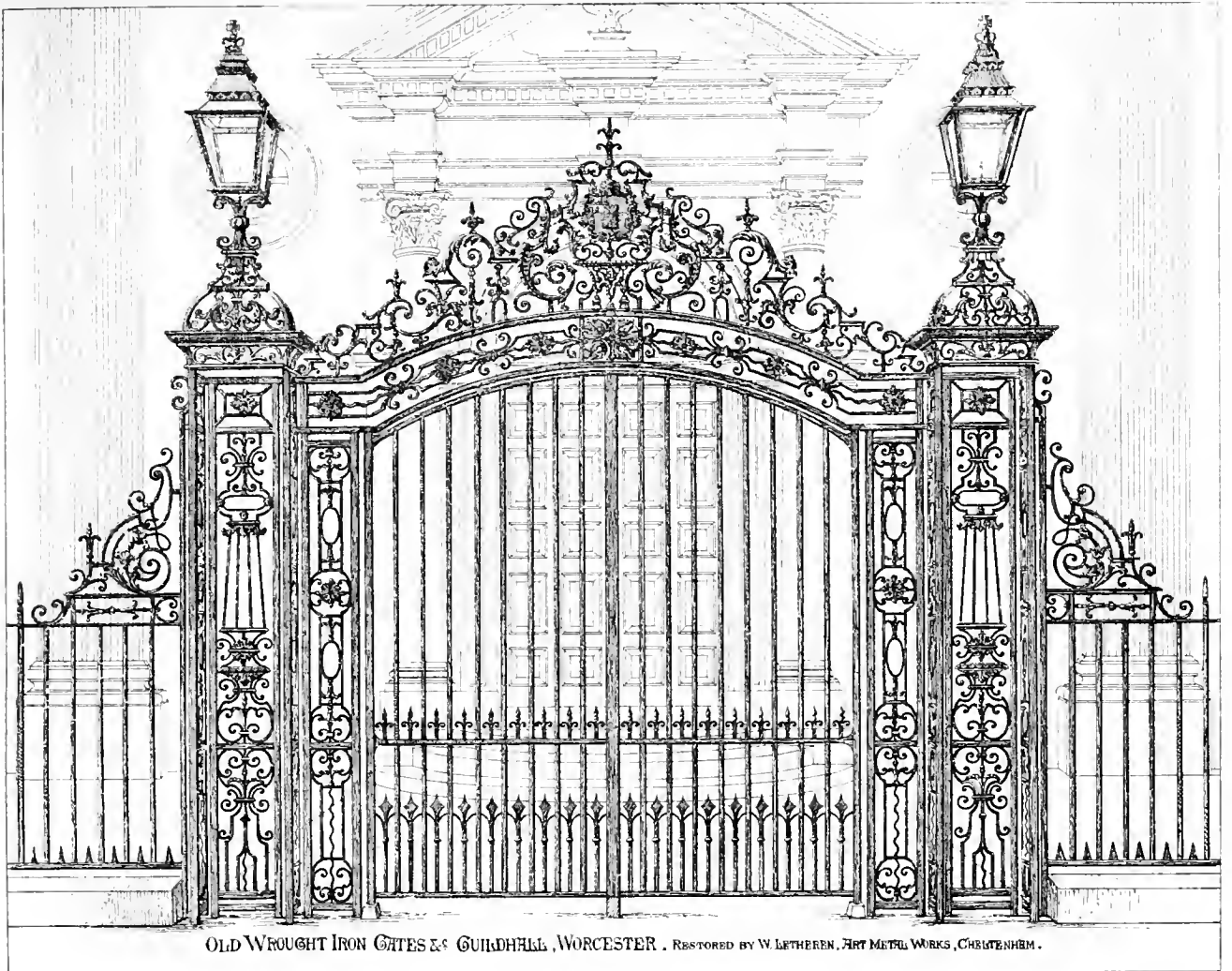
GROUND FLOOR





THE GUILDHALL, WORCESTER
 THOMAS WHITE (PUPIL OF WREN) ARCHT 1721
 RESTORATION AND ADDITIONS 1880
 SIR G. GILBERT SCOTT, R.A. & H. ROWE CITY ARCHT.



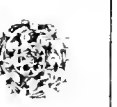
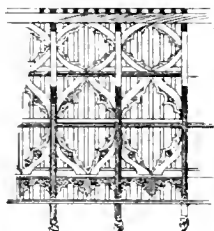


WORCESTER MONASTERY THE OLD GUESTENHALL ROOF

REBUILT OVER HOLY TRINITY CHURCH SHROUB HILL

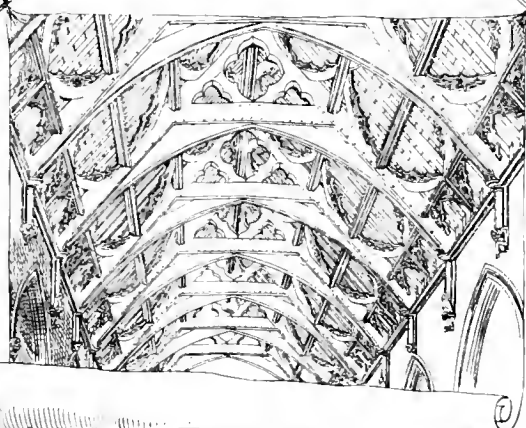
W. J. HOPKINS FRIBA. ARCHT.

— ALSO —
BOSSES & CARVINGS FROM
THE (OLD) BISHOPS PALACE
(DRAWN BY SIDNEY VACHER)



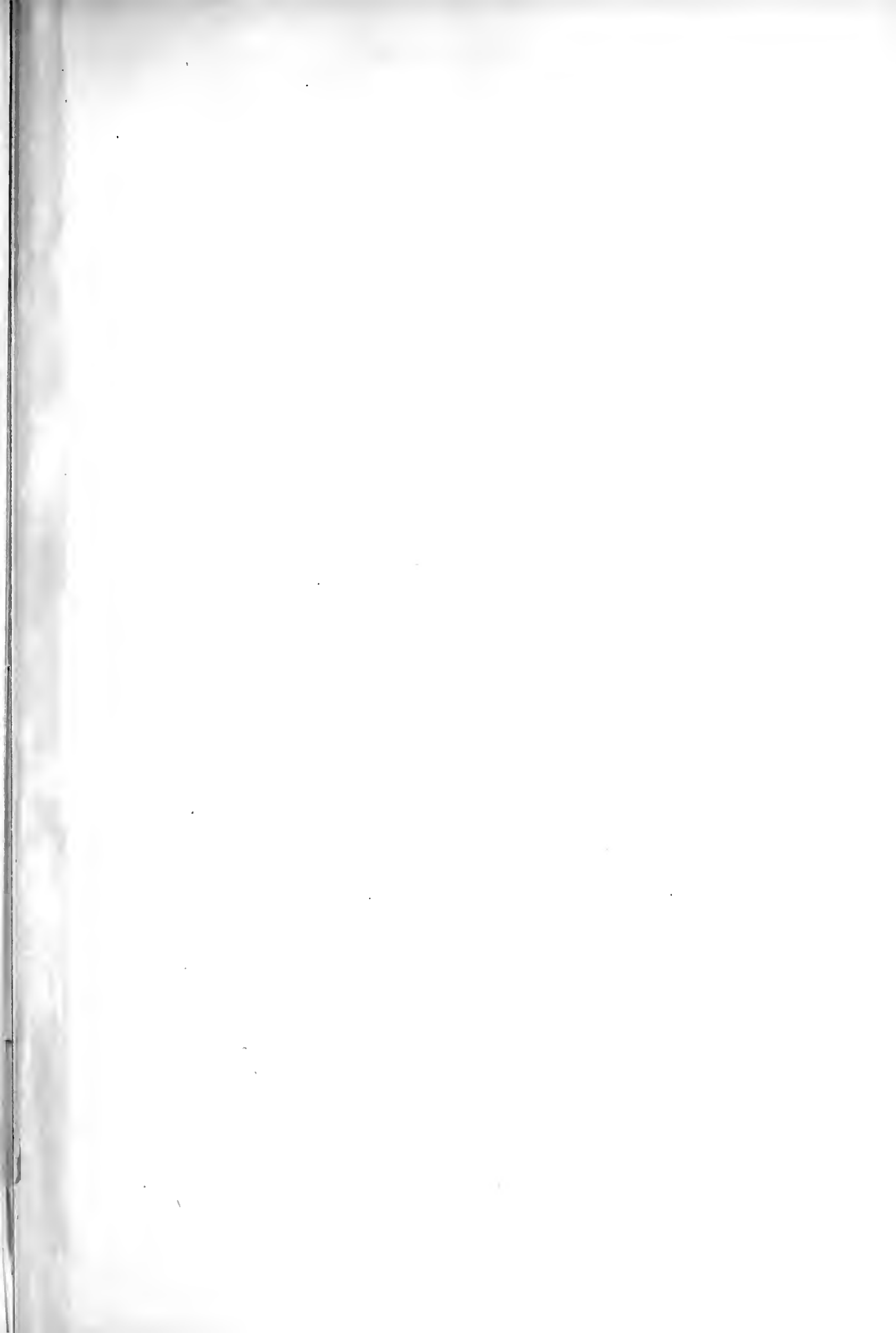
Note:

LENGTH 65' 4" HEIGHT TO WALL PLATE 36' 11"
WIDTH 34' 3" FROM DITTO TO RIDGE 19' 6"
TOTAL HEIGHT OF HALL 55' 6"



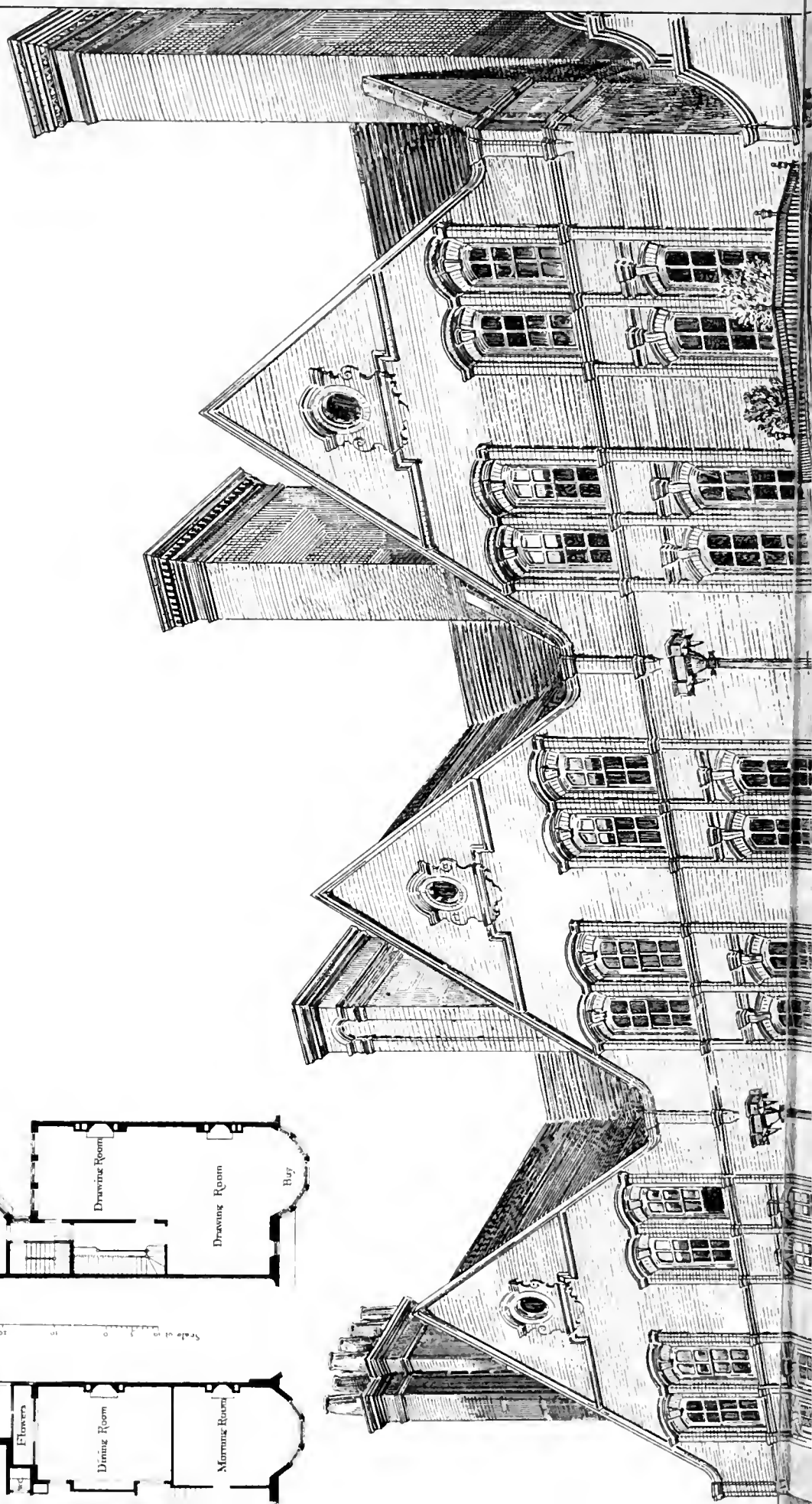
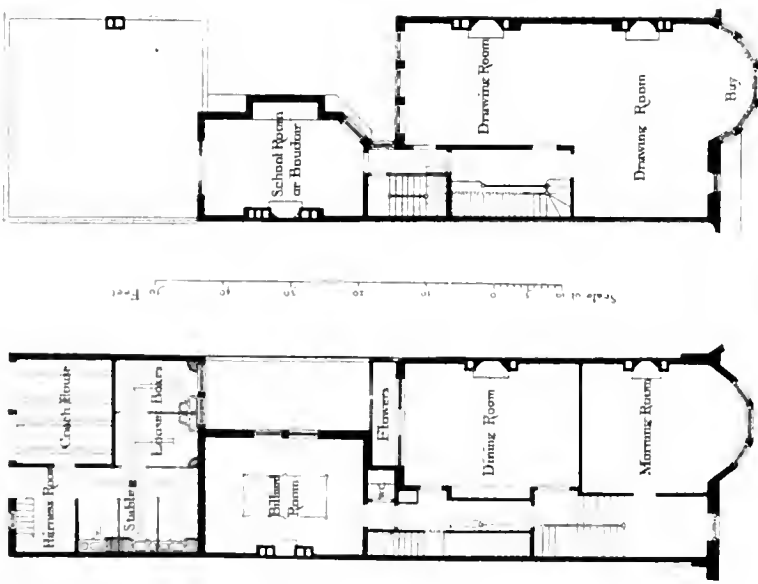
"A-A"
EXCURSION
1881

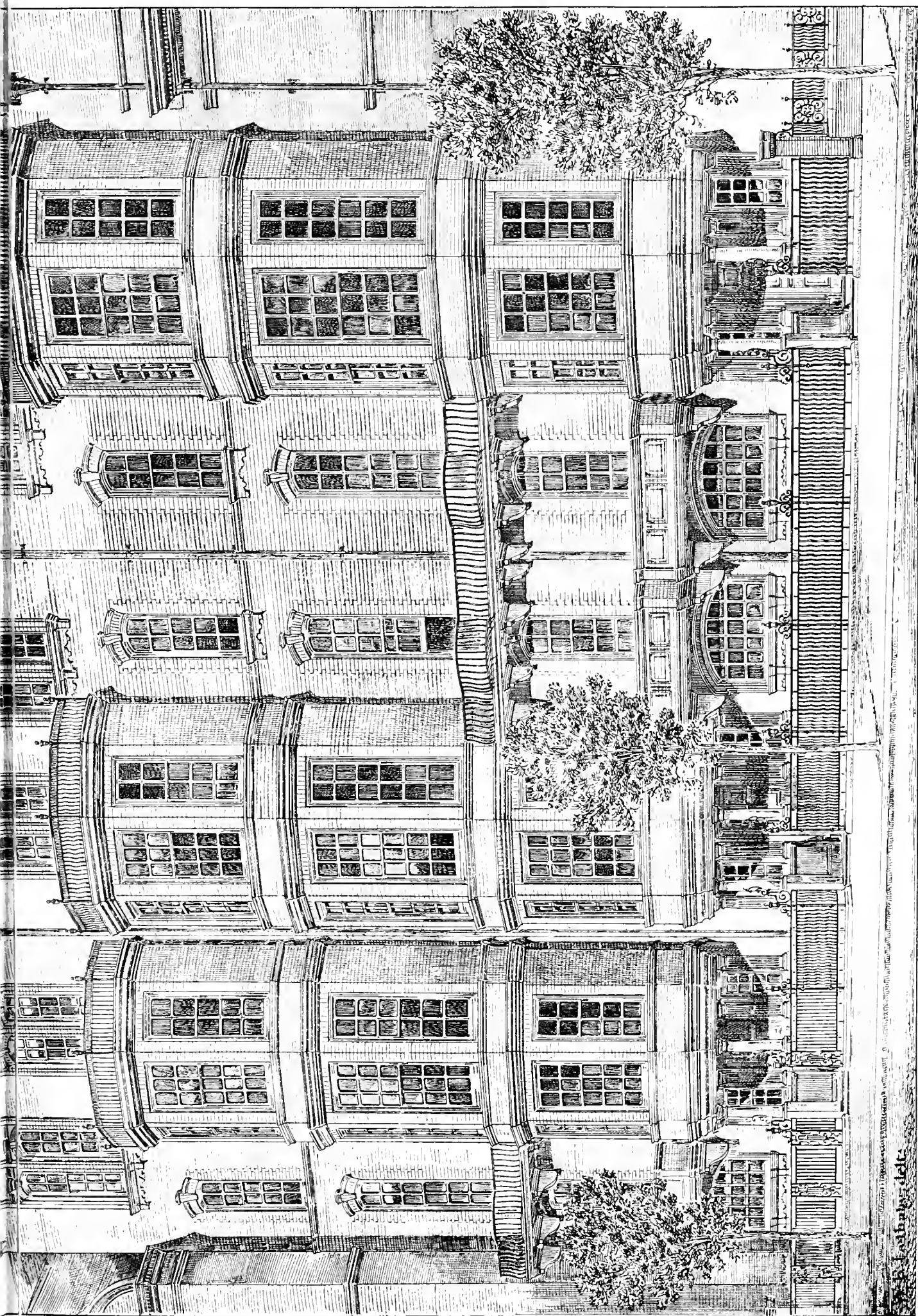




Three Houses on the Chelsea Embankment

R. Norman Shaw R.A. Architect





SPECIFICATIONS.*

LAST week we noticed a work illustrating a large scale details of house-building by Messrs. Palliser, Palliser, and Co., of Bridgeport, Conn., U.S.A., and we now draw attention to a work on "Specifications" prepared by the same firm. This work consists of printed forms, and includes articles of agreement between contractor and proprietor, with blank forms for filling up a bond; forms of specifications of materials and labour for masons' and bricklayers' work, carpenters, painters, slaters, plumbers, tinners, gasfitters, and engineers' work. Looking over the form of agreement, we find the usual conditions of contract introduced, and these are pretty full and clearly stated, though not in the usual terms found at home. As regards payments to the contractor, these are enumerated, and there is a provision appended to the effect that the certificates do not exempt the contractor from the liability to replace work if it be afterwards discovered to have been done ill, or not in accordance with drawings and specifications. The clause referring to the joint effect of the specification and drawings runs thus:—"That the specifications and drawings are intended to co-operate, so that any works exhibited in the drawings and not mentioned in the specifications, or *vice versa*, are to be executed the same as if mentioned in the specifications, and set forth in the drawings to the true intent and meaning of the said drawings and specifications." The third article relates to additions and alterations. It gives the proprietor the power to make any change without injuriously affecting or making void the contract; the difference for omitted work is to be deducted from the amount of contract by a "fair and reasonable valuation"; and for additional work required the amount is to be agreed upon before commencing additions, and such agreement is to state extension of time (if any) to be granted by reason thereof. The 6th article says: "No new work of any description done on the premises, or any work of any kind whatsoever, shall be considered as extra unless a separate estimate in writing for same before its commencement shall have been submitted by the contractor to the superintendent and the proprietor, and their signatures obtained thereto." Day-work accounts to be delivered to the proprietor during the week following that in which the work may have been done. These clauses are sufficiently binding, and are improvements upon many of similar import we have seen. Each trade has its own specification, a plan which has many advantages over the ordinary English mode of including the various trades in the same general specification. In each case a list of drawings is prefixed with general conditions. All drawings, writing, interlineations, figures, and details are taken as part of and as illustrating the specification; and it is stated "where figures are not given, the drawings must be accurately followed, according to their scale." Further directions state that, on the plans, blue designates stone, red brick, and yellow wood, and that the drawings and specifications are the property of the architect, and must be returned to him at completion of the work. The general conditions prefixed to each trade, requires the contractor to furnish all labour, materials, and apparatus required, to provide the best description of materials, and to remove all rejected; not to underlet the work without consent; and to be responsible for all violations of law, official notices, damages to property, &c. The items of masons' work include excavations, stone and brick footings, whitewashing, ironwork and brickwork, drains, &c. We find mention is made of hollow walls, and these are described to be tied together by iron-cramps set in every 6th course, and about 2ft. 6in. apart. The Carpenters' specification is very full and complete. Framing is particularly described, and the roofing and scantling are given with much detail. We meet with a few terms like "sheathing," "clapboarding," "lumber," which are not familiar to readers of English specifications. The fittings are pretty complete in their enumeration, though a great deal is left to the drawings. Elevators, electric bells in connection therewith, hand-lift or dumb-waiter, refrigerators, clothes-shoot, burglar alarms, telephones, and every modern appliance are included. We fail to see any provision made for disconnecting the drains, though ventilating-

pipes to the soil and waste-pipes, with ventilating caps, are specified, and also 1½ in. pipes from the top of all traps in the building to upright pipes. Steam heating is also described. Each specification is intended to be signed by the owner and contractor, and witnessed. As an *aide memoire* for architects and surveyors in writing specifications, or in preparing quantities, these outline forms will be found useful, and the young architect will derive instruction from their perusal. The price of the whole book is only 2s.; the sheets are printed only on one side, and the whole bound at the narrow edge in paper covers, with tape for rolling up.

MAHOGANY.

THERE is perhaps no wood with which we are acquainted of which so many varieties are known, as that we term mahogany or baywood. The mahogany first introduced and used mainly for cabinet work was the dark, dense timber termed "Spanish mahogany," imported chiefly from San Domingo. From this source for many years all the best logs were obtained, and the fine old furniture of the Georgian period was almost all of it made of the San Domingo wood. As soon as this supply fell short, other islands in the Antilles and the mainland of the isthmus were explored, and quantities of excellent wood were obtained from them. The wood from the central region of Mexico and from the Island of Cuba was but little inferior to the best qualities from St. Domingo, and from the regions further south, in Honduras, British and Dutch Guiana, logs of more fully-grown timber and of vast size were obtained. The lighter, open-grained wood, termed "baywood" or "Honduras," which in its best form may even approach the quality of the Spanish mahogany, but which chiefly approximates more nearly the texture of cedar, is now much used for joiners' work. The finest old Spanish wood is so scarce and valuable, that the bulk of it is probably cut up for veneers. The Cuba wood, which takes the place of that formerly brought from San Domingo, is mostly small. It comes over in sticks rather than in logs, seldom exceeding 2ft. square, and is liable to be "stainy" or streaked with purple. Some of the Central American timber from the interior of Mexico is very dense and rich in colour, and, perhaps, rivals that from Cuba. All mahogany darkens in colour on exposure to the atmosphere; but it is a favourite trick to stain the lighter varieties with an alkaline wash, in order to give them a darker tone. Few woods stand wear and tear better in cabinet-work than fine mahogany, and the bright, rich tints are found in no other wood with which we are familiar. It seems probable that all the mahogany timber to which we have alluded is the produce of the same tree, the *Swietenia mahoganii* of botanists, so called after Van Swieten, a Dutch physician; but evidence on this point is rather confusing. The value of mahogany fluctuates greatly, and the purchase of this timber is said to be always somewhat of a lottery. Buyers test the quality by boring into the log with an auger; but this plan is liable to mislead. There is a sort of tradition, the truth of which it is difficult to test, that Messrs. Broadwood once gave £3,000 for three logs of mahogany, all of them cut from one tree. Each balk was 15ft. in length, and 3ft. 2in. square. This would give 451 cubic feet, and a price of £6 13s. per cubic foot! In some other accounts of this transaction, the price named is £2,000, which, if correct, would represent £5 9s. per cubic foot. The cause of this extraordinary price is said to have been the extreme beauty of the "curl" or figure of the wood, which rendered it suitable for the production of veneers. Strange to say, this high-priced mahogany was imported from Honduras, and it seems probable that while the northern district of the country bordering on Mexico produces dense and fine qualities of timber, the wood grown in the low, swampy districts to the southward has given a bad name to the mahogany of the whole district. In an interesting paper read at the Society of Arts by Mr. Leonard Wray in 1859, on "Timber for Ship-building," printed in Vol. VII. of the Society's "Transactions," an account is given of the cutting down and preparation of this wood for sale, and, as touching the density of the best Northern Honduras mahogany, we read that its specific gravity equals that of the finest Travancore teak, and

is superior to English oak. The difficulties in felling the wood in the trackless forests and bringing it to Belize for sale appear to be immense, and all the labour has to be done at night by torchlight, owing to the intense heat.

Mr. Wray, in the paper before alluded to, states that mahogany is only classed in the second rate at Lloyds' among the timbers for shipbuilding purposes. While eight varieties of wood are ranked in the first division, we find mahogany included among the 20 species of timber placed in the second class, the reason being that fine, dense mahogany is too costly and good for the purpose, while the cheaper baywood, the price of which would enable it to be used, comes only in the second division. The mahogany of Hispaniola is said to have been used by Raleigh for the repair of one of his ships in 1595, and a Spanish line-of-battle-ship, built at Havannah, of the finest picked timber, when captured by the English and broken up, more than 100 years after she had been launched, was found to have every timber sound. The Queen's own steam yacht, the *Victoria and Albert*, is built of mahogany.

Concerning the first use of the wood in this country, it is stated that Dr. Gibbons, of King-street, Covent Garden, having received a few planks from his brother, a sea-captain, in 1724, had some of the wood, which had been previously rejected by a huller as worthless, and incapable of being worked, made into a candle-box by a cabinet-maker named Wellaston, who recognised the fine qualities of the material, for which a demand speedily sprang up, and from which he is said to have realised a fortune. The mahogany of East India and the west coast of Africa, though the produce of trees of the same natural order, the *Cedrelaceae*, does not appear to be obtained from the *Swietenia*, and the wood is in many ways inferior to the West Indian timber. In the above notes, we have brought together as far as possible the existing information respecting mahogany; and in drawing attention to the subject, we trust we may elicit some additional facts from those among our readers who have had practical experience concerning this timber.

CAERLEON.

THE annual meeting of the Monmouthshire and Caerleon Antiquarian Association was held at Caerleon last week, when Mr. Octavius Morgan, the President, favoured the company with an interesting review of the history and chief objects of antiquarian interest in the locality. Having expressed his conviction, judging from its position on a flat surrounded by hills—one which the ancient Britons would never have selected—that Caerleon must have been founded by the Romans, and that it was one of their characteristic square-built towns surrounded by walls with a forum in the centre, he went on to say that no trace was left of its original formation except the roads traversing it, and but little was known of it after the departure of the Romans till after the fifth century. Various writers had indulged in fanciful ideas as to its state in the intervening period, and one historian (Giraldus) had given glowing accounts of it, which he thought were much overdrawn and untrustworthy. The fact that the settlement was overrun by the Northmen, and was twice burnt down by the Danes, was sufficient to account for the disappearance of every vestige of the original Roman structures. Caerleon was remarkable to the antiquarian for some things—namely, the Roman amphitheatre, otherwise wrongly called King Arthur's Table, and the Castle Mound. As for the amphitheatre, it was, undoubtedly, a Roman work, and was very similar to one outside the walls of Rome, called the amphitheatre of Castrucci, and the idea that it had some connection with the Knights of the Round Table must be exploded, because there was no trace of any Arthurian building or reminiscence about Caerleon. The castle mound was conical in form, and similar to mounds found all over England. Among other places there was once one at St. Woollos, Newport, but it had of late years been lost sight of beneath the rubbish from the railway. The Caerleon Castle Mound was, like it, far more likely to be the work of the Northern invaders (either Saxon or Dane), than to have been raised by the native tribes of this island. It was clearly post-Roman and Pre-Norman. As

* Specifications: being Printed Forms prepared and published by PALLISER, PALLISER, AND CO., Bridgeport, Conn., U.S.A.

for the ancient state of Caerleon, the remains of beautiful Roman pavements showed that there was a considerable degree of elaboration in the houses; the bronzes which had been discovered indicated that artistic work flourished at the period—though whether it was of British or foreign workmanship was not known; and there had also been found a remarkable specimen of plate-glass, evidently rolled out (as pastry would be rolled), and not cast in the present way, and this, he was much inclined to think, must have been manufactured in England. In conclusion, the president touched upon the remains of the priory, the origin of which had always been a mystery, though there was evidence that the Cistercian Order established itself in this neighbourhood at a very early period, and it was conjectured that the monks must have migrated to Llantarnam Abbey, still, however, keeping up this priory.

PRACTICAL NOTES ON PLUMBING.*

XI.

By P. J. DAVIES, II.M.A.S.P., &c.

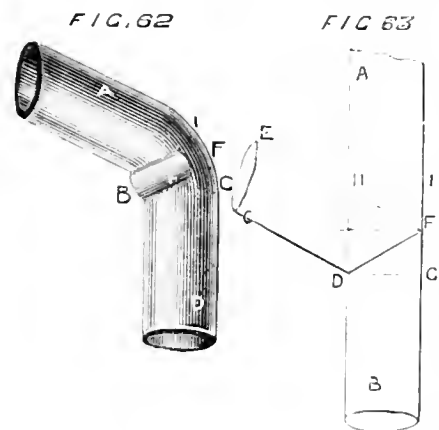
BENDS (continued).

TO complete my instructions on "Bend-making," I must describe the method of making bends in the centre of a long length. Assume that you have a 10ft. length of soil-pipe and you require a bend in the middle of it, and again assume that you have not any long dummies: you should slit the two sides (as at DB, Fig. 44) at the point where you require to make the bend, say, 12in. or 18in. long, pull the lead open and then your pipe round, work the lead truly round with your tools from the inside and outside of the bend; when you have soldered up the seam your bend is complete.

ELBOWS, SOIL-PIPES, AND TRAPS.

Elbows are frequently made to save the expense of proper bends. They are exceedingly useful for rainwater-work, though often used for closet-work. When used for the latter purpose, the pipe should have as much fall as possible, though actually elbows should not be used in closet-work, unless it is from a nearly horizontal to a vertical soil-pipe, such as would occur from the outlet of a trap to the down-pipe.

Fig. 62 is a finished elbow, A being the part coming from the trap, B the soldered part of the



elbow, D the down or vertical soil-pipe outlet. In this instance you will perceive that the elbow will work equally well as the bend, because the fall is good, and the soil tumbles over the throat of the elbow direct into a vertical pipe.

There is, comparatively speaking, no skill required to shape such a piece of work: all you have to do is set your elbow out on the floor or bench as shown at Fig. 63, A B being the straight pipe B, though commonly called the rake or fall line. Here you see that this line cuts the straight line in D, and E cuts again the pipe-line at F. Draw the dotted lines D G H I square to the pipe, and cutting the points D H, then from I to F. F to G will be the size of the piece to be taken from the throat, if you desire to make a true elbow.

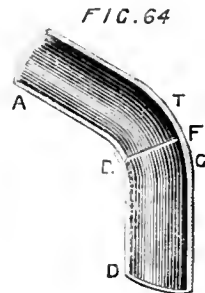
This exact method here explained we seldom

* All rights reserved.

or ever adopt; but instead, only cut three parts away, and the other part use for lap and for allowing the elbow to be worked round at the back as at I F G. In this case the solder need not be taken all round, but finish as shown at K. There is one thing important in elbow-making (which many think and say is unnecessary for me to mention, and so far as thoroughly intelligent workmen are concerned it is quite right, but there are other than thorough practical men whom these articles are intended to benefit), always well work the lead down the throat of the elbow at B, Fig. 64. This prevents hair, &c., &c., lodging at this point.

SOLDERING ELBOWS.

Having soiled the elbow, shave it to about 1in. wide for the outside, and 1/2in. wide for the inside. Shave it first or before pulling it up together, then pull it up as at Fig. 64 and from



the points A D. Tie the ends together with string, and solder up the throat to appear as shown in Fig. 62.

SOIL-PIPE MAKING.—COPPER BIT WORK.

This work is very easily learned. Take a piece of lead wide enough to wrap round a wooden mandril, the size of the required pipe, and say 10ft. long; place the edges true one with the other, wrap the lead round the mandril and withdraw it, then soil the pipe, and with a gauge hook shave the desired width 1/2 of an inch, after which tack the lead together every 10 or 12in., and solder it down, using rosin freely. The larger the copper bit the better chance you will have to float your work.

DRAWING SOIL-PIPE WITH POT AND IRONS.

This requires a little more care and practice than the last-described method of work. Proceed as follows:—Having prepared the pipe as for copper-bit work (except the shaving), shave it at least 1/2in. wide, or with a gauge-hook 1/2in. blade, this will make a 1/2in. seam. Now take a ladleful of hot solder, your mate holding the edges of the lead together, you pour a little solder across the seam every 8in.; this will keep the edges up in proper position. Then take a red hot iron, and with a strap of lead burn the two ends together; this is most easily done by your mate holding an old felt under the seam. This done, all is prepared. Take the ladle in your right hand and the iron in your left, pour some solder upon each side of the seam, and get up the heat; then with the red-hot iron draw it first on one side, then the other of the joint; this causes the solder to flow down the pipe; at the same time you must keep pouring fresh hot solder upon the joint. Suppose you have a start of 9in., or, in other words, 9in. soldered, then let your mate start 6in. from you, and with a sponge pour a little cold water on the seam—this prevents the pipe opening; thus you work down the pipe, your mate following with the sponge. If by chance a little solder hangs to the side of the seam, the mate should push it away with a little stick.

N.B.—The bench should have a fall 1in. in 10ft.

STACKING SOIL AND OTHER PIPES.

Soil and other pipes should be properly stacked away. One of the best methods is shown at Fig. 65; it is simply a shelf having F nailed on the front; by stacking the pipes carefully away you often save yourself the trouble of driving.

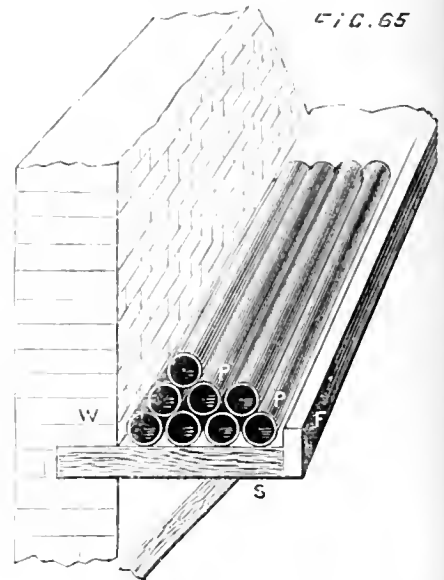
DRIVING SOIL-PIPES.

This is done by driving a short length of mandrel through the pipes, to take out the dents or bruises. For this purpose a piece of 1/2in. gas-

pipe, or a length of ridge-roll, is frequently used.

STINK-TRAPS AND THEIR VARIETIES.

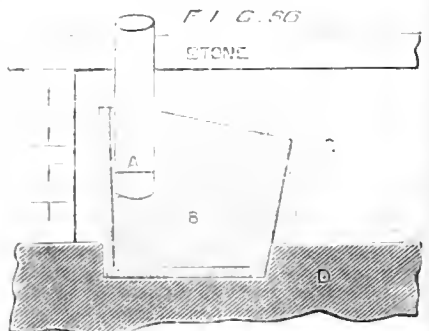
Stink traps, as you will see by the "Alphabetical List," have many titles. I do not pretend to treat half of the number of names known, but only those in general use. There are the Antle trap, Balance Trap, Ball trap, Bath or belly trap, Bowl and Pipe trap, Branch trap, Cistern trap, Circular trap,



trap, Davies's trap, Dip trap, Eclipse trap, Fat or Grease trap, Flap trap, Float trap, Flower-pot trap, Gully trap, Half trap (Hellyer's), Hunch trap, Intercepting trap, Inverted Cup trap, Knott trap, Lip trap, Mansion trap, Man-ion trap, trap, trap, trap, Siphon trap, Side trap, Signal Alarm trap, Sink trap, V trap, Ventilating trap—all of which have been made of lead. The above are only a few quoted from memory, and are only a portion of the multitude, and yet nearly all are subject to, and dependent upon, the same law of action—viz., the water-seal. We are told that Glanber, the old chemist, knew the value of the water-seal, or Stink trap, and I quite believe he made use of what we now call the Be'l trap, as a water-lute or valve for arresting his chemicals or gases, and to this day we, together with the first chemists of the land, are glad to use this simple contrivance as a governor or check against noxious gases.

The simplest made of all traps for sanitary purposes is that known as the bowl-and-pipe-trap, mostly used for rainwater-pipes, sinks, bath wastes, &c., &c., especially when these pipes empty themselves into the old-fashioned "brick-trap." I have personally, about 20 years ago, taken six, or in some instances, ten such ends of pipes, into one bowl or cistern; for instance, on the Camp-bourne Estate for the late Mr. John Jury, who was greatly in favour of them.

I always endeavour, even now, to carry the ends of waste or other pipes (excepting soil-



pipes) into the water of an outside gully-trap, as, by so doing, all draught is prevented from coming up this pipe; it also dispenses with the

necessity of another trap being fixed inside or just below sink. This trap is neither more nor less than a bowl of water, having the end of a pipe dipping into it as at A, Fig 66.

Here you see the bowl B, which may be made to any shape (round bottom is best) and of any material (in the olden days it was of lead); now it is not unfrequently a common flower-pot with some Portland cement dropped to the bottom.

I must ask my readers to take notice of this trap, as I think it was the first step towards the invention and adoption of the well-known G-trap, the history of which I am endeavouring to trace.

(To be continued.)

TESTS FOR STONES.

FOR purposes of the engineer, or in geological surveying, the physical character of a rock is of value. There are a few tests which it may be necessary to have recourse to. Mr. W. H. Penning, F.G.S., says: "To ascertain the kind of rock exposed in a pit or quarry, a fragment is detached from that part which has been least altered by the action of the weather. A good-sized piece of the rock is broken off, and afterwards reduced by chipping into a square lump. Good edges are thus obtained for observation of its texture by the aid of a pocket-lens." Scratching is a tolerably good means of testing hardness, and the young architect or geological student might examine the hardness of the stones in any locality with the aid of his pocket-knife. Those which are easily scratched, effervesce rapidly by dilute hydrochloric acid; and generally the degree of durability of a stone may be ascertained by the rapidity or slowness of effervescence. Calcite or carbonate of lime, limestones, &c., are easily scratched and effervesce rapidly under acid. Magnesian limestone and dolomite do not effervesce quickly, and many sorts of stone, like gypsum sandstone, do not effervesce at all. Other important tests may be resorted to if additional information be required, and the texture and colour are important for the architect. Texture is discovered by chipping an angle, and this may be crystalline, earthy, fibrous, granular, or compact. The behaviour of a stone before the blowpipe is another valuable test: some stones reduce to quicklime, as those in which carbonate of lime is the chief constituent; others are fusible more or less, and some yield copper, lead, glass, slag, &c. It would be as well if these simple means of testing were more generally known and exercised in the selection of building-stones.

MOTIFS FOR PANEL DECORATION.*

MR. JOHN WARD, of Birmingham, is the author of a series of suggestions for the use of art manufacturers, which is intended to be completed in four parts. Parts I. and II. are now upon our desk, and the author apologises for the appearance of his work by stating he has frequently felt the want of suggestions when there has not been the necessary time or inclination to obtain details for his purpose. No doubt Mr. Ward speaks on behalf of a large class of manufacturers in Birmingham and elsewhere who do not trouble much about art, but who find it necessary to make their goods "artistic" or decorative, though we have a strong opinion that if necessary time cannot be found for artistic details, manufacturers had better not risk their reputation upon art by copying inferior designs. We have on more than one occasion spoken of the injury done to real art by the publication of stock designs, which no artist, properly so-called, thinks of using any more than a skilled writer would condescend to use a set of ready-made sentences or "elegant extracts." We do not believe it is possible for anyone to become artistic by a system of plagiarism or cribbing. These remarks, however, only apply to those who use design in an unmeaning sort of way, and not to those who publish them, who may be prompted by the highest motives. The designs shown are of a general character, and are intended to supply motifs for the decorative artist, cabinet maker, earthenware manufacturer, metal-worker, and amateurs who devote their leisure to painting on china, &c. In the first part are

no less than five plates, and these consist of suggestions suitable for panels, stained glass, *repoussé* relief, carved work, painted pottery, &c. The stalks, rushes, and leaves in plate I. are arranged after a Japanese fashion and exhibit variety in panel treatment. The sunflower conventional decoration, Plate II., and the border enrichment, are more satisfactory specimens. The suggestions for medallion decoration are quite Japanese in conception, though they are not all very happily worked out. They illustrate emblematic devices, as Morn, Noon, Air, and Water, &c. Plate IV. shows a rather *naturelque* treatment of blackberry and thorn rose with spiders' webs, suited for long panels; and another design, foliage and trees, with a bird on the wing and a butterfly, is intended probably for a screen. The other part illustrates decorative designs of a similar class suitable for panels and medallions, the chief character of these being a natural rendering, in a Japanese spirit, and for lacquer-work, china painting, &c., the designs may be suitably employed. Mr. Ward is fond of flowers and birds disposed in the unsymmetrical fashion so characteristic of the art of Japan; in one plate, VII., there is a panel in a Jacobean or Queen Anne style; in another a series of fables intended for tile decoration; and the remaining designs show pleasing instances of panel decoration, in which birds, fish, and foliage are combined in a quaintly conventional manner. The plates are well photo-lithographed and effectively printed, and the work will prove a help to those decorative artists who may have panels and surface ornament to execute.

THE AMERICAN SOCIETY OF CIVIL ENGINEERS.

THE address of the president of this Society, Mr. James B. Francis, at the 13th annual convention, held at Montreal last June, shows that since the foundation of this Society in 1852, it has been constantly increasing in usefulness. Including honorary members, associates, and juniors, the Society now numbers 636 members, and we may congratulate them on the purchase of a permanent home in the city of New York. The president's address mainly touched upon water-power in the States, a branch of engineering of which he is an authority. Mr. Francis sketches the earliest applications of water-power—namely, to grist and sawmills, which were essential to the comfort of the early settlers. At Paterson, New Jersey, the "Society for Establishing Useful Manufactures" formed in 1791 the first machinery worked with water-power; after which the facilities furnished by the Passaic, Merrimack, and the Mohawk rivers, where falls of 35ft. and 105ft. gave additional impetus, and horse-power to a large amount was utilised. At Lowell, Massachusetts, at Cohoes, in the state of New York, at Manchester, New Hampshire, at Lawrence, Holyoke, at Lewiston, and other places, the water-power of the rivers, in some cases augmented by the erection of dams, has been turned to account. Mr. Francis alludes to the usual process of developing water-power in America. "A company is formed to acquire the title to the property, embracing the land necessary for the site of the town, and the population is sure to gather around an improved water-power." An official report states that in the State of Maine, the survey of water-power recently made is between one and two millions of horse-power. Some of these are not available, for want of railways, capital, or population, as in the case of an elevated region in the north of the South Atlantic States, close to the cotton-fields, and the area of which exceeds 100,000 square miles.

Referring to the manner in which the power of a waterfall can be utilised, compressed air is mentioned as more convenient than ordinary motors. The fall may be too small to be utilised by the latter, or the site where the power is wanted may be too distant from the fall, or it may be desired to distribute the power in small amounts at distant points. The president mentions a method of compressing air by means of a fall of water devised by Mr. Joseph P. Frizell, C.E., of St. Paul, Minnesota. The air is carried "in small bubbles in a current of water down a vertical shaft to the depth desired to give the compression, then through a horizontal passage, in which the bubbles rise into a reservoir near the

top of this passage, the water passing on and rising in another vertical or inclined passage, at the top of which it is discharged, at a lower level than it entered the first shaft." As waterfalls are usually in rocky formations, the passages and reservoir could be cut in them, and it would be necessary only to charge the descending column of water with bubbles of air, which can be done by throwing the water into violent commotion at its entrance, and a pipe and valve for the delivery of the air from the reservoir. Sir W. Thomson's idea of utilising the Falls of Niagara by transferring its power by electricity for the production of light and mechanical power over North America, is considered feasible. Water-wheel improvements, by which a larger percentage of the theoretical power of these machines can be utilised than before, is another matter touched upon, and the president concludes his address with an interesting explanation, derived from actual observation, of the way in which "anchor or ground-ice is formed" at the surface of the water and finds its way to the bottom. The ice is formed in small needles on the surface of the water, which, if not agitated, would form a sheet of ice there. The currents, disturbance, and interchange of position in a flowing stream causes the water at the bottom to rise to the surface, and *vice versa*, and the needles of ice are carried to the bottom, and adhere thereby by the process known as "regelation." It is shown that this adherence is always down stream, "and that water powers, supplied directly from ponds, or rivers, or canals frozen over for a long distance above the places from which the water is drawn, are not usually troubled with anchor ice, which requires open water, up stream, for its formation." The *Transactions* of the Society contain a full account of the minutes of the meetings, and reports of committees, which are full of interest.

SOMERSETSHIRE ARCHÆOLOGICAL SOCIETY.

THE thirty-third annual meeting of the Somersetshire Archæological and Natural History Society was commenced on Tuesday at Clevedon.

At the opening meeting, Dr. E. A. Freeman (the retiring president) said he was there merely as a bird of passage, both in Clevedon and in this island in general. He had no more to do but to give up the chair in favour of Mr. Edmund Elton, who must be well-known to every one in Clevedon, and who he was sure was a good choice to be their guide and leader.

The President (Mr. E. H. Elton) then took the chair, and delivered his inaugural address.

In the afternoon the members of the society visited Clevedon Court, at the invitation of Sir Arthur Elton, who read a paper descriptive of the building.

A vote of thanks having been passed to Sir A. Elton, the party left Clevedon Court and proceeded by rail to Yatton, where they inspected the fine old pretendal church, dedicated to Saint Mary the Virgin. The church was described by Mr. E. B. Ferrey, Dr. Hardman, and Mr. E. Green. The church is a large cruciform structure, with a central tower and unfinished spire. There was formerly a Norman fort here, but it is now buried. The present building is of four different periods—Early English, Decorated, Early Perpendicular, and Late Perpendicular of the Somersetshire type. In the north transept there are a couple of tombs, with effigies. In the centre there is a tomb, which has been identified as that of Sir Richard Newton, a former Chief Justice of the Common Pleas, who died in 1448. He was formerly Recorder of Bristol. There is a beautiful church erected by the Newton family, and dedicated to St. John the Evangelist.

Subsequently a visit was paid to the Old Rectory, at Yatton, which Dr. Hardman explained was considered to have been erected about 1440, and was one of the finest examples of a Mediæval rectory. The party returned to Clevedon by the 4.35 train, and visited Clevedon Old Church, the principal features of which were described by Mr. E. B. Ferrey. The church is cruciform, with a remarkable Early Decorated nave arcade, and Perpendicular clerestory. There are Norman arches on the north and east sides of the central tower, and a curious monu-

* Motifs for Panel and Other Decoration. By JOHN WARD, Birmingham.

mental effigy of Jacobean period. Attention was likewise called to a peculiar cruciform west window, and the rich Late Perpendicular poppy-headed bench-ends to nave.

In the evening a meeting was held at the Public Hall for the reading and discussion of papers on subjects of local interest.

Mr. C. E. Davies, F.S.A., gave a description of the recent Roman discoveries at Bath. In 1755 some excavations were made near the Abbey, and the result was the discovery of a large system of baths, and in consequence of excavations which he had recently made at the expense of the Corporation, he had been enabled to make a correct plan of them. In 1871 he found a large Roman drain, and by clearing out this they were enabled to carry the excavations to a greater depth, and the result was that they discovered recently a large bath 80ft. long and 40ft. wide within a large hall exceeding 120ft. in length. Subscriptions were started with the object of clearing the baths, which were built of the most massive masonry, and making them available for the public. The excavations had revealed the fact that these baths occupied about one-fourth of the ancient city of Bath.

On Wednesday the members assembled at the Clevedon Public Hall in the morning to take part in the excursions which had been arranged for the day. The first place visited was Tickenham Court, which was described by Mr. Emmanuel Greene. The remains are those of a manor-house of the early part of the 15th century, erected probably by one of the Berkeley family. The only part remaining is the hall, and that is in a very dilapidated condition. Tickenham church was also inspected, the chief features of the building, which was described by Mr. Ferrey, being its fine Perpendicular tower, Early English south porch and north aisle, containing three effigies of the same period; low Norman chancel arch and ancient font. A move was then made to Wraxall Tower House, a Medieval house, with a Tudor tower. The parish church of Wraxall was next visited. It has recently been restored, and Mr. Ferrey, in his description, said its Perpendicular tower was one of the finest in the county of Somerset. There were traces of a Norman church, and also of an Early English church; but the structure at present was of the Middle Perpendicular period. A drive of about half an hour brought the party to Ashton Court, the seat of Sir Greville Smyth, Bart., who had invited the Society to luncheon. Ashton Court was formerly the seat of the Daubenys and the Chokkes, and considerable interest was derived from an inspection of the extensive collection of family and historical portraits, and specimens of natural history. The Rev. Mr. Way having conducted the party over the mansion, a visit was made to Long Ashton Church. Mr. Ferrey stated that the church had nothing of Norman remains, the earliest being the effigies of the 14th century. The tower seemed to be rather earlier than the rest of the building, and was Early Perpendicular. The nave arcade was certainly very Late Perpendicular, and one might almost call it Debased. One of the most striking and remarkable features on entering was the very splendid rood-screen, which was always coloured, and which was restored about eight years ago, the old colour being faithfully reproduced from the existing original. It had not been used in these churches in Devonshire, Somerset, and Cornwall to see the screen running right across. This had remained singularly perfect, and was one of the glories of the church. From Long Ashton the members proceeded to Flux Burton Church—a small edifice of the Perpendicular period, with Norman south doorway, chancel arch, and font. Afterwards an inspection was made at Buckwell Church, the chief features of which are its fine Perpendicular tower, and the mortuary chapel of the Rodneys. The Rev. E. Burbridge, the rector, read a short paper on the history of the chapel. The next stoppage was at Chelvey Church, the body of which is in the Perpendicular style, while the chancel is Early English. Attention was called to the remains of Medieval painted glass, and the rich Early Perpendicular mural tombs in the south aisle. The building is in a dilapidated condition, and no restoration seems to have been attempted for some years past. There are only seats for about fifty persons. An inspection was also made at Chelvey Court, where there are the remains of a fine old mansion-house of the Tyntes.

Dr. Hardman pointed out the principal features of interest, attention being particularly called to the very fine staircase. Nailsea Court was to have been visited, but as the afternoon was far advanced, this was passed over, and the party proceeded to Nailsea Church, and were afterwards entertained to tea at Nailsea rectory by the Rev. J. Johnson. As the consequence of the late return of the members, the evening meeting for the reading and discussion of papers was delayed. The Rev. H. G. Tomkins gave a description of Worlebury camp, and the Rev. Fred. Searth contributed a paper on the history of Wrington. Yesterday the society visited Cadbury camp, Postbury priory, church, and camp, Portishead, Clapton-in-Gordano, and other places.

OUR COMMONPLACE COLUMN.

OBLIQUE ARCH.

AN oblique or a skew arch is an arch built in an oblique direction, or not at right angles to the abutment, as in the case of a bridge crossing over a road obliquely. The beds or courses of an oblique arch are spiral surfaces wound round a cylinder, every part of which cuts the axis at a different angle, the latter being greatest at the keystone and least at the springing. The art of oblique bridge-buildings has been traced back to the year 1530, when Nicolo Braccini, of Florence, called "Il Tribolo," erected a bridge over the river Mugnone, near Porta Sangallo, at Florence, on the road to Bologna (see "Vasari," Vol. XI., p. 308). Geo. Stephenson appears to have been the first to introduce them on railways, and Mr. G. W. Buck, the author of "Oblique Bridges," showed how the dimensions and lines were to be obtained by trigonometrical calculation. The elements of the subject are discussed in Nicholson's work on "Stone Cutting" (1828); but those who desire more detailed particulars, should consult Mr. Buck's "Essay on Oblique Bridges," a new edition of which has recently appeared (Lockwood and Co.). In this edition Mr. W. H. Barlow, C.E., has appended a method for facilitating the construction of oblique bridges by diagrams and multipliers, from which the dimensions for forming the templates and working the stones may be obtained. Only cylindrical arches are considered proper; elliptical arches are not so well suited for an oblique plan, are less stable, and more difficult to execute. Mr. Buck says that 25° is the natural limit of obliquity to which an arch can, with scientific propriety, be constructed when composed of an entire semicircle on the square span. Hitherto 45° has been considered as the greatest degree of obliquity at which it is safe to construct an arch, arising from the difficulty of making a semicircular arch safe at that angle; but the author shows that though the difficulty increases from 90° to 45°, it is less from 45° downwards, and an arch may be safely built at an angle of nearly 25° (see article in *Engineer*, *Britannica*).

OCTAGON.

To draw an octagon without a plan, the sides are thus proportioned: Make the centre equal 5 parts by scale, and the sides 3½ parts each, or 12 parts altogether. *Octagonal Plans:* The baptisteries of St. John Lateran, Rome; of Florence, Perugia, Pisa, Parma; Stoney Middleton Church, Derbyshire, is also octagonal, and St. Dunstan's, Fleet-street; and the form has been used in Mr. Newman Hall's church, Westminster Bridge-road, and other modern buildings.

OCTOPARTITE VAULTING.

The Angevine vaulting, as seen at the hospital at Angers in France, is of this kind; it has eight ribs, and Mr. Street says it has nothing analogous to it in England; it is very domical, both in its longitudinal and transverse sections. See Professor Willis's remarks in *Transactions of R.I.B.A.*

OFFICES, DOMESTIC.

The usual domestic offices attached to a good house comprise, besides the kitchen, butler's pantry, housekeeper's room, still-room, store-room, scullery, steward's room, servants' hall, housemaid's closet, larder, &c. The dairy, bakery, brewery, beer, coal, and wood-cellars, ice-cellar, laundry, and other conveniences are generally arranged round a kitchen court. In town houses the offices are generally placed in a basement, and are necessarily limited. Main offices should be attached to the house without

sacrificing the comfort of the principal rooms, and should be separated by a door from the hall. For examples of planning domestic offices we refer the reader to the illustrations in the *BUILDING NEWS*, to Kerr's "Gentleman's House," and to Wightwick's "Hints to Young Architects" (Guillaume's edition).

OGEE ARCH.

(FRENCH *inflexe*, *contre-courbe*). One of the earliest examples of an ogee arch is a tomb in the north aisle of Salisbury Cathedral, circa 1216. This form of arch took its origin, no doubt, from the Arabs, who used it in the 13th century.

PACKING-CASE.

For tables showing the solid contents of packages the reader may consult Mr. M. K. Todivale's "Calculator of Measurement of Packages, Timber, Casks, &c." (See recent notice of this book in the *BUILDING NEWS*).

PAGODA.

With respect to the derivation of this term, it is thought to be from the Persian *pout* idol, and *ghadu* temple, and to be a corruption of the term "dagoba," the relic shrine of the Buddhists. (See Ferrierson's "Indian Architecture," and "Arch. Diet.")

PAINSWICK STONE.

An oolitic limestone quarried near Gloucester. This stone is of a light cream colour, and is very uniform in grain. It was used in the interior of the Houses of Parliament. Its chemical analysis shows it to be largely composed of carbonate of lime. It weighs in an ordinary state 125lb. per foot cube, and works like Bath stone, being harder than Corsham, but is not a weather stone. For steps and landings it has been largely used at Roupell Park, Brixton. According to the "Arch. Diet." the best stone of this sort is only obtained from the Ball's Green Quarry, near Stroud. The cost delivered in London, according to Laxton, is 2s. 2d. per foot rough block.

COMPETITIONS.

BRENTFORD DRAINAGE.—In this competition sixteen sets of plans were sent in, and were referred by the Local Board to Captain Galton. The first premium has been awarded to the plans sent in by Messrs. Gotto and Beesley, of Great George-street, Westminster. The works are estimated to cost about £18,000.

CHIPS.

We hear that the "Imperial" self-acting exhaust ventilators (Weaver's patent), which have been recently taken up by the Sanitary Engineering and Ventilation Company, of Victoria-street, Westminster, are now being applied to the Shore-ditch Town-hall, for the ventilation of the council-chamber. The company's "Imperial" ventilating-tubes are also being fitted there, as well as at the Army and Navy and New University clubs.

Foundation-stones of a new Primitive Methodist chapel were laid at South Normanton, near Derby, on Monday week. The architect is Mr. John Wills, of Derby, and the contractors are Messrs. W. Wass, of Normanton, and J. Redwood, of Sutton-in-Ashfield.

The Chesterfield board of guardians adopted last week, plans by Mr. Rollinson, their architect, for the remodelling of the workhouse, rendered necessary by the removal of the children to the new industrial school buildings.

Extensive alterations have just been commenced in the Derby Assize Courts, with the hope of improving the accommodation. The seating in the new portion of the courts will be remodelled, giving more room to the Bench, jury, and bar, and removing parts of the galleries, while hot-water pipes and extracting-ventilators will be put in. The contract for structural alterations has been taken by Messrs. Walker and Slater, of Derby; that for joinery and wainscoting by Messrs. Fish and Sons, Nottingham, and that for warming, heating, and ventilating by Messrs. Benham and Sons, London. The estimated cost is £1,500.

The parish church of Rowley Regis was reopened on Sunday week after partial restoration.

The foundation-stone of the Town-hall for Penny Stratford was laid on Monday week, with public rejoicings.

Building Intelligence.

BOLTON.—The new infirmary at Bolton is to be opened on the 5th of next month. The plans of the structure, which were selected out of sets sent in by 37 competitors, were prepared by Mr. R. K. Freeman, architect, of Derby and Bolton. The style is Gothic. The building is constructed of brick, with Yorkshire stone dressings, and may be said to consist of four distinct departments. There is, first of all, the administrative block in the centre, the right and left pavilions, and a children's hospital at the rear of the left pavilion. All these are connected by corridors only one story in height, so as not to interfere with the free circulation of air. Over the entrance-hall there is a tower which rises to a height of 103ft. from the ground. The dimensions of the wards are as follow:—Large pavilions 59ft. by 27ft.—cubic space per bed, 1,820ft.; small wards 22ft. by 16ft. 6in.—cubic space per bed, 1,877ft.; children's wards 35ft. by 26ft., with a cubic space for each bed of 1,700ft. There will be room for 75 beds in all, 42 being in the men's wards, 17 in the occasional wards, and 16 in the children's hospital. The principal corridor extends from end to end of the building, with a total length of about 300ft. Special care has been taken in the construction to reduce the danger arising from fire to a minimum. The wards will be heated by a system of central fireplaces, which combine open grates with hot air and ventilation.

KIRESTALL.—The partial decorations of the parish-church have just been completed. They are wholly mural and mainly of the chancel walls, of which the decoration on a diaper ground, interspersed with a few bands of relieving colour in due architectural harmony, is chaste, yet presenting graceful outlines. Above a dossal hanging are entablatures of figures, painted on a dead gold ground, but mainly in outline, slightly tinted. On the wall north and south of the east window are John the Baptist and St. Stephen, the dedicate Saint of the church; and on the north and south chancel walls the figures of the four Evangelists. Each of the figures is surmounted by a canopy. The design and execution of the above is by Powell Bros., Leeds.

LEVENS, WESTMORELAND.—A new schoolhouse, comprising a schoolroom and a classroom, has just been built and finished in this township at Beathwaite Green, by the Hon. General Upton, of Levens Hall, and this week it was formally opened by the General and Mrs. Upton. The building is from the design of Mr. Eli Cox, architect, of Kendal, and was carried out under the personal supervision of that gentleman; the masonry by Mr. Thomas Pricket, of Beathwaite Green; the woodwork by Mr. Thomas Sisson, the Levens joiner and house-carpenter; and plastering and colouring by J. Steel and Co. of Kendal.

MICHELDEVER CHURCH, HANTS.—This church was reopened on Sunday, the 14th inst., after having been closed for alterations for some time. The church before the restoration consisted of a western tower (16th century), a vestibule connecting same with nave, and containing a gallery and organ; a nave in the form of an octagon with two quasi-transepts, built of red brick and covered with slate and having heavy plaster mouldings and arches on the inside; a chancel covered with cement on the outside, and encumbered with heavy plaster mouldings and arches on the inside; there was also a red brick and slated vestry and furnace chamber opening out of the vestibule. The seating was of oak, narrow and uncomfortable, and placed on a stone floor. The alterations and improvements effected consist of the restoration of the chancel, by the removal of the cumbrous plaster arches, the insertion of a new panelled and moulded wooden ceiling, with carved bosses, the mouldings and bosses being richly coloured and gilt, the erection of an organ-chamber and new chancel-arch, with carved capitals and marble columns, a new glass mosaic pavement, new oak altar-table, choir-stalls and prayer-desk, a marble credence table, and a brass altar-railing and standards. In the nave the oak seating has been reconstructed and placed on a wooden floor, the gallery removed, and the tower-arch thrown open to the church. A fine old stone arch of Early

Perpendicular work has been brought to light and restored. A carved stone pulpit, executed by Mr. Newman, of Winchester, has been erected, stone traceried windows, filled with cathedral tinted glass in geometrical patterns, have been inserted in the place of the old wooden ones. The western doorway and window have been restored, the latter filled with stained glass. A handsome polished brass eagle-lectern, by Jones and Willis, has been presented by residents in the parish. In the chancel are handsome marble monuments to various members of the Baring family, by Flaxman, to which has been added a beautiful marble structure, by J. E. Boehm, A.R.A., to the memory of the late Mr. Thomas Baring, of Norman Court, represents two kneeling angels watching a panelled portal. The cost of the restoration (exclusive of the lectern, stained glass in western window, and marble monument in chancel), is about £2,600, the whole of which has been borne by the Earl of Northbrook. The work has been ably carried out by Mr. W. Coles, of Winchester, builder, under the superintendence of John Colson, F.R.I.B.A., and Son, architects, of the same city.

PANTASAPH.—The new chapel of St. Clare's Orphanage and Convent at Pantasaph, near Holywell, was opened on Wednesday. The chapel has been designed by Mr. Edmund Kirby, of Liverpool, who was also the architect of the convent buildings. It is situated on the north side of the convent, and will accommodate about 300 persons. Its width is 28ft. 6in., and it has a centre aisle with benches arranged on each side, while the total length inside is 108ft. There is an apse at the sanctuary end of the church with an ambulatory round the altar, and a clerestory. This clerestory is supported by seven arches, resting on polished Anglesea marble columns. The style adopted is Early English of a severe type, to meet the simple characteristics of the order. The external walls are of the local limestone, with Talacre stone dressings. The general contractor for the work was Mr. William Owen, Liverpool, and the whole of the work has been carried out under the superintendence of Mr. Kirby. The other contractors were—For the stained glass, Messrs. John Hardman and Co., Birmingham; for the reredos and altar, Mr. R. Boulton, Cheltenham; for the tiling, Mr. Leadley Brown, Liverpool (agent for Craven, Dunnill, and Co.)

WALTON-LE-DALE.—The corner-stone and memorial stones of a Wesleyan chapel at Walton-le-Dale, have been laid. The style is Gothic; the building is being built of brick with stone dressings, having ornamental brick panels in the gable and other parts of the structure. The woodwork will be of best pitch-pine, stained and varnished. The roof will be open-timbered, having carved and moulded principals, and the windows glazed with cathedral tinted glass. The chapel will be approached by a fair-sized porch at the south side from the main road. The dimensions of the chapel will be 52ft. 3in. by 29ft. There will be a transept on the east side, a chancel measuring 19ft. by 9ft., and a vestry in the rear. The yard and out-buildings on the west and north will be inclosed by a brick wall. The whole contract, including pulpit, heating-apparatus, gas-fittings, railings, gates, &c., has been let to Mr. H. Ward, of Preston, for £1,277 19s. 4d. The architects are Messrs. Myres, Vaver, and Myres, of Preston and Westminster.

A Hull journal states that, a few days ago, a joiner and builder named Brumpton disappeared from Grimsby, and shortly afterwards it was found that he had got a considerable number of acceptances cashed prior to his departure. The inquiry showed that Brumpton had for many months past been raising money on forged bills, which he redeemed as they fell due, and at length he absconded. It having been ascertained that he had left Liverpool for Philadelphia, a cablegram has been forwarded to the authorities, asking for his detention at that port.

An inquiry was held at Chesterfield on Thursday, the 18th inst., before Mr. Robert Morgan, C.E., an inspector of the Local Government Board, into an application from the rural sanitary authority of Chesterfield Union for sanction to borrow £370 for sewage disposal in Hasland parish. Some opposition was offered to the scheme on behalf of owners, who thought the sewerage should be extended further.

"To a practical man with a taste for mechanics, and the bump of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Two-pence of all newsmen, or post free 2½d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

(We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.)

All letters should be addressed to the EDITOR, 31 TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph Advertisement inserted for less than 5s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold); for France or Belgium, £1 6s. 6d. (or 33f. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Mr. CHARLES WILSON, of 13 and 15, Lighthouse-street, New York City, is authorised to receive American subscriptions at the rate of 6 dols. 40c. per annum.

Mr. R. M. TUTTLE, of Titusville, Penn., U.S.A., is also authorised to receive subscriptions at the same rate.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Vol. XL, Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete Vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—J. W. and Co.—H. and Co.—J. and H. R.—G. C.—J. D.—M. and Co.—W. H. S. and Son.—J. N. J. and Co.—G. W. G.—T. and R. B.—G. E. H.—M. Bros. and Co.

ASSISTANT.—(Lewis and Son, 1, Lowndes terrace, Knightsbridge.)—BOAR. (We believe they can be obtained at Batsford's, 52, High Holborn.)—JEFF OLDHAM. (You had better write to the secretary, at 9, Conduit street, W.)—W. LAURIE. (The first description of Mr. Engert's device for the prevention of echoes in buildings appeared in the BUILDING NEWS of Aug. 13, 1880, on p. 176.)

"BUILDING NEWS" DESIGNING CLUB.

RECEIVED.—F. M. S.—Yarra Yarra. (The designs will be returned shortly.)—A. L. B.—Veronese.

Correspondence.

SANITARY PLUMBING.

To the Editor of the BUILDING NEWS.

SIR,—Mr. Davies thinks that, by his experiments at the discussion on Monday last, he has conclusively proved his assertion that the O-trap will clear itself as well as the siphon. I certainly differ from him. If he intended to show how a O-trap would act when placed under a w.c., he has certainly failed altogether. The two arrangements will admit of no comparison. The model produced held less than half a pint of water, and yet through this little thing Mr. Davis thought it necessary to pass about 1½ gallons of water, or nearly 30 times the quantity contained in the trap.

Now, Pullen's cast O-trap holds 3½ pints of water. To test this, so as to fairly compare with the model, you must place it beneath a tank holding 12 gallons of water, and this quantity must pass through by means of a 4in. plug into the trap in the same time as did the 1½ gallons through the model.

Had Mr. Davies taken the plug out of his tank and thrown in 2 pints only of water, the test would have been a fair comparison to an ordinary w.c. flush; but I think anyone will see

that, as it was, it was most misleading. Of course, the same will apply to Mr. Hellyer's experiments as far as they represented w.c. traps.

Mr. Davies seems to think it a point in favour of his trap, that with the ink test, the black water passed away before the flush had time to mix with it.

I really can see nothing wonderful in this. The fact is, between the plug of the tank and the seal of the trap there was a space filled with air, and when Mr. D. raised the plug, the great weight of water falling through forced this air, which in its turn forced the seal before it, so that by the time the flush had reached the trap nearly all the ink was out at the mouth.

With reference to the quantity of water held in the body of various traps, I have also tested this, and find as follows:—

The old \odot ,	1 in. seal, holds 5 pints.
Pullen's cast \odot ,	1 in. " " 3 1/2 "
Hellyer's V	1 1/2 in. " " 5 1/2 "
Smeaton's Eclipse	1 in. " " 3 1/2 "
Round \odot -Siphon	2 in. " " 4 1/2 "

—I am, &c., DANIEL EMPTAGE, S.E.
Dane Hill Sanitary Works, Margate,
August 20.

SIR,—Mr. Davies has not yet fully established his theory, or proved any superiority over the \odot -trap gained by the almost new construction of the \odot -trap, which is certainly well known and acknowledged to be a great improvement on the old and cast \odot -trap. As I remarked in my last letter, "contracting the width of the body is a step forward in the right direction," and tends to prove that if there are others unwilling to learn anything from these lectures, it is not so with Mr. D., and I hope soon to see the \odot -trap constructed, not only according to his model, but with a few additional improvements—namely, by rounding the bottom, thus doing away with the sharp angles, and allowing the top to form a part of the outgo, and by allowing the outgo to be the full width and part of the trap, for by doing so it will prevent the breaks formed at the sides and top by the solder in the interior of the trap, and recommending a vent-pipe to be always attached to prevent siphonage and perforation of the lead by the action of the gases; and, lastly, the most important of sanitary rules is efficient water-flushing, for the soil passing into the trap should never be allowed to rest, but made to move speedily in one continuous swift stream direct into the sewer, and a good flush can always be obtained by slightly increasing the size of the valve and flushing-pipe, thus allowing the water to be suddenly discharged and making the removal complete; for a large amount of water sent through a small pipe is scarcely of any value, and the chief fault of a foul-smelling trap and closet is generally insufficient water-flushing; for a pail-full of water occasionally thrown down into a closet is of much more value than the same amount delivered slowly into the basin, thus causing the soil to be only partly removed at each flush, and adhere to the inside of the trap and soil-pipe, to putrefy and generate gases, only waiting for a chance to pass into the house through some defective fitting, especially if not properly ventilated.

Now, I believe there are some people who will fix almost anything bearing the name of a trap, especially if cheap, quite regardless of the important part it has to play in connection with sanitary matters, and, if we could have the \odot -trap in a much improved form it would be something gained, and of some advantage to the public, and would help to remove many objections to the present form of the \odot -trap.

Still I contend that you can only prove which trap has the advantage over the other by actual test, side by side, and each fixed under the same relative conditions, which was not the case in Mr. D.'s case; therefore it was simply no test, and I am confident that a trap constructed on siphon principles would have acted equally as well as the model in question (if not far better); in fact, Mr. D. himself publicly owned "that the siphon-trap would clear itself far better than a \odot -trap, of such things as gravel, sand, &c."—I am, &c., H. B.

Lambeth, August 22nd.

VENTILATION OF SOIL-PIPES.

SIR,—Mr. Buchan has no ground for imputing to me "tradesman conceit" or "mercenary considerations," but he is not so invulnerable,

having, as he says, fitted "hundreds of my disconnecting ventilating traps." He is naturally, and, perhaps, excusably angry, if anyone should hint the possibility of his patent being a "superfluity." Nevertheless, he has not even attempted, either scientifically or practically, to prove it otherwise. I have hitherto refrained scrupulously from attacking his or anyone's patent; but in the interest of the poor owners of property, have recommended a simple, inexpensive, and, as I believe, thoroughly effective expedient. This correspondence has, so far, failed to elicit any clear rebutting evidence.

The irrelevant comparisons, dogmatic assertions, and opprobrious epithets, which are the principal weapons wielded by Mr. Buchan in his letters, are far removed from argumentative reasoning, and are not worthy of courteous comment.—I am, &c.,

MICHAEL DRURY.

[This must end the correspondence; the disposition on either side to conduct it without personalities having evidently become exhausted.—ED.]

SIR,—Mr. Michael Drury, in reply to my letter in your issue of August 5th, p. 184, says that "he shall be glad to be convinced that a larger air-pipe is more effective" than the 1 in. one which he advocates.

It appears to me rather strange that anyone who has anything to do with siphons, and who carefully thinks over the effect of the flow of water through them, should compare, as Mr. D. does, a "simple water-siphon" with the siphon-trap of a w.c. Let us look at them for a moment. Mr. D. says both have a long leg and a short one. Very true; but did it never occur to him that in the one case the long leg was rarely more than twice the length of the short one, and that the liquid was drawn through its small bore with comparative ease? While with the other, the long leg, which is the soil-pipe, is frequently 40ft. long, with a short leg of only an inch or two, and that through this siphon the water rushes in large volumes.

Surely Mr. D., upon reflection, will see his error, and, for the benefit of those he has unintentionally misled, acknowledge it.

Again Mr. Drury says, "Supposing the trap is unsiphoned, little or no harm is done, because the apex of the trap is free from accumulation." What! a w.c. trap fixed at the head of a cesspool drain unsiphoned, and liable to remain so for (sometimes) hours, during which time the contents of the cesspool may be stirred up from other sources, over and over again, and no harm done? Does Mr. Michael Drury believe this? I hope not.—I am, &c.,

DANIEL EMPTAGE, S.E.

Dane Hill Sanitary Works, Margate,
August 19.

UNTRAPPED GULLY-HOLES.

SIR,—Mr. Rawlinson recommends the Town Council of Brighton (see page 251) not to have the street-gullies trapped.

Perhaps if this were done throughout a town the sewer-gas would be "so diluted as to be practically harmless."

But Mr. Rawlinson admits that "an unpleasant odour might be experienced in the street." That seems to me a quite sufficient reason for keeping the gullies trapped, and getting rid of the foul air by pipes attached to, and carried to the top of, each house. It is much better that people should be over-fastidious about the smell of sewer-gas than that they should think it harmless. I know of a case where two persons, waiting one evening in the street for an omnibus, noticed a strong smell coming from an untrapped gully.

Foolishly enough, they did not move away. They were both taken ill with typhoid fever, and one of them died.

This, at any rate, was not "an imaginary grievance."—I am, &c., C. F. M.

DRY ROT IN TIMBER.

SIR,—There are nowadays only few naturalists who believe in spontaneous development of germs or fungi, and even these few admit the possibility of the propagation of diseases by wandering germs. It is, therefore, advisable to protect the timber against the contact with such materials as are likely to carry and develop the seeds which produce dry rot. However well-seasoned the timber may be when put in, such

materials as sawdust, hay, straw, shavings for sound-proofing, old laths for plaster-pugging, old soundboards and fillets for concrete-pugging, &c., will necessarily endanger the soundness of the building, because they are likely to contain the germs of putrefaction which is conveyed by any draught of air to all parts. Therefore, the greatest care must be taken about the material for pugging. Dry rot, where it can be got at, is easily to be cured. Wash the affected surfaces with a solution of chloride of magnesium ($MgCl_2$) of 8-10 per cent. specific gravity, and when the film is thoroughly soaked, scrape it off and burn it, wash again, and heat the wet surface with a movable gas-flame or otherwise until it is dry. During this process hydrochloric acid will evaporate, leaving in the pores of the wood small particles of magnesia (MgO). All vegetable life is now destroyed, and it will take some time before new germs can take root. The surface may be painted over with silicate of potash of 5 per cent. specific gravity to make the wood non-inflammable.—I am, &c., C. BAATSEN, C.E.

COOPER'S HILL AND THE ROYAL ENGINEERS.

SIR,—Glad to see the letter of "An Indian Civil Engineer" in this week's issue. I, too, strongly objected to the tone of "Jaalam Smith's" remarks, and regretted that I had unintentionally been the means of lighting up such a firebrand, as my only object in addressing you was to prevent that unwarrantable assertion of the Duke of Argyll passing uncontradicted, or at any rate unqualified—not to set on foot comparisons which are always odious.

I am certainly of opinion that taking the two classes, Royal and Civil engineers, the balance of education and general ability is on the side of the former, and during the whole of my service in India, I met with nothing but fairness and kindness from my superior R.E. officers, firm friendship, and cheerful companionship from those of my own standing, and hard work with willing obedience from the junior officers; indeed, it is this kindly feeling that prevents many civilians joining that agitation advocated by some of the P.W. department, and recently embodied in a letter to Mr. Gladstone by their representative.

There is undoubtedly great room for improvement in the pension rules of civilians which I hope to see carried out; but it must be remembered that the existing rules were framed at a time when the civilian element was not of that high standard that of late years has existed in the department, and that many of them in those days were not civil engineers at all, only clerks of works, and men of a similar class. Only since about 1867 has a better class of officer been introduced, i.e., from the commencement of the railway era and of Lord Mayo's Vice-royalty.

I cannot quite agree in thinking that animus should be against the R.E. corps, whether as a body or as individuals, but (if at all) against those individuals who hold the reins, whether civil or military. What good comes to the civil engineers when their cause is ably advocated by a Royal Engineer (as, for instance, by Colonel Sir Andrew Clarke, one of those fair and above-board officers who, I am thankful to say, are by no means scarce in the corps) if all his plans are vetoed by a viceregal council at the instigation of the Minister of Finance, a civilian? He is far more the stumbling-block of the C.E.'s than all the Royal Engineers in the department.

Much more could be said, but I will not take up more of your space.—I am, &c., PETER PLAYFAIR.

August 22.

The Mills Memorial in the parish-church of Yarmouth has just been completed. It occupies the entire west end of the great south aisle. The triplet of windows has been filled with stained glass, the Raising of the Widow's Son at Nain occupying the centre, and on either side are two female figures—Faith, Hope, Truth and Immortality. The wall-space has been decorated in colour with lilies and roses, chevrons and flowers, and beneath the sills is a dado of polished and enamelled slate.

A portrait of the Bishop of Salisbury—a gift of the diocese—was presented to the Bishop at his Palace yesterday. It is from the easel of Professor W. B. Richmond.

Intercommunication.

QUESTIONS.

[6630.]-**St. Botolph.**-Any information respecting the symbols, attributes, history, &c., of St. Botolph will oblige, as Audsley, in his book of Symbolism, does not mention them.-ASH.

[6631.]-**Oak Shingles.**-Will any reader kindly inform me as to the best method of laying the above, and the usual size and thickness, and describe how they should be specified?—A 10 YEARS' SUBSCRIBER.

[6632.]-**Contracts Signing.**-Can an architect, as the representative of the employer, sign contracts on behalf of same, and in so doing, will the contract be binding on the contractor and employer?—H.

[6633.]-**Curves in Perspective.**-Can any reader give the best means of drawing curves in perspective so as to make the lines firm and pleasing to the eye, and kindly state when instruments may be used, and what kind?—S.

[6634.]-**Priced Quantities.**-Is it necessary to sign and stamp priced quantities at the time of signing contract, so as to make them binding upon contractor and employer?—F.

[6635.]-**Architect's and Valuer's Licence.**-Is it necessary for an architect to have a valuer's licence in pricing and getting out builder's accounts or valuing materials in connection with contracts and buildings?—H.

[6636.]-**Books on Construction, &c.**-Will any one kindly answer the following:—What is the best work on building construction and carpentering (in the building trade only)? Is there any book which gives information on sketching architectural buildings and taking measurements of details? What is the best practical introduction to Gothic architecture?—ARCHITECTURAL PUPIL.

[6637.]-**Government Berths.**-Would any of your readers kindly let me know where I can obtain any book that will give me a list of the above that are connected with the building trade, with subjects for exam., &c.?—A. J.

[6638.]-**Engine and Fuel.**-I should feel much obliged if any reader would kindly reply to any or all of the following queries:—How much ordinary coal will a 12 H.P. agricultural engine burn in 10 hours? How much oak fuel in same time? The ordinary price of an efficient 12 H.P. engine, any maker, new? Its weight packed for transhipment abroad?—S. F. C.

REPLIES.

[6589.]-**Reservoir.**-I believe "L. L. U." would find a large filter-bed the best for use. I suppose that he would only fill it occasionally from the stream, and he would not be continually carrying off the water by his supply pipe. At first I would lead the water from the stream into the filter-bed, and when the latter was full cut off the supply; the water would then filter through into one of the storage chambers till the level was even on both sides, this would probably make both the filter bed and storage chamber both about two-thirds full; then as the establishment drew off the water from the storage-chamber, it would be advisable again to fill the filter-chamber from the stream, after which the supply would again be closed. This fresh supply would probably, with what remained from the first, cause a small quantity to flow over into the second chamber, and the total quantity would probably be the largest amount ever kept in the three chambers. It was stated in the question that the stream was sometimes befouled by a clayey admixture, in which state it would not be advisable to fill the filter-bed from it, it is therefore pretty well necessary that the chambers should hold a supply for a week or even longer. If the filter-bed were quite full not allowing for filtering material or any empty space at surface, it would hold nearly 3,000 gallons, but as this must be considered, the total amount would not be 2,000 gallons or less than 300 gallons per day for a week's supply. This would of course be increased were a second quantity of water run into the filter-bed, after the first had pretty well filtered through, and on the other hand the amount would be decreased by an act of forgetfulness or bad weather coming on when not expected, and preventing the owner from taking a fresh supply from the stream when he intended. There is no connection between the size of the chambers and the size of the supply-pipe leading therefrom. A depth of two feet would be sufficient for the filtering material, of which 6 in. should be charcoal. I believe vegetable charcoal would be cheapest, and is good enough for the purpose, as the filtering material would be easily renewed. I am unable to inform your correspondent where to obtain it, but a contractor would probably know.—HUGH McLACHLAN.

[6597.]-**London Bridges.**-“Beta” will find a very good account of the construction of Charing cross railway bridge (over the Thames) in one of Weale's series entitled “Civil Engineering,” by Lsw and Burnell, with recent engineering works by D. K. Clark, M.Inst.C.E.—THOS. R. DAY.

[6611.]-**Measuring.**-In brick buildings the different measurements of heights can be easily taken with sufficient correctness by counting the courses, and then allowing four courses to the foot, or, more exactly, by measuring one dozen courses and calculating proportionately. Stone ashlar work and coursed rubble can at times be taken in the same manner, if it is found that several courses average the same all up, but seldom so correctly as in brickwork. Heights are occasionally taken by a mere judging of the eye so to speak, that is an elevation is carefully sketched in as correctly as the eye can judge and the hand perform, one or two measurements are then taken where accessible, and the remainder calculated therefrom proportionately to the drawing. It is very seldom this can be correct, the height thus found being generally too low, owing to the shortening of its appearance explained by the laws of perspective, yet I have seen one or more cases of old buildings illustrated in the BUILDING NEWS were thus taken. Otherwise inacces-

sible heights must be taken with optical instruments or calculated by trigonometry and mathematics.—HUGH McLACHLAN.

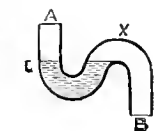
[6613.]-**Setting Pencil Sketches.**-I have met with the same experience as “Toad in a Hole,” and am sorry I cannot give a remedy after the mischief is done though I hope I can to prevent it in future. In my opinion the reason of these spots is a want of care in the setting of the sketches, it was so in my case. After covering the whole of the sketch with the diluted milk, I roughly drained off the superfluous liquid and left the drawing to dry; the result was that in so doing the largest part of the liquid not drained off settled in one or two places, after which the water was drawn off by evaporation, leaving a creamy deposit causing the spots described in the question. In my case I was careless as to the appearance of the sketches, being anxious only to preserve the pencil lines and figuring; I have not looked at them for the last few years, though I could get at them if I wished to. If the liquid were carefully drained off, and afterwards any settling removed during formation with a brush, I believe no such defects would be found.—HUGH McLACHLAN.

[6614.]-**Chalk in Concrete.**-Chalk is suitable for the purpose intended. I have seen it similarly used in the interior of the cloister walls of Westminster Abbey. The medieval builders appear to have been fond of a concrete core for their walls with ashlar facing. The chalk should be considered as replacing some of the larger ingredients of ballast or chippings; it is necessary that it is not open to the weather, nor used when great weight has to be borne, being a soft stone only. Proportions: One of cement, three of chalk, and six of ballast and sand.—HUGH McLACHLAN.

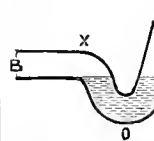
[6616.]-**Order for Additions or Deductions.**-It is not necessary to have a form when giving written orders, any letter or note expressing what is required and properly signed is sufficient for the purpose. The contractor would be sure to keep any order for extras as a voucher; but were he dishonest and to deny receiving any order for deductions it would be necessary for you to prove his receipt of the order, this may be done by sending it in a registered letter, or by having it delivered to the contractor by two witnesses.—HUGH McLACHLAN.

[6619.]-**Carpentering.**-In addition to information already given, the best glue, besides being hard, somewhat transparent and of a bright amber colour, will generally be found to be in thin cakes, very different from the thick black-coloured cakes of common glue which can be had at about half the price of the best. In preparing it, it should be as described by “L. L. U.” and W. Jackson, well soaked; water should not be mixed with it. I generally prepare glue the day before I require it, giving it sometimes 24 hours to soak, it should have at least six, when well soaked pour off any water remaining that is not absorbed or carried off by evaporation, otherwise your glue would be too thin. Cover the joints well with the hot glue after it is melted, then in fitting press out as much glue as you can, for the less glue that remains in pressing a joint well together the better, though it should not be stunted before fitting. Do not mind wasting the glue a little.—HUGH McLACHLAN.

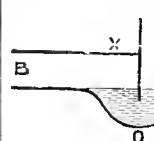
[6624.]-**Traps.**-The simplest form of trap is the ∇ , the section being thus— the water resting in the hollow at the angle of the bend. The ∇ -trap is exactly the same in principle as far as I know and has an extra bend, its section being



the water occupying the same position as in the last. The ∇ -trap is a very slight modification of the ∇ , but having the advantage of a deeper water seal and a sharper angle to check the movement of the contained water during the movement of siphonage or the emptying of the trap of water, the section is—



It consists of a chamber shaped like the letter ∇ (whence its name) but having a division to check the water during siphonage, it has also an opening to clean it out when needed. There is one other variety of trap much recommended, Smeaton's “Eclipse,” the section being thus—



The outer line is similar to that of the ∇ and ∇ -traps, but it has the division of the ∇ -trap to check siphonage. In the sections before given A is every case make the inlet and B the outlet. The easy curves of the ∇ and ∇ -trap assist the cleaning of them but makes siphonage easier, whilst the sharper edges of the ∇ , ∇ , and Eclipse traps make the action of siphonage more difficult, but render them more liable to fouling. This shows that what is beneficial to self-cleaning assists siphonage and vice-versa, therefore each has its advantages and disadvantages. All traps should be ventilated to carry off foul gases and hinder siphonage, this can be done with all the traps where marked X. All traps are liable to fouling, and provision is made in the best of each kind where marked O for this purpose some opening from the side, some from below, and the ∇ from above.—HUGH McLACHLAN.

[6622.]-**Building Construction.**-In reply to “F. P.,” surely a great city like Edinburgh is not with-

out its school of art, and I have no doubt that with very little trouble he would soon find such a school where he would obtain instruction on above.—FRED. J. FREEMAN.

[6623.]-**Building Construction.**-There is a science and art school at Edinburgh in connection with South Kensington, where I expect building construction is taught; possibly by inquiry on the spot better information may be obtained, professional schools being as a rule superior to the Governmental.—HUGH McLACHLAN.

[6627.]-**Photos. Pencil-Sketches.**-Soak the photos in water till they leave the mount freely. Let them lie in water all night if requisite. I have unmounted a great many in this way, of all sorts and sizes, and have not had one injured. To set charcoal, crayon, or pencil drawings, use bleached gum-mastic, dissolved in methylated spirit or spirit of wine, blown over the drawing with an ordinary odorator, purchased at a chemist's. As much gum mastic should be put to the spirit as will dissolve. I usually use methylated spirit as being cheaper, but for important drawings should use spirit of wine. This method is far superior to any which requires the drawing to be washed over.—JOHN TRAVEN.

[6628.]-**Styles of Architecture.**-In reply to “F. B. P.,” read “Styles of Architecture,” by T. Talbot Bury, F.R.I.B.A., &c. Illustrated, 2s. Crosby Lockwood and Co. “Nicholson's Architecture,” 15s. 6d., and “Rickman's Attempt to Discriminate the Styles of Architecture” (with considerable additions), by J. H. Parker, F.S.A., 13s. The two latter works may be obtained from Mr. B. T. Batsford, 52, High Holborn, London, W.C.—FRED. J. FREEMAN.

PARLIAMENTARY NOTES.

OPENING OF MUSEUMS ON SUNDAY.—Mr. Alderman Fowler, last week, asked the Vice-President of the Council whether he was aware that works of art for loan exhibition from South Kensington had been publicly exhibited on Sunday; and whether, in view of the fact that Parliament had repeatedly refused to sanction the opening of the State museums on Sunday, he would give directions that works of art should be loaned from the South Kensington and other museums for exhibition, only on the condition that they should not be shown on Sundays so long as South Kensington and other State museums remained closed. Mr. Mundella.—I am not aware that works of art by South Kensington have been exhibited on Sunday. No statement to that effect has reached the Department. Our general practice is to make loans to museums established by and under the control of municipalities or the managers of local schools of art (hear), and I should consider it a very improper interference with the rights of municipalities to refuse a loan on the ground suggested by the hon. member. Since coming down to the House, I have heard that the municipal museums of Manchester and Birmingham are open on Sunday afternoon; but the hon. member could not expect us to refuse loans to those important centres on that account.

DECORATION OF THE HOUSES OF PARLIAMENT.—Mr. Lefevre, on Tuesday, in reply to Sir H. Tyler, said it was originally intended that there should be four pictures painted by Mr. Herbert, R.A., for the Peers' Robing-room. When the second picture was ordered it was expressly stated that the Government would be under no obligation to give any further order. The picture entitled “Moses,” already placed in the Robing-room, had given satisfaction. The second picture, entitled “Daniel,” had not yet been placed, and it would be premature to express an opinion about it.

LEGAL INTELLIGENCE.

ST. MARGARET'S CHURCHYARD, WESTMINSTER.—An application was made on Tuesday to the Chancellor of the Diocese of London, sitting at the Chapter House, St. Paul's, by Canon Farrar, the rector of St. Margaret, Westminster, and the churchwardens, for a faculty or licence to make improvements in the churchyard. There was no opposition, and the Chancellor said he had no hesitation in granting the faculty. There was one feature in it which was novel, and that was that his authority was asked to allow the tombstones to be covered over with soil. It was the first time he had been asked for such an order, but after the evidence given by Mr. Pearson, he could have no doubt that the inscriptions would be best preserved in that manner. He should, therefore, allow the faculty to be issued, and should direct a provision that the earth should be removed, if it became necessary, to examine the actual inscription on a particular tombstone, as a copy of the tablet might not be added in a court of law.

ST. JAMES'S CHURCH, PADDINGTON.—An application by the rector and churchwardens, for a faculty to reconstruct the body of the church, again came before the court on the question of hearing. Mr. Gainsford Bruce appeared for the petitioners, and Mr. Blakesley for the respondents. It was urged that the case should be heard without further delay, so that the works might be commenced in the present vacation. The learned Chancellor gave his reasons for proceeding with the case during the present vacation, and proposed that as Mr. Street, the architect, was about to

leave for the Continent, his evidence should be taken. Mr. Blakesley protested against the hearing of the case, as he was not sufficiently prepared. Mr. G. E. Street explained the plans he had prepared. He had several tenders for the work, and had no doubt that it could be accomplished for the sum subscribed—namely, £15,000. Mr. Blakesley declined to cross-examine Mr. Street, as he did not know what his witnesses would say. It was out of no want of respect to the Court that he had so acted. Mr. Howell, a parishioner and an architect, entirely confirmed the evidence of Mr. Street. Mr. Blakesley briefly cross-examined the witness, and the case was then adjourned.

WATER SUPPLY AND SANITARY MATTERS.

THAMES SEWAGE.—A deputation of gentlemen residing on the banks of the Thames between Gravesend and Woolwich, submitted to the President of the Local Government Board, last week, that the sewage from the Crossness and Barking outfalls is creating a great nuisance, and is deleterious to health. Mr. Dodson remarked that there was no evidence of increased sickness; but he promised to consider the statements that had been made. According to the report of the Thames Conservators, they have, with the object of preventing pollution, caused a rigid inspection to be maintained over the river, and likewise over the tributaries within ten miles of the Thames. These sewage works at the various places above the intakes of the water companies having been completed; the sewage formerly discharged directly into the river has been diverted. Occasionally, some defect in the action of these works is discovered, when steps are immediately taken, by legal proceedings, if necessary, to cause the defect to be remedied. On the tributaries many offensive and injurious discharges have been stopped, and several local authorities and other persons are now under the notices required to be given by the Conservancy Acts to discontinue the flow of sewage and of offensive and injurious matter into the affluents of the Thames. Should it be found that legal or other difficulties impede the action of the Conservators in carrying out the complete purification of the tributaries, the Conservators trust they will be able to obtain the sanction of Parliament to such additions to their present powers as may be deemed necessary to insure the thorough purification of the streams flowing into the Thames. The periodical surveys of the river having shown that shoals had been formed in Half-way Reach since the opening of the Metropolitan Sewage Outfalls, the Conservators deemed it advisable that an inquiry should be held under sections 20 and 21 of the Conservancy Act, 1870. That inquiry was limited to the question whether a sufficient obstruction to the navigation had been caused to render the Metropolitan Board of Works liable for the removal of such obstruction. This question the umpire and arbitrators had decided in the negative. It should be noticed, however, that the question of the pollution of the river could not be raised in this inquiry under the sections of the Act of 1870. During hot weather, when there has been little rainfall, complaints of the pollution of the river within and below the metropolitan district frequently reach the Conservators. The pollution thus complained of is indicated by the offensive odour and highly discoloured state of the water. It must be remembered that Kingston and Richmond, and other places below the intake of the water companies, still pass their sewage into the river, the penalties for their doing so having been suspended by the Legislature to give time for overcoming the difficulties of carrying out a complete sewage system for this district. Although the discharges from these places may in some degree affect the purity of the river near the metropolis, the Conservators think it can hardly be doubted that the chief cause of the polluted state of the river within and below the metropolis arises from the discharge at the outfalls and storm outlets of the Metropolitan Board of Works, in whose district ordinary sewage is exempted from the provisions of the purification sections in the Conservancy Acts.

STAFFORD WATER SUPPLY.—The boring operations on Stafford Common having proved a failure, a special meeting of the town council was held last week to receive a report from Mr. McCallum, the borough surveyor, as to the best means of increasing the supply. Mr. McCallum reported that either of two plans could be adopted—the one being to obtain water from the South Staffordshire Waterworks Company, and the other to pump water from a well at Berkswich, less than two miles from the borough boundary. The initial cost of the Berkswich scheme would be about £9,500, including a provision of £3,800 for reservoir, and the annual maintenance would be about £1,171 per annum. The use of the South Staffordshire Company's water would cost a capital of about £7,456, chiefly for mains from Huntingdon, and the annual payments for 400,000 gallons of water at

34d. per thousand gallons, and maintenance, he estimated at £2,645. By 14 votes to 3 it was decided that a trial boring be made at Berkswich at a cost not to exceed £500, the work to be executed by Mr. Timmins.

EVESHAM.—The Town Council of Evesham decided on Wednesday on a scheme for obtaining water from Snow-hill Valley, in the Broadway Hills, six miles from the town. The cost of the works is estimated at £10,250. The terms asked by Mr. Edgar Flower, of Stratford-on-Avon, the owner of the estate, were very favourable to the Corporation.

STAINED GLASS.

WESTERDALE CHURCH.—DUNCOMBE MEMORIAL.—A new two-light stained-glass window, dedicated to the memory of the late Colonel the Hon. Octavius Duncombe, Lord of the Manor of Westerdale, and for twenty-five years M.P. for the North Riding of the county of York, was on Sunday last unveiled by the rector, the Rev. J. R. Ellis, in the presence of the Earl of Mulgrave, the Hon. Lady Caroline Duncombe, &c. The window is in the nave. Each light is divided into two compartments by decorated bordures, allowing the introduction of four groups, illustrating respectively the "Nativity of Christ," "His Baptism in Jordan," "Crucifixion," and "Ascension." The colouring of the subjects alone is rich, the effect enhanced by a white-diapered background, the general style and tone being (in architectural conformity) rather severe and antique, relieved by bordures of apple foliage and fruit. The window is from the studio of Messrs. Powell Bros., Leeds, Mr. H. Perkin, of Leeds, being the superintending architect. At the same time was unveiled another and smaller painted window, over an entrance porch, of which the subject is "Christ Blessing Little Children," dedicated to the memory of two infant children of the Rev. John Rathbone Ellis (the rector) interred at St. Asaph. This, with a larger Ellis family memorial window, antecedently erected, are also by the same artists.

CHIPS.

A very handsome decorated reredos has just been sent out to Sydney Church (N.S.W.), designed and executed by Messrs. Jones and Willis, of Birmingham and London.

Mr. R. Morgan, C.E., an inspector of the Local Government Board, held an inquiry at Brompton, near Chesterfield, on Friday, to consider an application from the Brompton local board for sanction to borrow a further sum of £1,575, to complete the sewerage scheme, upon which £10,000 has already been applied for and expended.

The memorial-stone of a new Baptist chapel was laid at Newtown, Radnorshire, on Wednesday week. The style is stated by a South Wales paper to be "after that of Spurgeon's Tabernacle," and the cost, including land, £8,000. Mr. George Morgan is the architect.

The memorial-stone of the new Mechanics' Institute at Derby was laid on Saturday week on a site adjoining the new Free Library.

Hughenden church, it seems, is really to be decorated to the memory of Lord Beaconsfield. The paragraphs say that one of the features will be four new windows, to complete "a series of designs illustrative chiefly of angelic appearances recorded in Scripture." The late earl, it will be remembered, says the *Guardian*, declared himself, at Oxford, as being "on the side of the angels."

The guardians of St. Pancras are about to erect Quarantine Wards at the parish schools at Leavesden Woodside, near Watford, so that the children sent weekly from the workhouse shall undergo a three weeks' quarantine before entering the schools. Mr. H. H. Bridgman is the architect.

Shirley Church, near Southampton, is now being erected by Messrs. Stevens and Sons, of Southampton. The Purbeck marble columns are the same as used in the restoration of Salisbury Cathedral, and also the rouge royal columns were supplied by Messrs. J. W. Bird and Son, of the Euston-road.

The foundation-stone of a new Masonic hall was laid at Antrim on Saturday, Aug. 20, by Sir Charles Lanyon, with full Masonic ceremony. Mr. William J. Fennell, of Belfast, is the architect.

By a lamentable boat-accident at Sidmouth, in Devon, Mr. John Churchill and a companion have been drowned. Mr. Churchill was hurried upon the 17th inst. His funeral was attended by several hundred of his fellow-workmen and friends. He was outdoor foreman to Mr. Harry Hems, of Exeter, and had only held that position since the death of Mr. Stephen Shute, a notice of which event appeared in our issue for Sept. 17th, 1880. Churchill, who was only 28 years old, leaves a young widow.

Our Office Table.

The biggest thing on record—in obelisks this time—has, as usual, been achieved by the Yankees. Mr. H. Q. French writes as follows to the *New York Times*:—"In view of the attention recently given to the obelisk brought and set up in Central Park at a reported expense of over 100,000dols., the height of which, exclusive of pedestal, is 69ft. 1in., the following may be of interest to your readers: At our Westerly (R.I.) quarries we have just obtained a single stone 150ft. long, 10ft. wide by 8ft. thick, weighing over 1,000 tons, and the stone was loosened by one oblong blast-hole in such a simple and perfect manner that the theories and conjectures advanced by many as to the methods of the Egyptians appear absurd. Here is a stone that could be finished and erected in our own progressive land which would far exceed the largest stone the ancients are so far known to have handled. The obelisk of the most extraordinary proportions of which ancient writings give us any record was that of Queen Semiramis, described by Diodorus Siculus: as 125ft. in length and 5ft. in breadth and thickness. The block I mention contains over 12,000 cubic feet, and would be worth, cut into pieces, about 30,000dols., while if we desired to use it in its present shape the value would be far greater. I am quite positive this piece could be brought to this city, finished, and erected for about 150,000, but our demand for this granite is so great that we shall soon cut it into smaller pieces, with a possibility of getting another that would equal, if not excel, this monstrous stone."

The first general meeting of the British Association will be held on Wednesday next, at 8 p.m., in the Exhibition Building, York, when Prof. A. C. Ramsay, LL.D., F.R.S., V.P.G.S., Director-General of the Geological Survey of the United Kingdom, and of the Museum of Practical Geology, will resign the chair; and Sir John Lubbock, president-elect, will assume the presidency, and deliver an address. A complete programme of the local arrangements in connection with this, the jubilee meeting, has been issued by the hon. local secretaries, the Rev. T. Adams and Dr. Tempest Anderson. It contains information on all subjects specially connected with the meeting of the Association, such as places and times of meeting, and some account of the excursions. A short chapter on the zoology of Yorkshire is contributed by Mr. W. Eagle Clarke and Mr. W. Denison Roebuck, and one on the botany of the district by Mr. Thomas Gough, B.Sc. An interesting sketch of the York founders of the Association is by Archdeacon Hay.

A CORRESPONDENT at Rome writes:—"The demolition of the bakers' ovens and other wretched edifices built up against the posterior portion of the Pantheon has revealed the grand old walls which connected it with the *thermæ* of Agrippa. Notwithstanding that plans and engravings of these remains are to be found in the works of Fea and other well-known archaeological writers, their existence has taken the modern world of Rome by surprise, and there has been much controversy as to whether they should be allowed to remain or not. The modernisers of Rome, no matter what is sacrificed, have been urgent in demanding their destruction that the round mole of the Pantheon might be completely isolated; but the arguments of Roman archaeologists and scholars, jealous for the remains of the ancient city's grandeur, have apparently prevailed. It is true beyond dispute that to the just requirements of the capital of united Italy all other considerations must bow, but it does not at all follow that Rome should, by the commencement of the 20th century, be converted into a fifth-rate Paris."

It seems to be a fact, deduced from French Government statistics, that the exportation from France to this country of productions having an artistic element has only, in the last twenty years, increased 15 per cent., whereas importation into France of similar goods has increased to the extent of 488 per cent. This result is mainly credited, by those interested both in England and France, to the English schools of art. In a report this year, to the Chamber, on the estimates for the fine arts, M. Lockroy says plainly, "England has become our equal in furniture and ceramics."

THE BUILDING NEWS.

LONDON, FRIDAY, SEPTEMBER 2, 1881.

HOLIDAY WORK.

THE season, given up to archaeological rambles and sketching tours, is with us; and, in spite of the weather, some work has already been accomplished, as our pages during the last few weeks have borne ample testimony. It was rather unfortunate that the same ground was chosen for the Architectural Association's excursion this year, as had been selected by the British Archaeological Association, though, after all, each of these societies has its own point of view, as each has travelled over much the same ground, but by somewhat different paths. Probably no richer district could be found for picturesque scenery and archaeological investigation than that intersected by the Severn valley. Geologically, the red sandstone formation gives a character to the buildings of the locality, even as far as Bridgenorth, while to the architect few counties yield so rich a harvest of remains in Norman, Transitional Norman, and later styles as Worcestershire. From the archaeologist's point of view, evidences of antiquity are of far greater concern than the most beautiful examples of style, and we cannot be surprised if a few of the visitors indulged in giving free expressions of regret at what restorers had done. But we are glad to see that these meetings are occasionally tempered with common-sense, as well as a veneration for antiquity, and we note with pleasure the sensible remarks made by the Dean of Worcester, in his inaugural address at Great Malvern, which we fully reported last week. The Dean asked rather satirically whether the restoration and preservation of ancient buildings are not both alike the result, and in some degree the cause, of a great want of originality in the present day, and he very truly instanced the freedom and boldness of those who altered and enlarged the cathedral of Worcester. They did not hesitate to add to the Norman cathedral the Early English choir; nor did the 15th-century builders scruple to insert into the Norman walls of the chapter-house, windows of a totally different character, namely, contemporary Perpendicular.

The Dean's explanation seems the only one. Our habits of restoring and preserving have not certainly done much to make architects think for themselves, and such careful and minute study of old work seems likely, as Dean Alwyne Compton said, "to check any freshness of artistic thought." Our readers will peruse with satisfaction the remarks made by the president of an archaeological meeting, in which he admitted that, even as regards Renaissance work, the copying of ancient forms and decorations has had the effect of destroying style altogether. The only hope of advancing is, as we are told, in the employment of new materials, and in new methods of treating the old. There is also a good deal of truth in the statement that "perfection of workmanship," or neatness and finish, combined with cheapness, has tended to destroy fine art, and to make people value the imitative power of making a thing more than the thought. The younger architects and enthusiastic archaeologists will do well to remember that the old architects, like William of Sens and William of Wykeham, had not the facilities for travelling they have; that there were no annual excursions, and that the work of the Saxon or the Roman was not copied and revered as we are now doing theirs. Viewed in the light of the

past, this reverential mood has not been an unmixed gain to us.

Our more immediate purpose now is to dwell upon the actual results and possible work of the holiday season. We do not deny that a well-selected tour on the Continent, or even a flying visit through some parts of England may be the means of infusing some freshness into the mind of the young architect; but we have some misgiving as to whether it affords him much help or prepares him for original work. A few students take council together and set off on a sketching expedition, portfolio in hand. They take all the churches and remnants of monastic buildings to be found in their route, which they sketch to their heart's content, and come home laden. The sketches are labelled and put by for future reference; but when the sketches are looked at a few months or years hence, it is discovered that, by a most provoking omission, the measurements are not given, and what might have been usefully taken as a detail, becomes only of interest as a sketch. A capital or an arch moulding drawn from a clerestory has not been noticed with sufficient care, and has been taken for work on the ground-story, and the very dimensions of importance, diameter of shaft, its height, or position in the building, have been neglected. A more frequent source of vexation is that a sketch-plan, however rough, has not been made, and the whereabouts of a particular moulding or detail is lost. As for the general sketches of exterior, they are always interesting to look at; but their real value, save when finished as drawings or water-colour sketches, becomes of no account through the amount of uncertainty attached to them. But, for all that may be said in disparagement of sketching—and we are only alluding to hasty sketches—it is better that impressions be fixed on paper than lost to view altogether. The purport of our remarks is simply that, for practical architectural purposes, the rough, unfigured sketch has little value, and that for real instructive sketching of old work, the student ought to go prepared to do hard work, and to make his sketching so perfect, and his details so connected, that he can return home and redraw to scale the church, or portion of it, he has been engaged upon. For this object, it of course becomes necessary to go provided with a tape as well as a rule, a ready means of taking heights, and of making angular measurements. The sketch-book ought to be of good size, not a mere pocket-book, and the necessity of a straight-edge, scale, or set-square hardly needs to be insisted upon, though not perhaps absolutely, for all sketchers. Sketching at random is a pleasant way of employing the time; but it is, after all, rather aimless and certainly of little use. The subject is perhaps a capital or a boss, an arch-mould or a bit of tracery. Its chief value to the student is the exercise it gives him, the power over the pencil and grasp of subject it affords, and even such work is a gain; but why not take a little more time in fixing the positions of these features by reference to their height, and to their place on the plan? The student, during a hasty perambulation, is likely to commence sketching the least-important part of a building; in his eagerness to "do" something, he takes a capital or a piece of carving, but perhaps misses the most important point after all. At Worcester Cathedral, for instance, recently, we should not have been surprised to find him sketching a bit in the cloister, but neglecting the fine apsidal crypt of Norman date which ranks with that of Canterbury, and is a somewhat unusual feature in England. Again, how often we see a prettily-sketched capital and bit of arch-moulding, but without any evidence of its height above the

paving. The plan of the shaft and its dimensions have been overlooked, and there is nothing to indicate the span of arch or its proportions; and these omissions lead us to speak of the importance of careful plans and sections, as well as perspective sketches.

The slap-dash mode of doing work rather in vogue with younger members of the profession may make any advice about pursuing a method in these excursions extremely unseasonable; but if architecture is to be learnt by these tours, the details of plans and measurements ought not to be thought irksome. We may, therefore, offer a little advice on a few points about which correspondents frequently ask for information. The first thing to do in "attacking" any given subject is to thoroughly examine it; to walk round and look at the projections, marking any new feature in the exterior of the building; to thoroughly probe any part which seems doubtful, and afterwards perambulate the interior. This superficial examination made, the sketcher may begin to take a few leading dimensions of the ground-plan, plotting to a small scale the chief boundaries and piers, or if time will not permit of this, making a rough hand-sketch, and figuring the principal dimensions, especially those having reference to the part he is about to delineate. It is very necessary to mark the widths of all arches, door, and window openings, and by a few measurements to fix the positions of them in reference to an angle or cross wall. Careful observation of the salient angles and points will be time well spent, and insure more accuracy than a number of small dimensions; and we, therefore, impress upon the reader the importance of a general plan by which any geometrical proportions may be likely to be discovered. Centre lines and angles ought to be laid down in plotting a building with any accuracy, as they may disclose peculiarities of setting out and planning which may escape mere observation. It is a good plan to range lines of walls, arcades, &c., and to take offsets from them. When a fair plan has been made, parts may be lettered and details drawn of them to a large scale, and we would dwell upon the necessity of not omitting dimensions of height in sketching. It is a good plan, when time allows, to roughly plot the section or any elevation, filling in details at one's leisure. Many sketches are worthless from omission of these requirements. It is more useful to draw careful sections of mouldings to a scale than by the eye, and we here insist on sectional accuracy. For this purpose it is desirable to be provided with a small builder's level, but a plumb-line and spirit-level, which can be carried in the pocket, is sufficient for most purposes. These, a tape, and a two-foot rule, are all the plotter requires to take off the mouldings and their projection with accuracy. No capital can be drawn properly without taking the projection of each moulding from a plumb-line held close to the abacus, by which also the vertical heights can be ascertained. It is impossible to judge by the eye the projection of cornices, though fair proportional sketches may be made of them.

The greatest and sometimes insuperable difficulty in sketching churches is to measure the height of wall-plate, ridge, or, indeed, any part not accessible by a rod or tape. Various hints have been given, such as throwing a long line or string with a ball attached to one end over the ridge of roof, by which, if the other end of string is held down to the ground, straight with wall, and the ball on the other side is allowed to descend to the eaves level, the sides of roof and vertical height to eaves can be obtained, as the width is known; but this plan is not always practicable where aisles exist. The plan we have generally adopted is easier and less trouble-

some, as a rather stiff-jointed rule answers the purpose, and this is always supposed to be carried. Let it be required to take the height of vault: as the nave is generally accessible throughout its length, we walk from the west wall eastwards, till we reach a point at which an angle of 45° from the level of the eye is made to "sight" the ridge level. By measuring the distance from this station to the said wall, and adding to it our own height or level of eye, we obtain approximately, and quite accurate enough for plotting, the height of the ridge, as we know that the two sides of such a triangle are equal. A rule opened to an angle of 45° is the only instrument necessary, but any angle or set square may be used, and the sides can either be plotted or calculated by a simple rule of proportion. When the base of an object like a spire is inaccessible, there is another rule which is easily remembered, and that is to lay the triangle on the ground, or set it out horizontally by measuring any convenient distance at right angles to the line connecting the observer's position with the object. Two sides of a right-angle triangle being obtained, a second triangle is soon made, and then the sides are easily calculated by the well-known proportion. It is generally, however, to obtain vertical heights whose bases are accessible that the sketching student is in most need, and the former plan is sufficiently accurate if the horizontal side of triangle is held perfectly level. Arches are another trouble to the plotter. An arch may be generally sketched with tolerable truth; but it is desirable to obtain, if possible, the points of striking. To do this, the curves must be plotted with accuracy, or, at least, offsets from a chord-line are necessary. It may be well to remember also that the old masons seldom started their curves directly from the impost line; and in taking the heights the real springing-level ought to be found; also the projection of archivolt from the line of shaft. The apex of an arch, from the spring line of course, is necessary, and for rough purposes this height and the span alone may be sufficient. It would be unnecessary to enter into all the little difficulties experienced in drawing from measurement; the leading ones we have already noticed. One word is necessary to guard against confusing the points and lines from which dimensions are taken, and centre lines are sometimes taken for surface lines and *vice versa*. It is generally better to fix upon certain datum lines both for the plan and the heights, such as a wall line and the pavement level, though as many check dimensions are desirable as can be introduced. Much disappointment and vexation is saved by being able to plot roughly the main plan and elevations in the building, filling up the detail at leisure, and by not leaving one place till these dimensions have been worked out. Jointing is often left out of sketches, an omission which detracts greatly from their practical interest. Every architect knows the importance of joints in stonework, and many apparently inexplicable features are explained when the jointing and construction are given. If there is one fault in the work done by the tourist artist, it is the haste evident, and the desire to get over a lot of ground in a short time. It is better to remain in one city than to make a scamper over a whole country, and there is the mischief that was feared by the president of the Archaeological Association at Malvern, that all this research into old things may tend to check any freshness of thought. If on no other ground, we hope that future explorers of old buildings will attempt to understand the intention of the old builders, as well as what they have left for our admiration, and not be content with disjointed fragments of a once beautiful whole.

HOUSES TO LET.

BUILDING a house to live in, and building one to let on lease, are two such very different things that we are inclined to dispute the old aphorism which says, "Fools build houses and wise men live in them." In these days of gigantic building speculations the ready-built house does not add to the weight of the old saw. From footings to roof it is so perfect a deception that the ordinary tenant wonders why people are so stupid as to give themselves any trouble about building; when every comfort and convenience has been arranged to suit the taste of the most exigent. There is plate-glass in the bay windows, tessellated tiling in the vestibule, a parquet hall, rooms of good size, a bath-room "with hot and cold water," lavatory, gas-fittings, and electric bells—every convenience, in short, that it is possible to get in an advertisement, and what more can the most exacting applicant desire? It must not be imagined we are pleading for the employment of architects, for in many localities professional assistance has not mended matters much. The chief thing to deplore is that would-be tenants are so easily led into a trap, that they still continue to take houses without examination, and that they neglect to avail themselves of the means of protection. Outside appearances, and an outer semblance of cleanliness and comfort, still lead men and women, who in other relations of life would be a match for imposition, into taking premises utterly incapable of affording comfort or even protection against the weather. People still continue to be led by outside show: a little cement ornamentation or stone carving about the windows, or glass panels to the front door are sure to find admirers, cover a multitude of defects, and essential blunders of construction and arrangement pass unnoticed. It is to be regretted there is not some means of certifying the condition of houses so that intending tenants may be guaranteed that they are entering premises in a state fit for occupation. Unfortunately, stringent regulations have hindered rather than promoted buildings of a suitable character, as some respectable builders hesitate to erect houses in neighbourhoods subjected to inspection. Mr. Cresswell's proposition to register or certify all houses in the same manner that the seaworthiness of ships is certified would lead no doubt to the abandonment of tawdry embellishments and false ornamentation, it would compel at least the builder to spend more on the essential requirements of the house, and in its turn a more wholesome competition would be promoted. Left to themselves, landlords will not trouble about the wants of tenants, and we cannot hope for a decided change till the law gives facilities for the purchase of freehold land by tenants. Building societies were started with the avowed object of encouraging the working classes to purchase their own land and houses; instead of which many of them have been multiplying houses, and doing the very thing which they were intended to prevent. They are now entered as a means of investment, the subscribed funds helping to increase the class of borrowers and small builders. The renter of a house has to pay heavily for his accommodation; he has to pay, in addition to the full interest on the capital expended in erection, a sum for the interest of money borrowed, and a certain amount for the loss of defaulting tenants and non-occupation.

Turning to the practical examination of houses built to let, we find builders more stingy than ever in parcelling out sufficient breathing area. In a new suburb we lately inspected in the locality of Brixton, a row of houses has been built to fill up a margin of land between a new road and an old

property. The latter is bounded by a high wall some 12 or 15ft. high, and the houses are built within 7 or 8ft. of the wall in the rear. In places they are only one room deep, except a kitchen at the back on one side, and the front wall is so close to the railing that any mischievous person or boy might touch the window-glass. These cramped areas, back and front, are cement paved, probably for the sake of cleanliness, and there is a very considerate covenant in the agreement that "no fowls are to be kept," an injunction we should think hardly needed. Other more essentially necessary points will be found neglected; and we are told few tenants care to inquire how the drains are laid, whether they go through and under the floors or not, and with regard to disconnected waste-pipes and ventilating gullies, they are things which no one, except perhaps a sanitary inspector, would care about ascertaining. One of the most objectionable things about these houses is, that the refuse or ashes have to be brought through the house to the road, sometimes through the scullery and kitchen, and generally the front passage is the only way. It is rather a perverse piece of builders' folly which provides for a coal-plate just in front of the main entrance, while no provision is made for the removal of the most obnoxious part of the domestic refuse. Ventilation under floors, and damp-proof courses, are generally mere pretences; air-bricks, inserted in front, are often nothing but shams, as the perforation is seldom continued through the brick wall, and a circulation of air is impossible with the usual arrangements. We often see the air-brick placed so low down that it becomes an opening to admit water to soak under the floors, and in this manner it becomes more dangerous than useful. As a consequence, the basement-flooring generally decays and sinks, its original level being indicated by the crevices under the skirting, and the position of the hearthstones. Although sanitarians have been constantly indoctrinating the principle of cutting off all waste-pipes from the drains, not one house in a hundred shows that the slightest attention has been paid to the teaching; the kitchen sinks continue to give vent to the most poisonous emanations, and the lead pipes, instead of being cut off outside and allowed to discharge into an open gully, are taken through the floor, as if builders were determined to adhere to the practice of their forefathers. The same disrespect for improved sanitary details appears in the closets and lavatories; all the principles that have been inculcated appear to have been quietly ignored by the builders of these modern dwellings, for we find unventilated soil-pipes incased or buried in inner walls with bad-seamed joints; pan-closets imperfectly trapped, waste-pipes from lavatory and bath entering the drains, and cistern overflows which allow sewer-gas to permeate the drinking-water.

There is another class of defects, though of less importance to the health of the tenant, to which it is necessary to call attention—we mean the poor joinery and cheap fittings throughout the house. Of course, no such thing as Memel or Dantzic is to be found; all the framing is of Swedish timber, and that of the most inferior quality. This is a matter, however, the tenant can put up with, if the doors and window-sashes shut tolerably close, and exclude wet and draught; but do we ever find them answer our expectations in these respects? And here, again, the inexperienced tenant is tricked by the old delusion. The doors are showily grained to imitate oak, satinwood, or maple, and their appearance beguiles the attention, but a little examination would in numerous instances show a "wind-ing" in the door, and that one's fingers might be placed between it and the rebate.

Nor is the jamb-lining or door-frame so truly fixed as it ought to be, defects which tell immensely against the arts of deception practised by the painter and grainer. The position of doors to the principal rooms is dictated by the whim of the builder; we frequently find the door placed so as to open exactly opposite the fireplace, without regard for those who may be seated back to the door in cold weather. The idea of the builder seems to be to give a symmetrical look to the principal room, which generally is the first to captivate the weaker sex in choosing a house. If the gilt pier-glass or over-mantel, with its *objets de luxe*, be seen from the door, it adds much to the "first impression" with certain people, whatever may be the discomfort after-experiences confirm during the colder months of the year. Then, of course, folding-doors is another of the weaknesses of "genteel" houses, and it may be necessary to caution the would-be tenant to see if the doors are so hung that one of them does not come in collision with the outer hall-door of either room. It is remarkable to find such a carelessness in planning; but we have really more than once found that sufficient wall room had not been left to clear both doors comfortably, the result of which is that a stranger or even an occupant occasionally gets a rather awkward knock when entering the room. A door close to the bottom of a staircase is a frequent cause of accident; nor must we omit the thoughtless plan of placing a door close to the corner of a room, the effect of which is that a useful surface of wall is lost for furniture, while anyone seated near the door may come to grief. We may caution intending householders to look carefully to the stoves, which are generally of a showy, trumpery kind, and the backs so thin that a few fires will eat them through; the smoke-doors are often badly pivoted, and are constantly getting out of order, and much will depend on the setting of the grate, for if badly done smoke will find its way through the crevices, and it will be next to impossible to enjoy a clean or comfortable hearth. The kitchen-range generally comes off the worst of all, and is of the cheapest and thinnest kind. The boiler is proverbially useless after a while, the tap leaks and the back and oven-plates wear through, so that the heat is lost, or burns the pastry. If a kitchen is fixed, the only safe way is to light a fire and test its capabilities. After stoves, attention may be directed to the flues and the manner they have been gathered in over the fire-opening; and if there is a heating-apparatus it is desirable to call in a practical engineer to examine its working. In one recent instance we know, a tenant discovered that all the water drawn from the upper cistern was warm; the pipes were examined, and it was found that they descended so close to the flow-pipe from the kitchen-boiler, that the heat was abstracted from the warm pipes, while the latter naturally lost heat, and both the hot and cold supply suffered. Attention ought to be mainly directed to the boiler, the position of the flow and return-pipes, the connection with the bath-cocks, and to see if proper valve-cocks, to regulate the heat, have been provided. These are unpleasant details to inspect; but upon them the comfort and habitability of a house depend. The cisterns and tanks equally demand the closest attention: that there should be one for the potable water in a place above the suspicion of being poisoned by gaseous emanations, and another for culinary use, hardly needs mention.

It is unnecessary to say how much of the comfort of a house depends on the fittings, and we might enter rather fully into this part of the subject if space permitted. Sash-fasteners and water-bars and bolts for casements are amongst the most vital to the comfort of a house; but the speculating

builder seems to think anything good enough. The sash-fastener bends or gives way with the strain, and does not draw the sashes closely together as good ones will do, while the door furniture throughout the house is cheap and of the vilest manufacture; the handles soon get loose and fall off, and the spindle never turns the latch properly. As for the smaller latches and turn-buttons, they are constantly breaking; and the tenant, if he takes a long lease, ought to guard himself against the imperfection of these things, and the expense of being called upon, at the termination of his holding, to make good deficiencies. We have referred, rather in detail, to these weaknesses of modern houses built to let, in the hope that, before long, the unwary tenant will find some protection, and, either by legislative interference, or by a combination of interests, the lessee will obtain some guarantee of the fitness of a house before he enters into a legal contract with his landlord to pay rent for a certain term, and to be subject to the shortcomings, and discomforts, and repairs of a dwelling, the brunt of which the tenant covenants to bear.

GASEOUS FUEL.

WE have so long been accustomed to regard coal-gas merely as an illuminant, that it requires some effort to familiarise ourselves with the opinion which is daily gaining ground, that gas, suitably prepared and consumed in furnaces and stoves of proper construction, is among the best and cheapest kinds of fuel. One of the foremost and ablest advocates of the employment of gaseous fuel is Dr. Siemens, whose name is justly honoured by all students of science as the inventor of the regenerative furnace, and the pioneer of the employment of electricity for illuminating purposes. Dr. Siemens has recently urged the preparation of two kinds of coal-gas which he proposes should be distributed in separate mains, and be each of them specially adapted for the particular use to which it is to be applied. The gas given off from the retorts at the beginning and end of the process of gas-manufacture is far less rich in illuminating qualities than the gas expelled during the other part of the distillation, and the Dr. has pointed out that by collecting the gases evolved at the commencement and close of the operation and separating them from the remainder of the gas, it would be easy to obtain from, say, one ton of coal, one-third of illuminating-gas of high quality, or about 3,520 cubic feet, and two-thirds heating-gas, 7,040 c. ft. In London and many of our large towns it would scarcely be necessary to provide any additional mains, as, owing to competing companies, or the extension of the supply, many of the streets already contain a duplicate set of pipes. But even if it became necessary to lay fresh mains, to make new house-connections, and to provide a second meter to each house, the advantages of the plan proposed by Dr. Siemens would, we think, repay the additional outlay required. The cost of the cheaper and less perfectly purified heating-gas might be kept as low, probably, as 1s. per 1,000 cubic feet, while the pure and high quality of the illuminating-gas might fairly enable it to be charged for at a rate of, say, 5s. per 1,000 ft. We need not, for the present argument, suppose that the heating-gas would be distributed without any attempt at purification, for it would certainly pay the gas company to take from it certain impurities which now constitute a considerable source of revenue, and amply repay the cost of their extraction. We have reproduced the stock arguments of gas-managers against the plan propounded by Dr. Siemens, in order to show that though at first sight it might appear that there are considerable difficulties in the

way of such a scheme, they are by no means insurmountable, and could readily be overcome if needs be. The main obstacle to any attempt at progress at the present time is the comparative insignificance of the demand for gas for any other purpose than that of lighting, and the strong position of the gas companies in the absence of any serious competition. We may assume that at the present time, each ton of coal carbouised yields about 10,500 cubic feet of coal-gas. This volume of gas, sold as at present for 3s. per thousand cubic feet, yields, say, 31s. 6d. to the company. They have no inducement to split up this gas, even if a brisk demand arose for cheap heating-gas, into, say, 3,500 cubic feet of 18-candle gas at 5s. per 1,000 feet, and 7,000 cubic feet of heating-gas at 1s., for they would obtain only 24s. 6d. for the same volume of gas. Even if we take the best possible case, and assume that the total yield is broken up into 7,000 feet of 16·25-candle gas at, say, 4s., = 28s.; and 3,500 feet of heating-gas at, say 1s. = 3s. 6d.; total, 31s. 6d., the company only gain the same price as at present, and they have to undertake a double distribution. From the experiments of M. Ellisen, of Paris, it would appear that the latter case represents the most favourable results to be obtained by splitting the gas into two qualities. When half the total volume of each kind of gas is obtained, the lighting-gas is of 16·78 candle-power. It is worthy of notice that even the very high qualities of gas do not actually contain more than 6½ per cent. of illuminating constituents. In ordinary gas, such as that supplied in London, in each 100 cubic feet there are only four which actually yield light; the remaining 96 cubic feet are chiefly heating-gases, which burn with a colourless flame. We do not wish to make out that the gas could be used without these heat-giving constituents; indeed, they have a most important office to perform in raising the temperature of the flame, in order to permit of the perfect combustion of the hydrocarbons. We only draw attention to this fact in order to show what a relatively large proportion the non-lightgiving gases bear to the illuminants—viz., about 24 to 1.

But when cooking and heating by gas and the employment of gaseous fuel for manufacturing purposes comes to be a little better understood, we very much doubt whether even the cheaper form of coal-gas, prepared as at present, and which we have assumed might be sold at 1s. per thousand cubic feet, will ever become the fuel of the future. Heating-gas of very good quality, and in every way well adapted for domestic and manufacturing purposes, can be obtained at an infinitely less cost, and with a far cheaper description of plant than the gas which is now distilled from coal in retorts. To this cheaper gas the term, "water-gas," has been somewhat improperly applied, and such gaseous fuel as this can be prepared on a large scale at little more than 2d. per thousand cubic feet, with a fair margin of profit. Concerning the manufacture of water-gas, we need say no more here than that there are numerous plans, all more or less efficacious, for decomposing water into its two gaseous elements, hydrogen and oxygen. By the best of the contrivances which are employed for this purpose, it becomes possible to effect the separation of these gases, and to cause the oxygen at the moment of its liberation to combine with a volume of carbon, producing the best form of gaseous fuel obtainable from coal—to wit, carbonic oxide gas. In the ingenious apparatus which has been patented for the manufacture of this gas by the Dowson Economic Gas Company, water contained in a small boiler is converted into steam, and this steam is superheated in iron tubes; a jet of the high-temperature

steam thus obtained is then passed into a furnace containing a deep layer of anthracite coal. The steam, acting on the principle of the injector, is made to carry with it an adequate supply of atmospheric air, and the red-hot coal at once decomposes it into its gaseous elements—a very copious evolution of gas suitable for heating purposes is thus effected—and the gas may be purified by passing it through a layer of spongy oxide of iron. The yield of gas is in the ratio of 1,000 cubic feet to each 12lb. of coal added to the furnace, and 180,000 cubic feet can be readily obtained from one ton of anthracite coal. This gas has a calorific power equal to about 'rd that of coal-gas, so that, in round numbers, we may assume that each ton of coal will yield, by this treatment, an amount of gaseous fuel equivalent to that obtained from five tons of coal carbonised on the present system. But gas made by the decomposition of steam has no tar, no ammonia, and cannot possibly burn with a smoky flame; indeed, there can be no deposition of soot, even when a cold metallic surface is exposed to the flame. Moreover, the foul-smelling hydrocarbons which cause the disagreeable smell in ordinary coal-gas, and which have led to many difficulties in using gas for cooking purposes, are entirely absent in the water-gas. It will be quite possible for a few families living in adjacent houses to combine and to obtain a supply of this economic gas laid on to their houses in the same way as coal-gas now is, and this new gas can then be employed in the kitchen, the laundry, the bath-room, and the conservatory, and the present use of coal as a fuel may be entirely abandoned. We are informed, indeed, that Lord Sidsely has adopted the gas for all these purposes with complete success. We have still to mention that another important feature connected with this gas is the facility with which it may be carburetted or impregnated with illuminating constituents. This is effected by passing it through a vessel charged with gasoline. The vapour of the gasoline is absorbed by the gas, which becomes thereby so much enriched as to yield a high standard illuminant, superior in fact to London gas. We should remember, in conclusion, the immense importance which the possession of such a gas implies when we require power for domestic or manufacturing purposes. In a gas-engine of the "Otto" type, made by the Messrs. Crossley, this water-gas can be used in the same way as coal-gas now is, and the cost of each horse-power is proportionately decreased. The actual cost of working, on an extended trial, with a 3½ horse-power effective engine, has proved that one horse-power (indicated) per hour is obtained with a consumption of gas derived from 14lb. of anthracite coal. When we contrast this result with the working of the largest and best steam-engines, using 2lb. of steam-coal per horse-power per hour, the gas-engine has a large balance in its favour; but when we remember that with small steam-engines the common consumption of coal varies from 5lb. to 6lb. of coal per horse-power per hour, the advantage in favour of the gas-engine and the new gas is too great to be long overlooked by those to whom cheap power is a desideratum.

TIMBER AND ITS CONVERSION.

IN specifications for new buildings, under the head of "Carpenter," the general clause introduced in most instances, describes the timber to be of the "best Memel, Riga, or Dantzic;" but it must not be supposed that this phrase is literally interpreted by the builder. His interpretation is that any good timber, fit for the purpose, may be used. Technical and reliable information

on timber is not generally one of the branches of his profession with which the architect is best acquainted, and we have heard of instances of mistakes of rather ludicrous kinds. Memel is so like Dantzic that few can distinguish them, and after all, for practical purposes, no great harm would arise by the use of one kind for the other. It is as well to know, however, that Dantzic is the stronger timber of the two, and the balks will generally hold 14in. to 15in. square. Riga is not generally considered so good as the last, but it is more reliable and practically useful than the other kinds, as its grain is straight, and it is free from large knots—two points which, in spite of its cost, are much in its favour with the builder. Its size runs about 13in. Laxton says of it, though "dearest in the market, it is cheapest in the end." We should like to know how much Swedish timber passes for that described as Memel, Riga, or Dantzic. Many builders swear by Swedish timber, and when well selected there are few, even experienced architects, probably who would detect it from Memel. It is pretty well known, also, that "second quality" of Memel and "Middling" Dantzic do most of the London work of the best description. Swedish timber has also improved of late, and for small scantlings and weights it is as well suited as the other kinds of timber. Yet Mr. Laslett says Swedish fir has little to recommend it beyond the fact of its being cheap and suitable for the coarser purposes of carpentry. The balks are generally about 10in. to 12in. square, and are tapering in form. The best Baltic deal comes from Gefle and Soderham, and the best only ought to be used. Again, as regards seasoning, there is a good deal of misunderstanding. As the timber is bought in the water, it is always wet, and it is of little use to specify that whole timber is to be well seasoned. The only precaution that the architect can take is that shrinkage of partitions and other heavy portions be reduced as much as possible by the use of iron and the mode of framing. Of red pine little need be said more than it is durable and tough, has little sap, often resembles Memel and may be used with safety anywhere.

It is desirable for the architect to be able to specify the kind of timber best suited for the particular purpose, and by thus discriminating he earns the respect of the practical builder, and his specification is more likely to be followed than if he described all timber to be of the best quality Northern pine. Thus Memel of the "third" quality is good enough for heavy girders and timbers of warehouses; but for light scantlings "die square" timber is the best. Thus for ceiling joists the timber which comes over 1in. to 5in. square is as good as balk-cut timber, and is better seasoned. Such scantlings are about half the price of full-sized timber, and as the sawing is saved the builder gets an advantage. It is necessary to know, too, that timber in planks, deals, and battens, is a more convenient form for ordinary building purposes than larger timber. The price per standard at which they can be procured is much less, and sawing is saved. For large joists, girders, and binders, especially those which have to carry heavy weights, whole timber ought to be specified, as these smaller descriptions are cut out of young timber, and they are not so close-grained and strong as that cut from the log.

In specifying deals, it is usual to name best Christiania or Petersburg. When cut from the pine they are called "yellow or red deal," while the spruce produces the "white deal." As in the case of timber, the above description is liberally interpreted, and any suitable deals free from knots are used. As all our readers know, the usual

sizes are, for battens, 6in. by 2½in. to 7½in. by 3in.; for deals, 9in. by 3in.; and for planks, 11in. by 2in. One practical authority says deal used 3in. thick ought to be three years old before using; but if cut into inch stuff, it dries in about six months after cutting. In fact, the thinner the stuff the less time it takes to dry the wood through. It is superfluous to inform the practical reader that a free circulation of air is required in drying timber. The wood should be stacked so as to allow spaces between the deals, and it is found that wood dries faster when stacked on end than when laid flat. Of the Swedish deals, the Gottenburg are very reliable; they are distinguished for a small black knot—a "pin-knot," as it is sometimes called. The Finland white and yellow deals are also recommended, and they are straight and readily convertible. The Petersburg, Onega, and Archangel deals are, however, the best, and generally free from sap, shakes, and loose knots, clean in grain, and have a good wearing-surface; but there are inferior qualities, which are often worse than the better kinds of inferior goods. Newland, in his "Carpenter and Joiner's Assistant," says:—"In those from Archangel and Onega the knots are often surrounded by dead bark, and drop out when the timber is worked." Swedish deals are largely used for floors, and answer well. It is only the experienced architect who knows that there is after all very little in names and the mere terminology of specifications, and with respect to timber he exercises his own judgment. What is meant by "best timber" is that generally understood by the timber merchant—namely, straight-grained timber, free from knots and other defects. To give general rules for selecting timber is to mislead the young architect; to tell him to choose that which is the brightest in colour, in which the red grain appears prominent, and to avoid spongy hearts and porous grain, is to give him no distinct knowledge, as such terms can only have a relative meaning, and may after all tend to mislead. There are few parts of the building trade which perplex the younger members of the profession who have not had the advantage of workshop training, more than the technicalities of timber and its working, and no doubt a great deal of the aversion in which it is held is due to the number of dry rules which beset the trade of the carpenter and joiner. There are numerous treatises which give the theory and principal rules, but a great deal has to be gathered from actual contact with materials, workmen, and their machines. Let us, for instance, consider for a moment the immense strides made in timber conversion by the use of steam machinery. One of the most important things to learn, is how to convert timber to the best advantage. Let us take, for instance, those commodifiable sizes, battens, deals, and planks. There are certain ways of cutting these up to prevent waste, and it is just the neglect of this which leads young architects into error in details. It is well known that a lin. board when finished is not exactly that thickness, but is got out of stuff of an inch thick, and that with bad sawing and planing the deduction is generally quite an ½in. Some architects specify so as to cover this, though the clause is not often respected. It is seldom that two ½in. thicknesses of board can be got out of a 3in. deal without considerable waste, and, no doubt careless sawing at the bench by the revolving-saw has much to do with it. Many, on this account, have preferred the old-fashioned frame sawing as being truer. Perhaps in this particular operation the steam machinery has not been so decided a gain as it has in other operations, such as grooving, mortising and tenoning, moulding, &c. Again, in framed work, such as doors, the stiles and rails may be all got out of deals, and much

saving in pricing might be made without necessarily compromising architectural character, if architects would remember how best to economise the smaller descriptions of timber, or to cut a batten or deal without leaving a piece of stuff which is too thin to be of any use to the contractor.

THE BRITISH ARCHEOLOGICAL ASSOCIATION AT MALVERN.

[FROM OUR OWN REPORTER.]

THE Malvern summer meeting of the British Archaeological Association has been one of considerable and varied interest, as our report will indicate, and, in regard to the numbers attending it, may undoubtedly be reckoned amongst the most successful ever held. The area visited has been more closely circumscribed than usual, owing partly perhaps to the obstacles to locomotion presented by the great chain of hills lying to the west of the meeting-place, and partly to the fact that carriages were used in preference to the railways more largely than has been customary in these excursions—a choice which the unpropitious weather rendered somewhat unfortunate.

The feature of the meeting has been the diversity of objects seen. Numerous earthworks upon the hill-tops were examined, and caused warm discussion—as a matter of course not resulting in uniform agreement. Only one mediæval castle, and that (Branshill) a mere fragment of outer tower, was seen. Of the many churches examined a large number were cruciform in plan, with central towers, and retained in their low arcades, carried on cylindrical columns with plain heads, and in their deeply-splayed windows, extensive remains of work executed at the Transition period, when the highly-elaborated Norman was merging into the simpler, more refined, and less massive Early English style.

Perhaps the next interesting of these Early churches was that at Kempey, near Ledbury, which the exigencies of space compelled us to notice but briefly last week. It is a small building, entirely of the 12th century, and the internal walling is covered with elaborate contemporaneous frescoes, which were discovered in 1871 by Mr. Middleton, and are fully described in Vol. XLVI. of the "Archæologia." Those upon the walls and barrel-vault of chancel represent the Saviour in Glory, the Twelve Disciples, and various scenes from the Apocalyptic Visions, and are by far the most complete frescoes of their date in England, the nearest approach to them being the well-known ones in the apse of Copford Church, near Colchester. Unfortunately, Kempey Church is almost disused in favour of a modern and more commodious one, and not only has it not been restored since 1670—except in the careful cleansing of these mural decorations—but every side of the tower is scored with cracks and bulges from the perpendicular, in a manner suggesting apprehensions of a disaster to these unique examples of Transitional Norman frescoes, and possibly to human life. On the same day two examples of the massive detached church towers of Herefordshire were seen at Bosbury and Ledbury, and a third was described at an evening meeting in a paper by its restorer. Many beautiful illustrations of Early English and Decorated work were seen, the latter being rich in reticulated fenestration in the southern portion of the district visited; but the comparative rarity of the Perpendicular work was noteworthy, Kidderminster and Prestbury churches, the exterior of Great Malvern priory, and a few inserted windows and doors being the principal examples.

The Benedictine churches at Worcester, Tewkesbury, and Great and Little Malvern, furnished abundant material for study, and the stained glass of the 14th and 15th centuries in the two last-mentioned priory churches received the attentive study it merited. The few lettered and figured tiles still scantily sprinkled over many of the chancel-floors in the district—and in one or two cases, as at Great Malvern, used as reredoses, or as wall decorations—are a local peculiarity which attracted notice. Jacobean fittings were found in a few churches. Bearing in mind the extent to which church restoration has progressed during the past twenty years, it was curious to find so many churches still unrestored

since the days of whitewash, galleries, and high pewing, these including, among others, Kempey, just referred to, the extreme instance at Huddington, those of Areley King's, Bishop's Cleeve, and St. Andrew's, Droitwich.

The Malvern Congress will, perhaps, be longest remembered for the examples of domestic architecture seen during the nine days it has lasted. Many of the typical Worcestershire houses of the 15th and 16th centuries were visited. Two of these, Huddington and Birt's Morton Courts, still retain their original moats, and many are constructed of half-timbered quartering, filled in with plaster or brick nogging, the whole of the façades being painted in glaring relief with black and white—this colouring being, in several instances, extended, with a foolish disregard to honesty of construction, over later additions in brickwork. Sometimes the bargeboards were ornamentally treated, and in many cases the old internal subdivision into hall, with dais and minstrel's gallery, and wide staircase leading to the low upper rooms, could be traced, richly-carved oak chimney-pieces, the oak panelling, and the ornamental plastered ceilings of the Jacobean period being more common, and frequently coexistent with the hall arrangement.

The evening meetings were well-attended, and the papers read were chiefly historical or antiquarian in character, only two or three dealing with architectural subjects. The thoughtful inaugural address of Lord Alwyne Compton, is referred to elsewhere.

The benefits derived from congresses like that just concluded, are by no means restricted to those who take active part in them, although the latter must learn much by the comparison of many examples of ancient workmanship, and indubitably gain mental advantages in the vividness with which the life and history of the past are brought before their eyes. The chief utility of these archaeological excursions is the "gude conceit of themselves," imparted to the possessors and custodians of antiquities, by observing the interest their treasures excite in others, and the increased regard and value thereby aroused in their own minds. Of this reflex benefit, no better example could be needed than the singular rediscovery of forgotten municipal charters at Kidderminster on the eve of last week's visit. Mr. De Gray Birch's observations at Worcester Guildhall, as to the best means of preserving fragile and irreplaceable documents have weight, both from the speaker's official position and their simple and practical character. The delight with which scattered fragments of stained glass in the heads of tracery, figured tiles bestrewn over a passage through a church, or carved woodwork in a cottage or farmhouse are viewed, and the zeal with which they are noted and sketched, must result in these relics being more carefully cherished, while often a prophetic intimation that if a plaster ceiling were pierced, an open-timbered roof would be exposed, or if a wall were cleansed from whitewash, a fresco would be revealed, has led to discoveries in themselves pleasant additions to our knowledge, and of greater consequence in the new trains of thought awakened in the minds of those so set to work. In many a church and timbered house, a few suggestive remarks as to the desirability of resetting a few stones here, of carrying out a little drainage or ventilation there, or of pointing a chimney or gable yonder, have given hints for the preservation of ancient buildings, productive of great good. Each year such societies as this open up a new district, and so lead to a widened interest in their aims and objects.

But it is time we left these generalisations on the work and results of this and kindred archaeological and architectural excursions, and resumed our detailed narrative of the proceedings at Malvern.

To complete the story, we must revert to the proceedings of

THURSDAY.

Owing to the persistent rain, a very late start was made, and the programme was somewhat curtailed. A series of old houses lying south-east of Malvern, and close to the Severn, were visited, the first halt being at

BIRT'S MORTON.

The Church did not detain the members long. It has been enlarged and restored, from the plans of Mr. T. D. Barry, of Liverpool, and the carving of foliage responds to chancel and transepts, executed by a local man, Mr. Hill, of

Ledbury, were highly spoken of for freedom of treatment. The old "sanctuary ring" and hinges have been refixed on mod in south door; and in the church, the earlier portion of which is Decorated, are a plain circular Norman font, a fine altar-tomb, presumably to Sir John Nanfan, body-guard to Henry VI., having small carved figures upon it, representing members of his family, which has judiciously been left unrestored; a monument on chancel wall to Admiral William Caldwell, d. 1717, who is depicted in flowing wig and dress of the period, and an alms-box, tempo Edward VI., formerly attached to the churchwardens' pew; it is carved out of a log of wood, is adorned with incised ornament, and has three locks. *Birt's Morton Court*, close by, now a farmhouse, as seen in the rain, was the ideal of the dreary "moated grange"—a group of buildings in stone and brick, surrounded by a moat completely coated with duckweed, and approached from a muddy farmyard by a stone bridge. This bridge is faced by a 14th-century stone gateway, having a more modern brick battlement, and beyond an inner courtyard is the house, a low timber and stone structure, now inhabited by a farmer. The chief room has oak-pannelled walls and a massive fireplace, all well carved and enriched with shields of arms; above is an elaborate beamed and plastered ceiling in hexagonal panels. In this room, the Rev. W. S. Symonds, F.G.S., read a paper, in which he said that this village of Birt's Morton, standing in the Woodlands of Malvern Chase, was one of those mentioned in Domesday. The family Birts or De Brutes lived here in the reign of Edward I., and at a still earlier period tradition asserted that Owen Glendower, who married one of the daughters of Birt, used to visit the family (disguised as a shepherd), and a so-called secret chamber formed in the thickness of the wall, at the back of the house and looking into the moat, still existed, now used as a cupboard. Sir John Oldcastle, also connected with the Birts, was concealed here. The house afterwards came by marriage to the Nanfane, a Cornish family, who lived here in the 15th, 16th, and 17th centuries, and the statesman, the Right Hon. William Huskisson, was born in the house, his father being then a farmer and churchwarden of the parish. This room contained a great number of shields bearing the arms and quarterings of the families with whom the Nanfane married. Mr. Loftus Brock pronounced the present house, although occupying an ancient site, to date no further back than the time of Sir John Nanfan, of Henry VI.'s household: the beautiful pannelled ceiling was Elizabethan, and more recent than the beams which crossed it; and since it was cut away at the edges to admit the oak cornice, it was evident that the waiters were more recent, and indeed, was somewhat later than the Jacobean mantelpiece. Very similar carving, dated 1634, was seen the previous day in a house in Church-lane, Ledbury. Mr. Symonds and others urged that the arms must have been gradually carved as new alliances took place; but Mr. Brock held that, as at the present day, the whole series were done to order at one time about two centuries ago. The evidence of relative dates of walling and ceiling, fixed by the cutting away of the latter, appeared on examination indisputable. Upstairs the beams of what was once the hall, and some more ancestral bearings were seen, and in an upper room of an outer building next to the entrance gateway, now used as a cheese-room, a plastered ceiling divided into hexagonal and other panels containing fleur-de-lis was seen.

Payne's Place, *De Key*, the next house seen, is smaller and more modern, and has no moat; it is also occupied by a tenant farmer, and has been thoroughly restored by the owner, Mr. W. Dowdeswell. It is built of timber and red brick, and has at the back a highly ornamented bargeboard, one side of which, however, is a reproduction. The Rev. J. M. Guiling, of Busbley, explained that this house was built in 1450 by Martin Payne, a merchant in the neighbouring town of Tewkesbury; its chief interest was that after the battle of Tewkesbury, fought in 1471, soon after it was finished, Queen Margaret of Anjou, finding that her husband's cause was hopeless, prevailed on two monks to row her in a boat across the Severn, and to seek shelter here for three days. She then set out for Worcester, but was captured on the way. Canon Winnington Ingram asked what grounds

there were for this statement; to which Mr. Guilding replied, Tradition had always associated the room on first floor with the Queen, and the position agreed exactly with the historical narrative—on the opposite side of the Severn to the battlefield, and not two miles' distance from it. Canon Ingram replied that Margaret was said to have lived in a religious house—had this been identified with any establishment? It was replied it had not, but there was no monastery in the neighbourhood. Mr. Guilding also showed the parish register, brought from the (rebuilt) parish-church of Bushley, which dates from 1538, and contains the entry of the burial in 1516 of Edward Tyndall, brother of William, the martyred translator of the Bible. The lower room contains some good panelling, and high on the walls some didactic distiches, written by Margaret Stretton in the 16th century. On the upper floor was seen the modernised Queen's room, looking upon Tewkesbury Abbey, the Severn, and the battlefield, and in another bedroom and in a passage the high-pitched beams of the former hall, and part of the front of minstrel's gallery.

After luncheon in Moss House, Poll's-park, a modern picknick kiosque belonging to Mr. Dowdeswell, the carriages were resumed through Epton and Hanley, to *Severn End*, of which, on the 19th ult., we gave a view and description (p. 215). In the principal apartment, the dining-room, the Rev. T. W. Wood, vicar of Eldersfield, on behalf of Sir Edmund Lechmere, M.P., welcomed the members, and read an historical paper on the house, which he said occupied a spot that had, with one interval of 10 years, been the residence of the Lechmères from the time of their arrival from Brittany or Holland with the Conqueror. The name is only a century or so old, it having formerly been known as Hanley and Lechmere's place. The house, as they saw it, was built by Nicholas Lechmere, a judge of Charles II.'s time, from whose diary we could trace the whole progress of the work. Nicholas was the third son and the heir of Edmund Lechmere and Margaret, the daughter of Sir Thos. Overbury. He was born in 1613, and in 1611 began the alterations and additions which transformed the house, erecting on south or riverward side new rooms, and then garden-walls. In 1656, he planted an avenue of elms at the back, and in 1671 built a study at the south-west corner of the garden, which was restored by Sir E. Lechmere in 1861. In 1673, he contracted with John Avenon to build him north and south projecting wings to the house, for £250, making an entry in the diary, "How this shall be performed time will show," a misgiving afterwards confirmed by the added note, "He failed in all things." In April, 1701, Judge Lechmere died, aged 88, but his descendants continued at Severn End till early in the present century, when the head of family sold the property, which was repurchased in 1855 by the father of the present Sir E. Lechmere. It was now furnished as a museum, and inhabited by the steward. The members then went over the house, examining the specimens of armour, china, and Etruscan ware, minerals, autographs, &c., with which it is furnished, and also the small but valuable library. The rooms have highly ornamental ceilings, but are very low; the main staircase has a disproportionately large newel and very narrow treads. It was remarked that the floors are of bees-waxed and polished elm, cut from very wide planks, the average being over a foot.

At the evening meeting at Malvern College, papers were read by Mr. C. H. Compton, on "The Antiquity of the Game of Golf," and by the Rev. W. S. Lach Szymra, on "Some Records of a Cornish Borough,"—those of Marazion or Market Jew, in which the author urged the desirability of having those interesting historical documents examined, edited, and published.

FRIDAY

was spent in a group of places near Kidderminster, being arranged and personally conducted by Mr. John Brinton, M.P., to whom the suggestion of Malvern as a meeting-place for the Association was due. The members arrived at

KIDDERMINSTER

by special train about 10 a.m., and were received in the new town-hall built in 1876, from the designs of Mr. J. T. Meredith, in a Renaissance style by Mr. Brinton, who introduced them to

the Mayor (Mr. Willis) in full robes, and the members of the Corporation. Upon the table were displayed a number of municipal documents, and the Mayor, in welcoming the visitors, mentioned that till the previous day, no one in Kidderminster knew whether any old manuscripts existed other than a charter granted by Charles II., and some very modern ones; but the night before, the assistant town-clerk, in searching through some old papers in preparation for the congress, found a paper parcel which, when opened, proved to contain a number of valuable documents now laid before them. He feared time would not permit of detailed examination that day; but after the congress the Mayor's parlour would be at the service of any members of the association, if they would examine and report on the discovery. Mr. Brinton, M.P., referred to this fortuitous coincidence as a tangible proof of the benefits accruing to towns through the visits of archaeological societies by inducing the inhabitants to search for and treasure their links with past history. He then read an historical paper descriptive of the borough. Anciently known as Chideminstre, the earliest mention of the town was in the 8th century, when Cunibert received a parcel of land of the name from Etheldred, King of the West Angles, for a monastery, an establishment utterly demolished by the Danes a century later, and of which no traces remained. In 1164 the church was given by Manser de Bissett for the founding of a hospital for female lepers at Maiden Bradley, Wilts, and so continued till the Dissolution, in 1538. The manor was at the Conquest the property of the King, but was granted by Henry II. to the above-named Manser de Bissett, and it successively passed through the hands of the Beauchamps, Nevilles of Bergavenny, Blounts, Waller, the poet, the Foleys, to the family of Ward and Dudley. The manor-house, near the parish-church, was sold by the poet Waller, its possessor and occupant, to escape from difficulties with the Parliament, and was at the present moment unroofed, and about to be removed for the extension of the church schools. There was near the town a sandstone tower of Caldwell Castle, erected about the time of Edward III., and attached to it a residence rebuilt about the beginning of the 18th century. There was also a mount, which, together with the castle, played an important part in the last Civil War, although it was uncertain whether the mount was erected in connection with or to command the castle. The manufactures of the town dated back to the 13th century, and woollen goods and serge were made from that time till the 18th century. In the year 1710 the manufacture of carpets was surreptitiously brought here from Wilton, where it had been imported from Flanders, and it had since become the staple trade, and supported an increasing population. Mr. Loftus Brock said that on the table were three old charters, having fine seals, much injured by rough usage, granted by Henry VIII. in 1530, Elizabeth, and Charles I.—the first reciting previous charters of Henry VI., Henry II., and Richard II., not now known to exist, the latter incorporating the borough. Mr. C. H. Compton said another of the documents was a probate of will dated 1651, headed Oliver Cromwell, Protector, in lieu of the then bishop of the Diocese of Worcester. In reply to a question from Sir J. A. Picton, as to whether the establishment of the carpet trade was not prior to 1713, the town clerk of Much Wenlock said, that corporation possessed a deed dated 1687, being a formal transfer from the outgoing to the incoming high bailiff of a "carpet from Kidderminster for the council chamber," as the first of numerous items. The Mayor also exhibited a copy of Richard Baxter's "Saint's Everlasting Rest," dated 1651, containing the autograph presentation from the author to the high bailiff and burgesses; a silver-gilt loving-cup of late Elizabethan date, with an inscription, showing it to have been enlarged in 1623, and two Roman querns, found in 1879 in Church-street.

The members then perambulated the town, apparently a thriving, and public-spirited borough, seeing the statues to Richard Baxter in the Bull-ring, and to Sir Rowland Hill, opposite the Corn Exchange, the one unveiled in 1875, the other a few weeks since; both are by Mr. Brock, who is a native of Worcester; they are executed in white statuary marble, and are heroic in scale. Baxter's House, now

a confectioner's shop, has no intrinsic interest; but also in Coventry-street, beneath an inn, is a large concrete vaulted crypt, apparently Mediaeval in character, which has been traced for 35 yards, and is, as usual elsewhere, said to extend to the church, about half a mile off, although no vestige of it or of an entrance is known to exist there. In the vestry of a Unitarian chapel, the pulpit formerly in St. Mary's Church, and used by Richard Baxter till the passing of the Uniformity Act, was seen. It is of oak, has a huge sounding-board, and is carved with stiff roses, pomegranates, and foliage, agreeing well with the date over the crown at head, "1623." On the edge of sounding-board is a quotation from Psalms, and on the panels is carved "The gift of Alice Dawkx, widow." In 1875, at the "restoration" of the parish-church, this interesting memorial was sold, with a quantity of pewing, for £5, to a townsman, who presented it to the chapel trustees.

The Parish Church of St. Mary and All Saints was next visited. It is chiefly of the 14th and 15th centuries, and has been refaced externally with the exception of the tower at S.W. angle, which is of crumbling red sandstone; the panelled battlements of clerestories have been coated during some restoration with cement. Projecting from the east-end, and connected with it by a vestry, is a large Perpendicular chantry chapel, founded by Simon Ryse, and till recently used as the grammar-school. In this room the vicar, Canon Boyle, read a paper, in which he stated that there was a church built on this site before 1100 by John Niger, but no traces of it were known to exist, except, perhaps, the concrete core of the tower. The oldest visible part of the church was the north side of chancel, in Middle Pointed style, next to it the tower, and then the nave, which was in the Third Pointed style. It was repewed under Johnson, of Worcester, in 1785, and restored in 1847, and again in 1872 and 1877. In this chantry the vicar showed a carved chair of Jacobean character, said to have belonged to Richard Baxter, having cut upon the back the names of Baxter and two of his friends. Some doubt was thrown upon its authenticity, not lessened when it transpired that the relic was recently picked up in a London dealer's shop. The members then went into the church, seeing on the way the oolitic shaft of the old cross, the head of which was destroyed during a riot in Baxter's time. On the north side of the chancel were shown the dents traditionally said to have been caused by cannon during the last Civil Wars. Some amusement was occasioned by the Mayor's exclaiming that this must be a mistake, as he helped to make the holes himself when a lad, by throwing leaden weavers' balls against the church. The arcades, columns, clerestories, windows were all seen to be in the Perpendicular style, well developed. There is a large stained-glass west window, by O'Connor, and a new reredos, containing a representation of the Last Supper, designed by Mr. W. Jeffrey Hopkins, Worcester, and executed by Messrs. Boulton, Cheltenham. On the north pier, behind where Baxter's pulpit stood, has been recently found an appropriate quotation, in Old English characters, from Corinthians, and supposed to have been written for Dr. Baxter; but Mr. R. Danks, of Worcester, remarked that the passage was not cited from the authorised version, and was, therefore, probably earlier than 1611. The church contains several alabaster effigies and brasses, including amongst the former Lady Beauchamp, c. 1469, represented as lying in ruff and mantle under canopied recess; and several of similar character but a century later, to members of the Blount family, three of these lying in an out-of-the-way corner at the south-west angle of building. In centre of chancel is an unusually large and well-wrought brass to Maude Saint Pierre and her successive husbands, Sir Walter Cooksley and Sir John Philip. Colonel Bramble, of Bristol, in describing this memorial, mentioned that the costumes depicted were of very early 15th century, both the husbands wearing plate armour and the collar of SS., the Lancastrian badge, the armour, as shown especially by the elbow-pieces, was of two types, the second husband being the later. In a recess opposite, on north wall of chancel, were recumbent effigies of a knight and his wife, both in very similar attire to those just examined, but indicating a still later type of armour by 60 or 70 years in the addition of taitles to skirt of

taces. Mr. E. Piper called Col. Bramble's attention to the fact that both brass and alabaster were believed, from inscriptions, to represent a lady and her second husband; did the change in costume indicate that some mistake in identification had occurred? Col. Bramble replied, No; it illustrated the important principle in deciphering monuments, or, indeed, paintings or pictorial representations of any kind, that a mediæval artist did not attempt to depict his subject, whether a person or building, in the garb actually worn, but in that which was in fashion when he executed his commission. Having again shown the differences between the costumes of brass and monument, he suggested that the order for the latter was given some time after the brass had been laid down, and, of course, in any case to a different artist.

The members then drove to *Warshall Camp*, an entrenched space, on the summit of a hill in the Forest of Wyre, cut through by a roadway, and commanding a splendid view bounded by the Wrekin, the Hagley and Lickey Hills, the Cotswolds and Malverns, and the Radnor Brecon, and Shropshire Hills. Here Mr. Brinton read a short paper, in which he stated that the trenches and ditches which still crowned the hill formed one of a series of strong earthworks (many of which were pointed out) defending the Saxon borderland against the Cymri or Welsh, whose great camp was at Maybury hill, well in sight to the south. This fort was second to none in position, being placed so as to command the valleys of the Severn, Teme, and Stour. Passing through Wribbenhall and over Telford's Bridge to Bawdley, where were seen several half-timbered houses, and a large and plain brick church of about the time of George II., the party went to

RIBBESFORD CHURCH,

Which, although partially rebuilt two years since from the designs of Mr. Preedy, of London, afforded an agreeable surprise. It is much too large for present requirements of the little village, but is mother-church of Bewdley; it is chiefly of the fourteenth century, but the south and west doorways are Early Norman, and fragments adorned with chevron carving are worked into the south wall. The south aisle is separated from nave by massive oaken pillars and struts of the fourteenth century, while that to north has curious stone piers nearly a century later in style, evidencing an intention to rebuild in stone. The roodloft stairs and doorway (partly concealed by a new memorial-brass) are not opposite but between two pillars, and are in the south aisle wall. The lectern is completely covered with flat Jacobean ornament, and seems contemporary with south porch, which is dated 1633. The rude Norman sculpture in south doorway revived an old controversy as to its subject. It represents a man shooting with bow and arrow a four-footed creature of prodigious girth, and having spines on the back and a flat tail, while between runs a slender quadruped. This, Mr. Brinton said, had been described as an archer shooting a salmon and deer; but Mr. E. Lees, of Worcester, said he regarded the "salmon" as a seal and the deer as a greyhound, and others took the former to be a beaver or otter or dragon. The general opinion was that it was a symbolical representation of Pursued Man delivered from the strong one by a Stronger. Mr. Brinton, Mr. Brock, and others having described the church, the Early Jacobean *Ribbesford House* was seen directly afterwards. It is of stone, with octagonal turrets at entrance, covered with ogee cupolas, and is surrounded by a moat. It was formerly the residence of the Herberts of Cherbury.

ARELEY KING'S CHURCH.

is an unrestored structure having flat plaster ceilings, open pews, and unsightly west gallery. On the north side is a walled-up Norman doorway, of two periods of carving. The rector, the Rev. J. P. H. Hastings, showed in the chancel some singular epitaphs, including one on a flat stone to one Walter Walsh, dated 1702, who was "ruined by three quackers, two lawyers and a fanatic to help them," and in the churchyard a still more curious one. It consists of huge new red sandstone boulders forming the boundary-wall overhanging a cliff, and inscribed in letters a foot high with the trilingual jumble, "Lithologema quare? Reponitur Sir Harry." Till recently, the rector said, this was a puzzle; but the recent discovery and recovery of the ancient parish registers from a Tewkesbury

solicitor's had shown that the old tradition was correct, that they marked the burial-place of the eccentric "Sur Harry Consby," or Coningsby, of Hampton Court, Herefordshire, who "was buried in wollin at midnight," in Nov., 1701, near the wall he had caused to be raised. Mr. Brock pointed out that some elm-trees beyond the walls were breaking the inscribed stones of many tons weight, and would ultimately overturn them, but the rector said he would not have the trees cut down in his day. In the churchyard is also an immense hollow yew-tree, and a pillar sun-dial, dated 1687. The *Hermitage Caves*, near the Stour, are deep recesses in the sandstone cliffs, and vary from 10 to 20ft. high. They were probably formed by quarrying, and have been used at several periods, and again a few years since by persons of dubious antecedents. At

MOOR HALL, STOURPORT,

the members were entertained by Mr. Brinton, and in the after-dinner proceedings Sir James Picton referred to the re-discovery of the Kidderminster corporate records as the event of the congress, and said that in the examination of municipal documents, a new field of archaeological research was just being opened up, which would hereafter probably throw new light on our towns' inner life and history. A good example had been set in the publication of extracts from these manuscripts by Oxford city, which he trusted would soon be followed by Liverpool, and that other boroughs would endeavour to popularise the history buried in these muniments. The members then went over Mr. Brinton's residence, which is especially rich in landscapes in oil and water-colours by modern English painters, including B. Williams Leader, Nasmyth, T. Webster, H. Dawson, sen., and G. B. O'Neill, and a number of Tyrolean views by Vöschner.

At the evening meeting, Mr. T. Morgan, E.S.A., read a paper upon "Some Flowers of Chivalry and Fields of Rue, 1458-71 and 1642-57." Mr. E. H. Lingen Barker followed with one upon "Garway Church, Herefordshire," recently restored under the author's direction, and illustrated from his drawings in the *Building News* for May 13 of present year. The church had, he said, two peculiarities—a detached tower connected with the main fabric by a long, covered passage, and a fine chancel arch which had been thought by some to be Saracenic in its details. Mr. Loftus Brock said the drawings showed an ordinary Norman arch, with no suggestions of Oriental influence. Sir J. A. Picton said it was probably that the tower was erected as a defence against the Welsh, and that the church was a later addition. The Rev. J. R. Burton, F.G.S., read a third paper containing extracts from the parish registers of Ribbesford, visited on Thursday, and from the chapel and bridgewardens' accounts of Bewdley.

SATURDAY.

This was a carriage-day, allotted for the examination of early earthworks, a priory and church, and a modern and an old castle, lying a few miles south-west of Malvern.

LITTLE MALVERN PRIORY,

Now the parish-church of St. Giles and St. Mary is a fragment of a Benedictine monastery-church, consisting of central tower and chancel. The tower is Perpendicular, of four stages, abruptly capped by a modern high-pitched roof. Attached to the west face are responds and caps of Transitional Norman columns, with hollow chamferings (c. 1180), and to the south of these Mr. Loftus Brock pointed out still earlier work (evidently that of the original foundation) in plain-chamfered caps of former aisle. Beyond south side of chancel are ivy-clad piers and arches of a former aisle, and on the north Mr. J. Tom Burgess showed that a broken flagstone has on it moss-covered incised crosses in centre and on front edge, where is also some Roman lettering, clearly proving this neglected fragment to be a former altar-slab, probably of south chapel. Inside, the remarkable features are the remains of Late 15th-century stained-glass in east window, the Perpendicular rood-screen and beam now dividing the quasi-chancel from nave, an open-oak structure crowned by pierced quatrefoil-stage, and solid, slightly-overhanging cornice, the latter convex and carved with flowing-vine ornament, and a roll-member filled with roses; and the patterned tiles

in floor. The fenestration is at first sight a puzzle, as within Debased Tudor arches in side walls, are a lancet and Flowing Decorated windows, while above are 15th-century double clerestories—anomalies explained by the theory that Bishop Alcock, in the rebuilding, reset old lights in his new arches, which agree pretty nearly in style with his chapel at east end of south aisle, in Ely Cathedral. The octagonal base of a column, from the nave, is refixed in present church, to serve as a font, and there are two walled-up hagioscopes, formerly looking into chancel aisles. The carved misericords of the stall-seats have been hacked off. Mr. Daniel Parsons read a scholarly paper in the little church, which he said, like the others in the grand group of Great Malvern, Evesham, Pershore, Gloucester, Tewkesbury, and Worcester, was originally that of a Benedictine establishment, and was founded in 1125 on a site described by Buck in the last century as "a dismal cavity between the Malvern Hills," and the original grant was signed by Simon, twenty-seventh Bishop of Worcester. It seemed to have been rebuilt in 1171-87 by Joscelin and Edred, and again greatly altered in the Decorated period, to which, and to the Early Perpendicular, the present remains belonged. In 1480, Bishop Alcock, of Worcester, found the discipline very lax, and dismissed the four monks, and, after closing the priory for two years, and rebuilding the church, he reopened the establishment. It was dissolved in August, 1534. The site of the monastery was granted by Philip and Mary, to a Russell, descendant of one of the late king's secretaries, in whose family it remained till the present century, when it passed, in the female line, to the Beringtons, the present possessors. The glory of the part of church still left was the six-light Perpendicular east window, which still showed a valuable series of Yorkist royal portraits. Beginning with lowest pane to south, and reading from left to right, there was a space we knew to have once contained Richard, Duke of York, now filled by a kneeling figure of great beauty, brought from some other window; next, was a full-length portrait of Edward V., who was murdered in the Tower—a window preserved by the late Albert Way, who had it drawn, and then carefully releaded and replaced; the third should be Edward IV., now lost; then, full-length figure of Queen Elizabeth Woodville, wife of the last-mentioned king, and the remains of inscription; and then four figures of ladies in one light, two of which were identified as the sisters Elizabeth of York and Katharine. Above, in the next small tier were first two canopies, then the head of the Almighty Father; the body of a bishop, with crozier and two sets of chains, the head being gone; and two blank spaces. In the head were the shields bearing arms of Edward V., diminished for eldest son, and of Edward IV., each supported on a compartment by two lions and two angels, an unusually complete heraldic representation, and another the arms of Bishop Alcock. The tiles on floor had full inscriptions, and one had been singularly misunderstood by the late Albert Way and John Gough Nicholls; both of them regarded the motto "Misereatur me, Misereatur me," to indicate a mendicants' pavement, whereas, it was but the usual sign of a monk's burialplace, being a quotation from the passage in Job, used in the office for the dead.

Little Malvern Court, which occupies the site of the monastic buildings, was shown by its owner and occupant, Mr. C. M. Berington. It is a picturesque structure of various dates, having many gables, one on west half-timbered, and on north the principal entrance under a rough-cast circular turret. The library shows some remains of the kitchen built by Bishop Alcock, and contains a choice collection of 17th and 18th-century Catholic works, and a few illuminated manuscripts and early-printed books. Mr. Berington drew out of an old chest, which once belonged to Queen Katharine of Aragon, an embroidered quilt of rich silk, Moresque in pattern, and other relics of that Queen. He also exhibited several deeds relating to the monastery, the earliest being of the 12th century, one from William, Earl of York, relating to the priory, and the finest, the grant by Philip and Mary, of the monastery to Russell. Mr. Berington held up a walnut-shaped cowhide box, of which he challenged the members to give the use, although a feature of every house a century since; no one responding at once, he said it was a gentleman's wig-box.

A stiff clamber brought the party to the summit of the

HEREFORDSHIRE BEACON,

Where, after some time had been spent in identifying and pointing out the salient features of the magnificent landscape, extending from the Wrekin to the Severn estuary, and from Edgemoor to the Mid-Welsh mountains, with portions of some 13 or 14 counties, a fierce controversy arose as to the origin of the great earthworks by which the hill has been surrounded, and was only cut short by a sudden passing storm. Mr. E. Lees, of Worcester, delivered an address, in which, after pointing out the successive deep trenches and banks by which the eastern or English side of the Beacon is defended, he offered reasons for supposing that the hill could not have been used by Caractacus as a defence against the advances of the Romans under Ostorius, as it was not on the line of march, nor was it more probable that the Romans ever occupied it, as neither coins nor other traces of their presence had been found. Indeed, the only early object found on the Malvern range was the celebrated chieftain's gold crown set with jewels, of about the ninth century, dug up at Camphill on the N.W. side of this beacon, a few bones of domestic animals and pieces of pottery recently found on Midsummer Hill, and a few bones and a fragment of a cup dug up by the Ordnance surveyors in the cairn on the Worcestershire Beacon. (The latter he exhibited, and it was described by Mr. Brock as a piece of a third or food-cup of earthenware often found in tumuli with the familiar interwoven ornament afterwards improved upon in Norman manuscripts and carving.) Whenever formed, this Herefordshire Beacon camp was a vast undertaking. The summit of the hill, an oval space 60 yards in longest diameter, was enclosed by a ditch from 12 to 18 ft. in diameter, and below this, on the eastern face, were other deep walls and fosses, the lowest complete one being 2,970 yards round. Dr. Card, a former vicar of Great Malvern, was the first to notice that only the eastern face of the hill was strongly defended, and that the summit had been so scarped and banked up, with a dip to west, that a beacon fire would be visible to all the hillsides of Wales, while it would be hidden from the plains of Worcester and Evesham. He held, therefore, that the lines were formed by the Romano-Britons or Welsh as defences against the Saxons, and that the lower entrenchments were the most recent. Mr. T. Morgan remarked that the absence of Roman remains was no convincing proof that the Romans were never there; till the late discoveries at Brading it was denied that the Romans could have been in the Isle of Wight. Sir J. A. Pictet believed, from the variety in character of the hill defences, that like many other entrenched sites, they were used by many successive races; that the higher ones were the work of hill tribes far anterior to the Roman occupation. Mr. J. Tom Burgess pointed out from the rampart that just opposite, rising from the eastern plain, was the Bredon Hill, which was undoubtedly occupied by the Romans; indeed, in sight on the east was a long line of hill tops which were held by Ostorius during the second Roman occupation, and to the north-east another series of earthworks and forts of the Cornubii; while to the north was their capital the Wrekin, and a little to the west were hill fortresses attributed to the Silures. These gigantic engineering works on this beacon might be and probably were much older than the days of the Romans; but it was impossible to suppose that such a skilled commander as either Ostorius or Caractacus would have failed to secure so important a place, lying on the very borderland between the contending nations; and although no remains had yet been found, it was probable that the beacon was held by either party several times during the twenty-five years' war, and in this view he believed Mr. G. T. Clark, of Dowlish, concurred. Mr. Burgess then described the escape of Prince Edward from Wigmore Castle, and his victory over Simon de Montfort at the Battle of Evesham in 1265, pointing out the localities as he proceeded. The party having seen a square cave chamber of very novel appearance in the Valley, then walked on to *Edgemoor Camp*, a series of less clearly defined earthworks and a weir hill to the south, and here Mr. J. T. Burgess explained the excavations made by him two years since, and showed what he held to be cattle inclosures, and three pounds

for storing water on the side of the hill. Walking single file along the *Ridgeway*, a narrow backbone of the Wenlock sandstone, with shelving declivities on either side, a steep descent led to the approach to *Branshill Castle*, some discussion arising afterwards as to whether the narrow path was a geological or military formation. Messrs. G. H. Piper, C. Lynam, Swayne, and others holding the former theory, and Messrs. Burgess and George the latter, the general conclusion seeming to be that it was the result of detrition of the rock by rain, afterwards artificially scarped and rendered uniform for purposes of defence. Of *Branshill Castle* little is left, except outer lines of ramparts, an extensive moat, now inclosing a dell, overgrown with yews and other trees, and part of the shell of a red-sandstone tower, defending the bridge to the moat, a Late structure, octagonal without, and circular within, marked with stringcourses and ornamental loopholes. Mr. G. H. Piper, F.G.S., President of the Malvern Natural History Club, read an historical paper, showing the families who have held the Castle, which was never garrisoned, and was burnt down during the last Civil War. He exhibited a tracing of Buck's view, taken in 1731, which showed two towers defending a drawbridge and extensive walling, but proved quite inaccurate in detail when compared with the actual remains.

Easton Church, seen after luncheon, was rebuilt, with the exception of the west tower, in 1852, from the designs of Sir Gilbert Scott; the feature of interest is the chapel on north-east, of the Cocks family, now represented by Earl Somers, which contains several large altarcrofts, like the church, of fourteenth-century character, in marble inlaid with coloured marbles and precious stones; that to the second Earl, by Philip, being decorated with bas-reliefs; there are also mural slabs, the earliest being one to Richard Cocks, Alderman of London, died 1623.

EASTON CASTLE,

the last place visited, is the seat of Earl Somers, and is an attempt by Robert Smirke to reproduce a castellated mansion. Sufficient is it to say that the circular flanking towers at each angle, the inadequate central keep, and the battlements, are all copied from an Edwardian castle, while the decorative details of the exterior include the dogtooth, the zigzag, and other ornaments of the Transitional Norman period. It was built between 1812 and 1824, in solid ashlar masonry, at a cost, it is said, of nearly a million of money, and with all its many and glaring incongruities the castle is an interesting specimen of the knowledge of Gothic existing at that period. The entrance hall is very large, and 60 ft. high; upon the stencilled walls are hung a series of thirty-two complete suits of Milanese armour worn by the bodyguard of Charles V. There are many portraits by Kneller, Romney, &c., and a full-length of the present countess, then Miss Virginia Pattle, by Watts, whose Tennyson, exhibited at the Academy, is hung in one of the lower rooms. The dining-room is interesting, as having been furnished from Pugin's designs, in a florid Gothic style, now quite out of date.

In the evening a paper was read by the Rev. W. S. Symonds, F.G.S., on "The Battle of Tewkesbury," and the customary votes of thanks were passed.

MONDAY.

EXCURSION TO WORCESTER.

The business of the congress formally closed on Saturday night, but three extra days were arranged for, the first, which was very numerously attended, being spent in Worcester. The members were received at the *Guildhall* (illustrated by us with its entrance-gates, last week), by the Mayor, Mr. Townshend, and upon the table were arranged the charters and the corporation regalia, including four silver maces, a double-headed sword, with richly ornamented scabbard, two punchbowls, and two jugs of Worcester porcelain, and three flags. Mr. W. De Gray Birch, F.S.A., of the British Museum, gave a description of the charters, which he said were a fine and unusually complete series, beginning with the reign of Richard I., and ending with that of Charles II. In the first granted, in 1189, Worcester was called a "vile," and the inhabitants "burgesses;" but in the second, granted by Henry III. in 1216, and all succeeding ones,

"city" and "citizens." The plain tapes or bobbins, which formerly held the seals of the first and second charters, were amongst the earliest specimens in existence of the English weavers' art. The charters were in wonderful preservation; but he would suggest to their custodian that such invaluable documents ought not to be folded, as each creasing hastened the time when they would drop to pieces; they should be kept in a portfolio, or, better still, a glass case, but ample ventilation was essential to their preservation. Mr. Birch then read a paper on "The Anglo-Saxon Charters of Worcester Monastery," of which he said there were catalogued by the Monk Hemming, at the direction of Bishop Wulstan, between 200 and 300, relating to the sale and tenure of land, the transfer of real property, — documents which possessed the highest value as throwing light on our insular history. Of these more than half had ceased to exist; twenty had found their way to the British Museum; 24 were in 1703, and probably some were now in the possession of the Somers family; and only one remained in the care of the Dean and Chapter, and that was temporarily held by the Ordnance Survey. This single remnant of the capitular manuscripts, of which a facsimile reproduction in photolithography was exhibited, was a grant dated A.D. 770 to Uhtred from Regulus, King of the Mercians. Only about 2,000 Anglo-Saxon documents are now known to exist, a number necessarily by accidents, thefts, and the lapse of time which devoured all things always diminishing, and it was, therefore, desirable that an attempt should at once be made to complete the work commenced by Kemble, and to collate, edit, translate, and publish the whole in one volume. Mr. J. Tom Burgess gave an account of the recent discoveries in the city, and stated that, beginning from opposite the Guildhall and running in the line of the thoroughfare but sometimes just under the houses, to Little Angel-street, an ancient street, paved with Roman slag, had been found from 7 to 8 ft. beneath present surface; a quantity of detritus, horns of oxen and goats, and bones of pigs, and also two small broken cups of nearly black pottery, — pronounced by Mr. Brock, amidst general laughter, to be very like Elizabethan ware.

At the *Cathedral*, the members were received by their President, the Dean (Lord Alwyne Compton) who delivered an extempore address at various parts of the edifice, describing its peculiarities, the course of the recent restoration, which he stated cost over £130,000, and the appearance of the building previously to that work. Having taken the party over the entire building, nave, crypt, choir, transepts, cloisters and chapter-house, all of which were described in connection with the Architectural Association's visit in our issue for Aug. 19 (p. 215), the Dean led them to the refectory, which stands over a series of Norman vaults (one of which fell in a fortnight since) and is now used as the King's School. It is well-proportioned, with thirteenth-century walls, into which five Decorated windows are inserted on either side, the east end being occupied by a large quatrefoil, containing a greatly mutilated representation of the Lord in Majesty, and above is the blocked-up tracery of window, and on either side Perpendicular panelling.

In the Deanery, formerly the Palace (illustrated by a plan in the *Building News* for the 12th ult., and by details of bosses last week) the Dean entertained the members at luncheon in a splendid vaulted hall in the basement, and afterwards showed them, in the drawing-room, an extensive collection of water-colour, chalk, and pencil drawings of Worcester, sketched during the past half-century by Mr. H. H. Lines, of that city, who had lent them for the occasion. These are all dated, the construction being noted, and already are of high local interest, and must increase in value, as they illustrate the cathedral before restoration with its former tower-parapet, and east front, and the disproportionately high spirelets added to each gable a century since by the architect of St. Andrew's Church spire (and now replaced by weak Decorated pinnacles by Sir Gilbert Scott); the Gwesten-hall, wantonly destroyed in 1851; St. Peter's Church, another loss to picturesque Worcester; and the old buildings and walls on the Severn front of the cathedral adjuncts.

In the afternoon the *Hall of the Commandery*

(illustrated on August 12) was visited, and described by Messrs. J. Tom Burgess, E. Lees, and John Reynolds, the latter pointing out that the roof of the hall,—now unhappily divided by a carriage-road to stables, recklessly driven through the building by the last proprietors within living memory—was probably a unique example of the transition from the collar-beam to the hammer-beam mode of treatment, having the latter style of principals, which were also tied in and had collars, and curved braces to purlins.

The party then divided, one section going over the Royal Worcester Porcelain Manufactory and its Museum, under the guidance of Mr. Binns, F.S.A., its Director, another preferring to inspect the Edgar Tower, some half-timbered houses in Sidbury, a fourteenth-century wooden archway in a passage leading from Lych-street, leading opposite the north-east transept of cathedral, and conjectured by Mr. Burgess to mark the site of the Lich-gate. All re-met at the Museum, a section afterwards walking out to *White Ladies*, beyond the Tything, to find the site of this ancient priory occupied by a modern red-brick house, the only old portion seen being a blank wall, towards the street, of masonry, broken up by First Pointed blank windows, alternately tall and short, and a vault at the street side of garden.

TUESDAY.

Between sixty and seventy members took part in the day's proceedings, which were arranged by Mr. J. T. Burgess to cover much of the ground between Worcester and Droitwich visited by the Architectural Association on the last days of their excursion. Leaving Worcester in waggonettes at 10.30 a.m., *Cragbury or Cruck-borough Hill*, was first seen. It is an isolated mound, having, according to Mr. Lees, a circumference of 1,536ft. at base and 560ft. at the summit, which is 230ft. high, and marked by a central depression, and has upon it many elm-trees. Messrs. Burgess and Lees gave descriptions, the former pointing out its resemblance to other detached hills near by, and suggesting that if the depression on the top were excavated, a cist, human remains, and pottery would probably be found. Both speakers agreed that it was a natural hill artificially scarped, but differed as to the etymology, causing a discussion, in which Messrs. Proctor Burrows, Morgan, George, and others joined. At *Spetchley Church* an interesting Tudor north transeptal chapel was seen, but time compelled the members to hurry on to *Huddington*, where some coldness and opposition to an inspection was at first offered to the members in consequence, as stated by the tenant of the Court, of the report in this journal of the Architectural Association's visit. After some conversation every facility was given to the members, who were both loud and severe in their comments on the neglected state of the church, which fully bore out the description given by another writer last week (p. 262). Mr. Loftus Brock, after pointing out the peculiarities of the church—which appears to have been unaltered with the exception of a Perpendicular window or two, and the Jacobean altar fittings, since the beginning of the fourteenth century—said the present condition of the fabric was positively dangerous, and might result in a lamentable accident before many years; but it would be surprising what a difference the judicious outlay of a few hundred pounds in rendering it water-tight, and a little cleansing, would effect. *Huddington Court* (illustrated last week), of which the exterior is the most interesting portion, was afterwards visited, Mr. Reynolds pointing out that it was somewhat older than the similar house seen last week at *Birt's Morton*, and the members drove on to *Meer Hall*, Hanbury (illustrated in the *Building News* for Aug. 19, and described last week, p. 263), down a splendid avenue of elm-trees. Here the members were welcomed by the hospitable proprietor, whose ancestors have occupied the site as a dwelling since 1330, and who himself is an excellent example of "The fine old English gentleman, all of the olden time," a race now dying out. Col. Bramble made some observations on the Bearcroft arms on the porch and in the principal room. Mr. Loftus Brock gave an address upon the house, which, he said, in spite of the date on the front (1337), was certainly not older than about 1600. He added that he had an explanation to make of a somewhat personal character. The house was altered, to suit modern requirements, by Mr. M. Habershon, the father of the speaker's partner, in 1826, and the changes were, he ventured to think, carefully executed, especially considering the general knowledge of old work existing 55 years ago. In speaking of that work, Mr. Niven, in his "Old Worcestershire Houses," had fallen into an error in ascribing to Mr. Habershon the painting of the new brickwork in black and white stripes to counterfeit half-timbered construction, and many present must have noticed that a writer in the *Building News*—a paper to which they, as an Association, were much indebted for its public spirit in specially reporting, and for the careful descriptions given of their proceedings—last week repeated the statement in connection with the Architectural Association's visit. If any representative of the journal he had referred to were present, he should feel obliged if it could be made equally public that from his personal knowledge of the late Mr. Habershon, he knew him to be incapable of recommending such a sham as painting brickwork to resemble wood and plaster; and, further than that, he had ascertained that in this instance the additions were not so treated for some years after Mr. Habershon's connection with the house had ceased. The occupant of the house confirmed this statement, stating that he could remember the alterations being made, and their first being painted over—a work now repeated throughout the building every three years.

The members lunched at *Droitwich at the Raven*, a half-timbered building, possessing in the doorway to garden a good deal of very perfect stained glass removed from the Exchequer Court, demolished some years since during street improvements; it contains the arms of the Lyttelton, Bokking, and Winter families, and the dates 1501 and 1531. Opposite the hotel is the *Salter's Hall*, a picturesque reproduction of the local brick, half-timbered, and rough-cast style; it was erected in 1879 from the designs of Mr. Harrison Fagg, and faces the *Raven Hotel*. After luncheon, Mr. J. T. Burgess and the Mayor of the Borough conducted the members through the town, which has a steaming atmosphere and dilapidated appearance, giving a summary of its history, in the course of which former he said numerous traces of its occupation as a Roman city had been exhumed in the form of tessellated pavements, coins, and fragments of urns.

St. Andrew's Church, a building containing high pews and galleries, and with every internal feature obscured by many coats of whitewash, was first seen, Mr. Burgess claiming that the Early English work in the south transept is amongst the most beautiful of its period in the county. The church formerly boasted of the shrine of St. Richard, Bishop of Chichester, and the friend of Thomas à Becket, but of this no traces can be found. It is a building presenting many curious problems, such as the buttresses projecting from the chancel-arch spandrels within the line of the debased 14th-century arcades, the human heads used as corbels to the same arch, and the curious window in south side of chancel, which careful restoration would render clear. *Doddleshill Church* is on a cliff overlooking the railway. The nave was injured during the last Civil War, a grant being made to the parish for repairs, and the chancel arch is bricked up. Nash shows the nave, of which not a vestige can now be seen, in ruins. A central tower, of Transitional character, at one time existed; but this is gone, and is replaced by a plain 15th-century tower, immediately adjoining, upon the south transept, and this second tower is said to have given the railway company some cause for anxiety lest it should fall forwards on to the line. Inside, what remains of the church is dark and in need of restoration. On the way back to Worcester, the members visited the Church and Court at *Salwarpe*, the former, a Decorated building, restored as to its chancel by the elder Hardwicke, the latter a much-altered specimen of a half-timbered house, still retaining the wide four-centered oaken doorway and door, a rich barge-board, and other features of the beginning of the 16th century.

WEDNESDAY.

VISITS TO CHELTENHAM AND LECHAMPTON.

The closing day of the Congress was spent in the neighbourhood of Cheltenham. On arriving by train at that town, the party, who numbered between forty and fifty, walked to Thirlestaine House, formerly the residence of Lord North-

wick, and afterwards of the late Sir Thomas Phillips. Here they were received by the present owners, the Rev. J. E. A. and Mrs. Fenwick, who threw open to the members the picture-galleries and a selection from the famous collection of MSS. formed by the late Sir T. Phillips. The President, the Dean of Worcester, introduced Mr. E. Maunde Thompson, F.S.A., keeper of the manuscripts in the British Museum, who delivered an address upon the paleography of extant MSS.; these, he showed, went back to about the second century before Christ, and were successively written in capitals, uncials, cursive, and manuscripts; the insertion of breathings, punctuation marks, and contractions also served to mark the date of a manuscript, and the development of illumination was also a safe guide. In speaking of the Thirlestaine collection, Mr. Thompson said the late Sir Thomas Phillips brought together no fewer than 30,000 manuscripts, largely by personal purchases; he was his own librarian, cataloguing, arranging, and binding this mass of written material with his own hands, and he also, in the course of his long life, made himself master of a considerable portion of the contents. The work was found in a chaotic incompleteness at his death, but the trustees, Messrs. Carden and Gale, had continued the cataloguing, and the collection was now opened to students under necessary restrictions, and was largely used, chiefly by Germans. On the tables were displayed a series of illustrated French and Italian manuscripts, illustrating the development of ornamentation between the 13th century and the advent of printing, and on side-shelves were shown an extensive series of Greek and Latin manuscripts, from very early periods, and English works by Geoffrey, of Monmouth; Chaucer, Gower, and other well-known chroniclers and poets. The pictures are in two galleries, planned as the letter T, and top-lighted; the larger one, which communicates with the house, is hung with a miscellaneous collection of paintings by the old masters and deceased English painters of two generations since, the subjects being chiefly sacred or portrait. At the end of this long apartment is a smaller one, forming a *coul-de-sac*, the walls being covered with Welsh and Gloucestershire landscapes by Glover and one or two other painters. The pictures would have been greatly increased in value had the name, subject, and date been lettered upon the frames, and two catalogues seemed hardly sufficient for so numerous a party.

Lechampton Church, the first seen in the afternoon, has a Late 13th-century spire of great beauty, on tower at the crossing, and having beneath it Advanced Perpendicular groining. Above the altar is a reliquary locker, with bolt-holes perfect. The windows are chiefly reticulated 14th century. The church has been recently restored by Mr. Middleton, of Cheltenham.

At *Prestbury Church* the members were welcomed by the incumbent the Rev. J. De la Bere, who explained that the church, a large and fine one, was formerly served as a priory by Llantony Abbey, and that it had been restored by Mr. G. E. Street. With the exception of lower stage of tower, it is a Late Decorated building, and still possesses its original sanctus bell over chancel-arch. On the wall of south aisle have been hung a modern oil-painting of the Blessed Virgin Mary, and also a pre-Raffaélite one, representing the Last Supper, in which the Disciples carry symbolical emblems; these and a "Virgin and Child," near chancel-arch, and the well-kept condition of the sanctuary served to remind the members that other than antiquarian associations rendered *Prestbury Church* well known. *Prestbury House*, to west of church, was also inspected; it contains some remains of the Priory buildings, including some 15th-century mulioned windows, and a fine Late open-timbered roof extending through the attics.

Bishops Cleeve Church was the last seen. The grouping from south-west is very impressive. There are transepts, with square tower at the crossing; a south porch, having Late Norman doorway and groined interior, projects like a second transept, and is connected with the other by an extension of south aisle of the 14th century, but battlemented at a later period. The rich Norman doorway and west front is flanked by square pinnacles, which have been figured in

Parker's "Introduction to Gothic Architecture," and beyond these are the Decorated aisles. The church has not been restored, except that a wretched modern east window, with poor circular opening above, has been substituted for one which, judging from the remains of ball-flower enrichment, must have been as rich as the well-known examples at Leominster and Ledbury. On entering, the chancel, clean, but bare of fittings, and whitewashed, presented an effective contrast to that just left. The nave columns are cylindrical, but carry pointed arches of great span—a second aisle or chapel, separated by octagonal columns, existing on south side. The tower-arch is supported by stilted circular arches to main building and pointed ones to the sides, but the cushion capitals, with acanthus-leaves in the fillets, show, as Mr. Reynolds observed, that the pointed form is only adopted for structural security. The south transept is shut off by lath-and-plaster screen, and in it is an elaborate Decorated recess, treated with the ball-flower and bold cinquefoil cusping; in this is awkwardly fixed an effigy of a warrior clad in chain-mail and surcoat, and bearing a kite shield and broadsword, which enabled Colonel Bramble to fix the date as c. 1265-70. The effigy which probably belonged to the recess, is a female figure, now lying against a large Jacobean monument to a Bighott in the south chapel. There is a 15th-century west gallery carried on pillars. The visit to this fine and unaltered church proved a fitting climax and close to the Congress.

YORKSHIRE ARCHEOLOGICAL AND TOPOGRAPHICAL ASSOCIATION.

THE fifteenth annual excursion of the above society took place on Monday. Helmsley was the place selected, with the object of visiting the ruins of Helmsley Castle and Rievaulx Abbey. The town was reached about half-past eleven, and the visitors at once walked to the castle ruins, situated just within the lodge-gates of Duncombe Park. Here, in the midst of heavy rain, Colonel Brooke, of Huddersfield (chairman of the council), read a paper by Mr. G. T. Clark, F.S.A., on "The Castle." The writer stated that the position of the castle, if not specially striking, was yet strong, and favourable to the operations which rendered it in former days almost impregnable. The plan of the castle is rectangular, and its earthworks are upon a scale not usual with castles of pure Norman origin, and which, notwithstanding their form, raise a surmise that they may be of much earlier date. When the Norman engineer undertook to fortify the place, he seems to have confined himself to the construction of a curtain of 10ft. thick round the inner area, placing it on the firm ground, and employing the earth-bank as a ramp against the wall. To this he added a gateway at each end, and a work of some strength as a barbican beyond the inner ditch; then a second gatehouse, placed upon the barbican; and finally, a second or outer bridge. On the west side of the inner area, where the rock was firm, a low cliff of 20ft. to 25ft. was substituted for the slope of the ditch. The keep appears to have been a square of 53ft., and although about 9ft. of it are buried in earth and rubbish, it still rises to about 90ft. Rather more than the outer or eastern half has been blown up, and has fallen into the ditch, and what remains has suffered much from alterations and additions. It is built in rubble of a very ordinary description, but with quoins and dressings of ashlar. The walls are plain, 9ft. thick, having neither string nor set-off, and but one low pilaster buttress, which rises to the first floor only, and is placed upon the west end of the north wall, to give strength to the interior stair. An addition of about 30ft. has been made to the original keep, giving it an upper or second floor. In the west wall of this addition is a pointed window in a segmental recess, resting on the old masonry. In the north wall is another pointed window and a fireplace. There is a loop towards the south, but this part of the wall, both inside and out, is obscured by ivy. In the wall of this floor, cutting the line of the windows, is a corbel-table, the corbels cut somewhat into the shape of heater-shields. This must have supported the roof, but have interfered seriously with the windows. How this story was reached does not

appear; probably by a well stair in the wall, now destroyed, a point which could no doubt be ascertained by uncovering the fragments in the ditch. The upper wall seems as thick as that below, and it is curious that there are no traces visible of mural galleries or chambers. It would seem that the original keep was Late Transition or Pointed Norman, and therefore might well have been built, as supposed, by Robert de Ros, surnamed Fursan, who held the lordship from 1184 to 1226, and probably completed the work before 1200. Then came the alteration in the first floor in a most decided Early English style, and, therefore, probably by Robert de Ros, Fursan's grandson, who married the heiress of Belvoir, and flourished between 1257 and 1285. Then followed the addition of the upper story, and of the battlements and turrets, all rather Late Decorated. This might well be the work of William de Ros, who held Helmsley from 1317 to 1342. The Domestic buildings standing opposite to the keep are composed of two blocks. One, a square mass of great height, and with walls of considerable thickness, has traces of Transition Norman or Early English work, but has undergone alterations in the Decorated period, and finally in that of the 16th century. The other, or Norman building, may be an early foundation, and probably is so, but its fittings are of the 16th century, and probably the work of the Earl of Rutland, whose armorial bearings are embossed in plaster on a deep cornice, and on the pannelled ceiling, all now in the last stage of decay. It is difficult to form an opinion upon the age of the earthworks of this castle. Either the Romans or the Normans might have laid out an earthwork on a rectangular plan; but when either people desired to construct a place of excessive strength, they employed masonry rather than earthworks. The Saxons and Early English, on the other hand, so much given to employ defences of earth, and often upon an immense scale, are not known ever to have made them rectangular. What was the practice of the Romanised Britons, who inherited something of Roman arts and military rules, and might also have derived from their Celtic forefathers a taste for works in earth, is not known. Such a fortification as the present may possibly be their work. Of course it is possible it may have been the work of Robert Fursan, especially as, remarkable as it is, it is not named in Domesday or any early record.

After inspecting the ruins, the company proceeded to the Black Swan Hotel, where luncheon was provided. Colonel Brooke expressed the gratitude of the members for the hearty welcome they had received at Helmsley. The very first object that their society had in view was to do something towards the conservation of those ruins, of a portion of which his Lordship had spoken. He said nothing about the ruins of Duncombe Hall—that was too painful a subject for Yorkshiremen to talk about—but with regard to the priceless ruins of Rievaulx, he hoped efforts might be made by their society to bring a knowledge of them within a larger area than they were at present—he meant in a scientific point of view. It was known that they were indebted to the late Mr. Edmund Sharpe for many excellent dissertations on the monasteries of Yorkshire, and especially of those of the Cistercian order. Mr. Sharpe's mantle had fallen on a member of their own society, Mr. Mickelthwaite, who would shortly give them some account of the ruins of Rievaulx Abbey, and he (Colonel Brooke) hoped and believed that an opportunity would soon be offered of throwing some light upon what still remained an unsolved mystery.

The party then proceeded in waggonettes to Rievaulx Abbey, and spent some time in inspecting the magnificent ruins. During the journey rain continued to fall, but at the Abbey it ceased for a short time. Rievaulx Abbey was the first Cistercian house built in Yorkshire, and the second in England. It dates from 1131, and was founded by Walter l'Espee, who afterwards became a monk, and was buried in the Abbey. Mr. J. T. Mickelthwaite, F.S.A., briefly alluded to the rise of the Cistercian Order, and described the architectural features of the Abbey. While Mr. Mickelthwaite was speaking, there was a renewal of the rain, which came down even heavier than before. His remarks were therefore curtailed. Helmsley was left at 5.20, and Leeds was reached shortly after eight o'clock.

THE BRITISH ASSOCIATION AT YORK.

THE Jubilee meeting of the British Association is being held at York. The opening address was delivered by Sir John Lubbock on Wednesday. The address, which is a masterly review of the progress of science during the past fifty years, will be found fully reported in the *English Mechanic and World of Science*, we can only spare space for one or two extracts.

ARCHAEOLOGY.

Dealing with the question of the antiquity of the human race, Sir John Lubbock said: "Few branches of science have made more rapid progress in the last half-century than that which deals with the ancient condition of man. When our association was founded it was generally considered that the human race suddenly appeared on the scene about 6,000 years ago, after the disappearance of the extinct mammalia, and when Europe, both as regards physical conditions and the other animals by which it was inhabited, was pretty much in the same condition as in the period covered by Greek and Roman history. Since then the persevering researches of Layard, Rawlinson, Botta, and others have made known to us, not only the statues and palaces of the ancient Assyrian monarchs, but even their libraries; the cuneiform characters have been deciphered, and we can not only see but read in the British Museum the actual contemporary records, on burnt-clay cylinders, of the events recorded in the historical books of the Old Testament, and in the pages of Herodotus. The researches in Egypt also seem to have satisfactorily established the fact that the pyramids themselves are at least 6,000 years old, while it is obvious that the Assyrian and Egyptian monarchies cannot suddenly have attained to the wealth and power, the state of social organisation and progress in the arts of which we have before us, preserved by the sand of the desert from the ravages of man, such wonderful proofs. In Europe, the writings of the earliest historians and poets indicated that, before iron came into general use, there was a time when bronze was the ordinary material of weapons, axes, and other cutting implements, and though it seemed *a priori* improbable that a compound of copper and tin should have preceded the simple metal iron, nevertheless the researches of archaeologists have shown that there really was in Europe a "Bronze Age," which at the dawn of history was just giving way to that of "Iron." The contents of ancient graves, buried in many cases so that their owner might carry some, at least, of his wealth with him to the world of spirits, had proved very instructive. More especially the results obtained by Nilsson in Scandinavia, by Hoare and Borlase, Bateman and Greenwell, in our own country, and the contents of the rich cemetery at Hallstatt, left no room for doubt as to the existence of a Bronze Age; but we get a complete idea of the condition of man at this period from the Swiss lake villages, first made known to us by Keller, and subsequently studied by Morlot, Troyon, Desor, Rüttemeyer, Heer, and other Swiss archaeologists. Along the shallow edges of the Swiss lakes there flourished, once upon a time, many populous villages or towns, built on platforms supported by piles, exactly as many Malayan villages are now. Under these circumstances innumerable objects were one by one dropped into the water; sometimes whole villages were burnt and their contents submerged; and thus we have been able to recover from the waters of oblivion in which they had rested for more than 2,000 years, not only the arms and tools of this ancient people, the bones of their animals, their pottery and ornaments, but the stuffs they wore, the grain they had stored up for future use, even fruits and cakes of bread. But this bronze-using people were not the earliest occupants of Europe. The contents of ancient tombs give evidence of a time when metal was unknown. This also was confirmed by the evidence then unexpectedly received from the Swiss lakes. By the side of the bronze-age villages there were others, not less extensive, in which, while implements of stone and bone were discovered literally by thousands, not a trace of metal was met with. The shell-mounds or refuse heaps accumulated by the ancient fishermen along the shores of Denmark fully confirmed the existence of a Stone Age. No bones of the reindeer, no fragments of any of the extinct

mammalia have been found in any of the Swiss lake villages or in any of the thousands of tumuli which have been opened in our own country or in Central and Southern Europe. Yet the contents of caves and of river gravels afford abundant evidence that there was a time when the mammoth and rhinoceros, the musk-ox and reindeer, the cave-lion and hyena, the great bear and the gigantic Irish elk wandered in our woods and valleys and the hippopotamus floated in our rivers; when England and France were united, and the Thames and the Rhine had a common estuary. This was long supposed to be before the advent of man. At length, however, the discoveries of Boncher de Perthes in the valley of the Somme, supported as they are by the researches of many Continental naturalists, and in our own country of M'Eneery and Godwin-Austen, Prestwich and Lyell, Vivian and Pengelly, Christy, Evans, and many more, have proved that man formed a humble part of this strange assembly. Nay, even at this early period there were at least two distinct races of men in Europe, one of them—as Boyd-Dawkins has pointed out—closely resembling the modern Esquimaux in form, in his weapons and implements, probably in his clothing, as well as in so many of the animals with which he was associated. At this stage man appears to have been ignorant of pottery, to have had no knowledge of agriculture, no domestic animals, except, perhaps, the dog. His weapons were the axe, the spear, and the javelin; I do not believe he knew the use of the bow, though he was probably acquainted with the lance. He was, of course, ignorant of metal, and his stone implements, though skilfully formed, were of quite different shapes from those of the Second Stone Age, and were never ground. This Earlier Stone period, when man co-existed with these extinct mammalia, is known as the Palæolithic, or Early Stone Age, in opposition to the Neolithic, or Newer Stone Age.

THE INFLUENCE OF IRON ON ENGINEERING.

Steel can now be produced as cheaply as iron was formerly; and its substitution for iron as railway material and in shipbuilding, has resulted in increased safety in railway travelling, as well as in economy, from its vastly greater durability. The introduction of iron has, moreover, had a vast influence on the works of both the civil and military engineer. Before 1830 Telford had constructed an iron suspension turnpike-road bridge of 560ft. over the Menai Straits; but this bridge was not adapted to the heavy weights of locomotive engines. At the present time, with steel at his command, Mr. Fowler is engaged in carrying out the design for a railway bridge over the Forth of two spans of 1,700ft. each; that is to say, of nearly one-third of a mile in length. As regards railways, the Stockton and Darlington Railway was opened in 1825; but the Liverpool and Manchester Railway, perhaps the first truly passenger-line, dates from 1830, while the present mileage of railways is over 200,000 miles, costing nearly £1,000,000,000 sterling.

THE NEW NATURAL HISTORY MUSEUM.

In his opening address as President of the Biological Section, Professor Owen gave some interesting particulars with regard to the New Natural History Museum at South Kensington, the erection of which he strove for twenty years to accomplish:

Experiments which preceded the substitution, in 1835, of the actual Museum of the Hunterian Physiology at the Royal College of Surgeons, for the costly, cumbersome, and ill-lit building, with its three-domed skylights, which preceded it, had led to the conclusion that the light best fitted for a museum was that in which most would be reflected from the objects and least directly strike upon the eye; and this was found to be effected by admittance of the light at the angle between the wall and roof. But this plan of illumination is possible only in galleries of one story, or the topmost in a many-storied edifice. Such system of illumination may be seen in every gallery of the museum described to you last year at Swansea, save those of the stories of the main body below the sky-lit one which necessitate side windows.

I subjoin a copy of the letter from Sir Henry A. Hunt, conveying his conclusions respecting the plan of building discussed with him:—

"4, Parliament-street, September 25, 1862.
"MY DEAR SIR,—I return you the drawings of the proposed Museum of Natural History at South Kensington. In May last I told Mr. Gladstone that the probable cost of covering five acres with suitable buildings would be about £500,000, or £100,000 per acre.

"The plan proposed by you will occupy about four acres, and will cost about £350,000, or nearly £90,000 per acre.

"Having prepared sketches showing the scheme suggested by you, I have been able to arrive more nearly at the probable cost than I had the means of doing in May last. But, after all, the difference is not great; although the present estimate is a more reliable one than the other. It is right, however, to state that the disposition of the building, as proposed by you will give you a greater amount of accommodation, and admit of a cheaper mode of construction than I had calculated upon in May (relatively with the space intended to be covered) and therefore I think your plan far better adapted for the Museum than the plan I took the liberty to suggest to Mr. Gladstone.

"Believe me, &c.,
(Signed) HENRY A. HUNT."

The working plans of Sir Henry A. Hunt were subsequently submitted for competition, and the designs of the accomplished and lamented Capt. Fowke, R.E., obtained the award in 1864. His untimely death arrested further progress or practical application of the prize designs. On the demise of Capt. Fowke Mr. Alfred Waterhouse was selected as architect. He accepted the general plans which had been sanctioned and approved by Sir H. A. Hunt and by Capt. Fowke, and I took the liberty to suggest, as I had previously done to Capt. Fowke, that many objects of natural history might afford subjects for architectural ornament; and at Mr. Waterhouse's request I transmitted numerous figures of such as seemed suitable for that purpose.

Mr. Alfred Waterhouse, A.R.A., for the realisation of the plans and requirements of our Museum of Natural History, has chosen an adaptation of the Round-arched Gothic, Romanesque, or Romaic of the twelfth century. No style could better lend itself to the introduction, for legitimate ornamentation, of the endless beautiful varieties of form and surface sculpture exemplified in the animal and vegetable kingdoms. But the skill in which these varieties have been selected and combined to produce unity of rich effects will ever proclaim Mr. Waterhouse a supreme master of his art.

I need only ask the visitor to pause at the grand entrance before he passes into the impressive and rather gloomy vestibule which leads to the great hall, and prepare him for the flood of light displaying the richly-ornamented columns, arcades, and galleries of the Index Museum.

In the construction of a building for the reception and preservation of perishable objects, the material should be of a nature that will least lend itself to the absorption and retention of moisture. This material is that artificial stone called terra-cotta. The compactness of texture which fulfils the purpose in relation to dryness, is also specially favourable for a public edifice in a metropolitan locality. The microscopic receptacles of soot-particles on the polished surface of the terra-cotta slabs are reduced to a minimum; the influence of every shower in displacing those particles is maximised. I am sanguine in the expectation that the test of exposure to the London atmosphere during a period equal to that which has elapsed since the completion of Barry's richly ornamented palace at Westminster, now so sadly blackened by soot, will speak loudly in favour of Mr. Waterhouse's adoption of the material for the construction of the National Museum of Natural History. A collateral advantage is the facility to which the moulded blocks of terra-cotta lend themselves to the kind of ornamentation to which I have already referred.

In concluding the above sketch of the development of our actual Museum of Natural History, I may finally refer, in the terms of our modern phylegenists, to the traceable evidences of "ancestral structures." In the architectural details of the new Natural History Museum you will find but one character of the primitive and now extinct museum retained, viz., the Central Hall. In Montague Hall there were no galleries, but side-lit sloons or rooms of varying dimensions and on different stories.

In its successor, the Museum developed on its site at a later period, we find galleries added: that, for example, which was appropriated to the birds and shells being 300ft. in length. This architectural organisation still exists at Bloomsbury.

The Museum, which may be said to have budded off, has risen to a still higher grade of

structure after settling down at South Kensington. In its anatomy we find, it is true, the central hall and long side-lit galleries; but in addition to these inherited structures we discern a series of one-storied galleries, manifesting a developmental advance in the better admission of light and a consequent adaptation of the walls as well as the floor to the needs of exhibition.*

COMPETITIONS.

BRENTFORD.—The Local Board of Brentford, acting on the advice of Captain Galton, to whom the 16 plans lately submitted in competition for the drainage of towns were referred, have awarded the first prize to Messrs. Gotto and Beesley, of Westminster. The selected scheme deals with the sewage by chemical precipitation in tanks to be constructed on land adjoining the Ealing Sewage Works, the sewage being pumped up from a pumping station at the river-side, close by the Soap works. The estimated cost of the works is £18,000.

SUNDERLAND BOARD SCHOOL COMPETITION.—At a special meeting of the members of the Sunderland School Board the report was received of the general purposes committee on the plans for Stansfield-street School, Monkwearmouth, to accommodate 1,300 pupils at a cost of £7,000. Upwards of fifty plans were received in competition for the prizes offered by the board. After a close contest between "Workable" and "I Work to Win," the committee finally recommended that the first prize be awarded to the plan bearing the motto "Workable," by Messrs. Rounthwaite and Shields, of Sunderland, the second to "I Work to Win," by Mr. G. G. Hoskins, of Darlington, and the third to "Study," by Mr. F. Clark, of Darlington. It was decided, on the suggestion of Mr. Wood, to exhibit the successful plans to the public in a room adjoining the Liberal Club.

CHIPS.

The director of the excavations at Epidaurus reports that he is unearthing a theatre in the forest of Asklepios which is, with one exception, the largest of all yet found in Greece which belong to antiquity. It is said to be a masterpiece of the architect and sculptor Polykleitos, and, if so, is nearly 2,100 years old. The Archaeological Society at Athens will also soon set about the excavation of the Temple of Ceres, having purchased the ground which covers it at Eleusis.

On Wednesday an accident occurred at the quarry of Messrs. Turner and Brook, by which Samuel Syres met his death, and Stephen Blackburn was seriously injured on the head that he now lies in a critical condition at the Huddersfield Infirmary. A shot had been fired to dislodge some of the stone. About ten minutes after the explosion, the men named went to see the effect of the firing, and were buried by the fall of stone from the roof. It took half an hour to extricate them.

Colonel Wilson and Mr. W. M. Ramsay are at present making an archaeological tour in Phrygia and Kappadokia. At Doghanli they have made careful drawings of the Phrygian inscriptions, our previous copies of which they have found to be very inaccurate; and they have also taken measurements of the tombs and their ornaments. One of the chief objects of their tour is to examine the Phrygian sculptures and inscriptions at Doghaz Kent and Eryuk.

On Wednesday it was determined to take steps to erect in Exeter Cathedral a memorial to the late Chancellor Harrington, who during his lifetime gave £15,000 to the restoration of the building, and by his will has left his library to the Dean and Chapter, with funds for paying a librarian to take charge of the books.

* In the notable reply (*Annales des Sciences Naturelles*, 1829) to an illustration of the unity of composition or of plan in Cephalopods and Vertebrates, by bending one of the latter so as to bring the pelvis in contact with the nape, advocated by Geoffroy St. Hilaire, Cuvier did not deem it too trivial to call in an architect to elucidate his objections. "La composition d'une maison, c'est le nombre d'appartements ou de chambres qui s'y trouvent; et son plan, c'est la disposition réciproque de ces appartements et de ces chambres. Si deux maisons ont entre elles chacune un vestibule, une antichambre, ou chambre à coucher, un salon, et une salle à manger, ou dirait que leur composition est la même; et si cette chambre, ce salon, &c., émanent au même étage arrangés dans le même manière, on dirait aussi que leur plan est la même. Mais si leur ordre est différent, si le plan, pied dans une des maisons, ces pièces étagées placées dans l'autre aux étages successifs, on dirait qu'avec une composition semblable, ces maisons sont construites sur des plans différents" (p. 245).

CONTENTS.

Holiday Work	285
Houses to Let	286
Gaseous Fuel	287
Timber and its Conversion	288
The British Archaeological Association at Malvern	289
Yorkshire Archaeological and Topographical Association	294
The British Association at York	294
Competitions	295
Chips	295
Our Lithographic Illustrations	296
The City Church and Churchyard Protection Society	299
Our Commonplace Column	300
Hastings and St. Leonard's-on-Sea	310
Sanitary Engineering and Ventilation	311
Expansion of Cement and Concrete	312
The London Carpenters and Joiners	312
Building Intelligence	312
Architectural and Archaeological Societies	312
To Correspondents	313
Correspondence	313
Intercommunication	314
Parliamentary Notes	315
Legal Intelligence	315
Water Supply and Sanitary Matters	316
Statues, Memorials	316
Our Office Table	316
Tenders	317

ILLUSTRATIONS.

VIEW ACROSS THE NEW NAVE, BRISTOL CATHEDRAL.—ST. EDWARD'S SCHOOL, OXFORD.—STOKESAY CASTLE, SHROPSHIRE.—REMAINS OF WIGMORE ABBEY, HEREFORDSHIRE.—CONVALESCENT HOME FOR CHILDREN, ST. LEONARD'S-ON-SEA.—NEW CHURCH OF ALL SAINTS, FULHAM.

OUR LITHOGRAPHIC ILLUSTRATIONS.

VIEW ACROSS THE NEW NAVE, BRISTOL CATHEDRAL.

This drawing is a reproduction of one in this year's Royal Academy Exhibition. The works at Bristol were carried out by Mr. G. W. Booth, of London; the carving by Mr. Earp, of Kennington-road, and Mr. Margetson, present foreman of carvers at the New Law Courts. The two west towers are still incomplete. The N.W. tower is at the present time being carried on as far as funds will allow.

ST. EDWARD'S SCHOOL, OXFORD.

St. Edward's School, like Radley College and the Schools founded by Canon Woodward, and the College in the University of Oxford, recently built in memory of John Keble, is a result of that strong tide of deep religious feeling which, taking form under the influence of Dr. Newman and other eminent Churchmen of his standing, has stirred the Church of England into its present active and vigorous life. It was founded in 1855, by the Rev. T. Chamberlain, M.A., vicar of St. Thomas the Martyr, and senior student of Christ Church, Oxford, whose earnest and self-denying labours have been deeply and widely felt in various other ways. It was at first an experiment, but after a few years the success which it had attained, and the popularity which it had won, justified those interested in its welfare in establishing it on a more permanent basis; and it was determined to remove it out of the town, and build new premises, and Mr. W. Wilkinson was chosen as the architect. A fine site was secured, in every way suitable to the requirements of a large public school, and in 1872 the foundation-stone of the splendid range of buildings, which is now nearly completed, was laid, and in November, 1875, the first block of buildings was publicly opened by the visitor, the Right Honourable Earl Beauchamp, in the presence of the Bishop of Oxford, and a large number of persons interested in the scheme. During the last seven years the buildings have been steadily advancing towards completion. The buildings are placed in the form of a quadrangle. On the north side stands the warden's house and the school-house, capable of receiving 100 boarders, with dining-hall, classrooms, and studies, and all the requisite accommodation for that number. Connected with the schoolhouse by cloisters is the chapel. The central block on the east side contains the big school, 86ft. by 28ft., a reference library for masters and boys 50ft. by 24ft., the masters' common-room, and classroom. The south-side will be occupied by three masters' houses, in each of which there will be accommodation for thirty pupils. There will be managed on the same plan as is followed at other public schools where assistant masters

are allowed to take boarders. The boys will live in their own houses, have all their meals there, and do their preparation work there in the evenings, but will meet for all school during the day in the public school and classroom. A certain number of day-boys will be admitted, who will be at school from 9 a.m. to 6 p.m., and dinner will be provided for them in the school-house and the masters' houses. The tuition fees are fixed at twenty-one guineas a year for all. Boarders pay fifty-four guineas, and day-boys ten guineas a year which fees cover all necessary expenses. The buildings are executed with red facing bricks from Slough, with Box-stone dressings. All the buildings, except the masters' houses on the south side of quadrangle, are completed.

STOKESAY CASTLE AND WIGMORE GRANGE.

Stokesay is mentioned in *Domesday* as being held by Roger de Laci, under the name of *Stokes* (Ang. Sax. : a village). The word Stokesay is derived from *Stokes*, and *Say* the name of a family who first held the manor in the reign of Henry I. The church of Stokesay, dedicated to St. John the Baptist, was given by Hugh de Say to Haughmond Abbey in 1174. In 1281 we find Stokesay in possession of Laurence de Ludlow, and by him a license was obtained in 1290, or thereabouts, to strengthen his mansion with a wall of stone and lime, and to enclose late or embattle the same. In all probability the direct result of this was the erection of the fortified Manor House, now known as Stokesay Castle. There is a variety of delightful work in wood and stone throughout the whole of the buildings which go to make up the "Castle," and time would be well spent in making careful measured drawings of this charming architectural relic. It is a perfect picture of a Middle-Age fortified dwelling, half-house, half-castle, and in these days of reproduction of old work for its own sake, it is marvellous that no architect has found a client sufficiently enterprising to commission for an exact replica of this quaint old residence, with moat-entrance, gateway, tower, great hall, &c., complete. The sketch shows a portion of the N.W. side, with projecting chambers over the moat.—The sketch given of Wigmore Abbey, now known as Wigmore Grange, shows the only remaining portion of what was once, according to Dugdale, a monastery of the order of St. Augustine, and founded and endowed by one Hugh Mortemar (whose father, Rulph, came over with the Conqueror), about 1179. There are still in existence sufficient indications that the monastic buildings covered a very considerable area; but, beyond a few pieces of carving, caps, mouldings, &c., there is now little remaining intact, save the subject of sketch. This is supposed to have been the Fratty or Refectory. The roof timbering is very fine, of enormous scantlings, and quite worth a detail drawing. Many of the Mortemar, (or Mortimer, as it was afterwards spelt) family were buried here, and, amongst them, five Earls of March. Owing to the fact that the present proprietor has come into collision with the townspeople of Ludlow on the matter of common rights to the land adjoining his property, there is some little difficulty in obtaining entrance to view this charming old house. This is a matter of regret to all who take interest in old work of this description, as Ludford House is one of the best-preserved representative dwellings in the district.

CONVALESCENT HOME FOR POOR CHILDREN, ST. LEONARD'S-ON-SEA.

The subject of our illustrations is now being erected upon a site granted by the Eversfield Estate, at the extreme western end of St. Leonard's, and close to the West Marine Station on the L.B. and S.C. Railway, and is the development of a work which has been carried on for some years in a private house near Warrior-square, the object being to provide fresh air and proper nourishment to convalescent children, from London and other large towns, who have been suffering from non-infectious maladies. The buildings as illustrated, and which are now fast approaching completion, have ample accommodation provided for 25 children of each sex in the wings, and for several more in the central block, should such be required. There is also infirmary accommodation provided, so that isolation may be effected should any case of infection occur. The walls up to the first-floor level are built hollow and faced with picked

local red kiln bricks, Suffolk bricks being used for the quoins; local clamp bricks are used above, covered with red ornamental tiles on quattering; the gables have wood framing filled in with rough-cast. The roofs are covered with a dun-coloured tile laid on felt and matched-boardings. Both the roof and hanging tiles are set in lime and hair, and are nailed to sawn slate-battens. As the ground falls rapidly to the west it was deemed advisable to place the kitchen and offices in the basement, thus utilising space which would otherwise be thrown away; a small covered playground, for the use of the boys in bad weather, is also available. Mr. Charles Hughes, the builder, is carrying out the works under the superintendence of Messrs. Fowler and Hill, architects, of London and St. Leonard's-on-Sea.

NEW CHURCH OF ALL SAINTS, FULHAM.

The parish church of Fulham, dedicated to All Saints, had been so often added to and altered that, as it existed previous to the late rebuilding, scarcely a vestige remained of the original church except the tower. In pulling down nothing was discovered of any date apparently earlier than the latter part of the fourteenth or the beginning of the fifteenth century. The tower, which was restored by Mr. Godwin about forty years ago, remains untouched. In consequence of greater frequency of abnormally high tides, which not only come into the churchyard but have flooded the church itself more than once during the last few years, it became absolutely necessary to raise the floors at least three feet, and it was then determined to undertake the entire rebuilding. Some windows which formed part of a scheme for rebuilding, a very small portion of which only was carried out many years ago, had to be preserved and incorporated into the new design, with which they do not entirely harmonise. The style of the new building is Perpendicular, the materials used being Kentish rag with Bath-stone dressings. The roofs are of pitch-pine; the seats, with the exception of those in the chancel, which are of oak, are of the same material. The church has been designed to have all the windows filled with stained-glass for which a scheme has been prepared, and with a view to future coloured decoration. The contractors were Messrs. Goddard, of Farnham. Mr. J. Vaughan was clerk of the works. The carving was executed by Mr. Earp. The stained glass already executed is chiefly by Messrs. Henton, Butler, and Bayne.

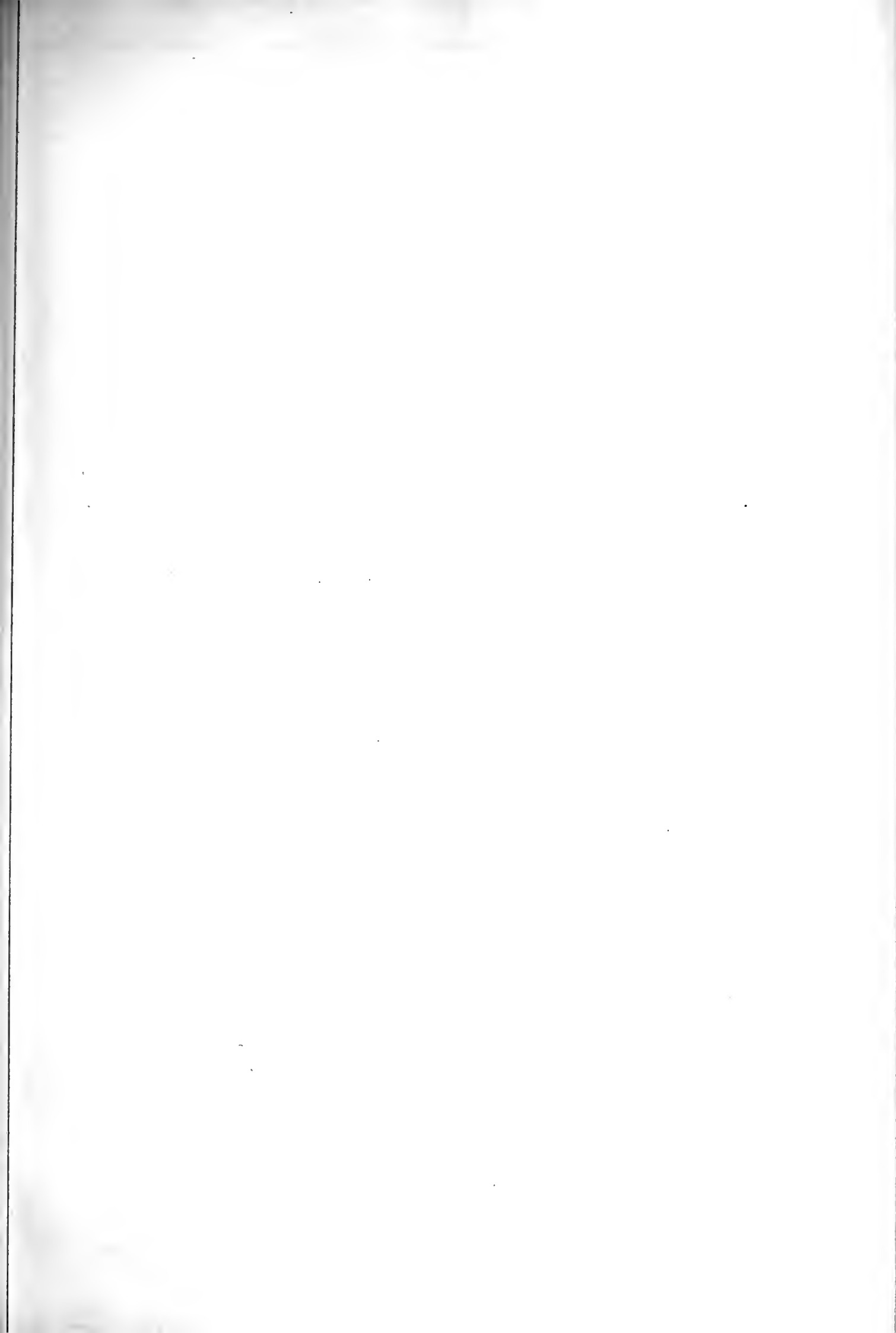
THE CITY CHURCH AND CHURCHYARD PROTECTION SOCIETY.

A SPECIAL meeting of the Council of the City Church and Churchyard Protection Society, presided over by Mr. J. Clarke Mould, solicitor, was held this week to receive the report of Mr. Henry Wright, honorary secretary, on the proposed destruction of St. Matthew's, Friday-street, a church with a good congregation at both Sunday services, the rector of which is the successor and a minor canon of St. Paul's Cathedral, Dr. Sparrow Simpson. Mr. Wright stated he had read the whole scheme of the proposal for the union of benefices of St. Matthew, Friday-street, and St. Vedast, Foster-lane, of which he gave the council a summary. After considering the various proposals in the draft, and particularly objecting to the sum of £1,500 being spent on a rectory house, which is not tenanted, and the handing over of £700 to the parish of St. Matthew, the council expressed their surprise that the vestry of St. Vedast should demand £1,500 to be spent on that church, when but two or three years back they informed the then rector that the church stood in no need of reclamation, and the more so, as there are ample parochial funds without robbing the proposed new district.

The following resolution, proposed by Mr. G. H. Birch, A.R.I.B.A., and seconded by Mr. Bowes A. Paice, A.R.I.B.A., was unanimously carried:—

"That the Council of the City Church and Churchyard Protection Society, whilst admitting there may be no special beauty in the Church of St. Matthew, Friday-street, yet consider that every opposition should be offered to its proposed destruction both from principle and on account of many of the provisions in the scheme for the Union of Benefices."

The council also expressed their determination to oppose any legislation which would remove these ancient landmarks of the City.



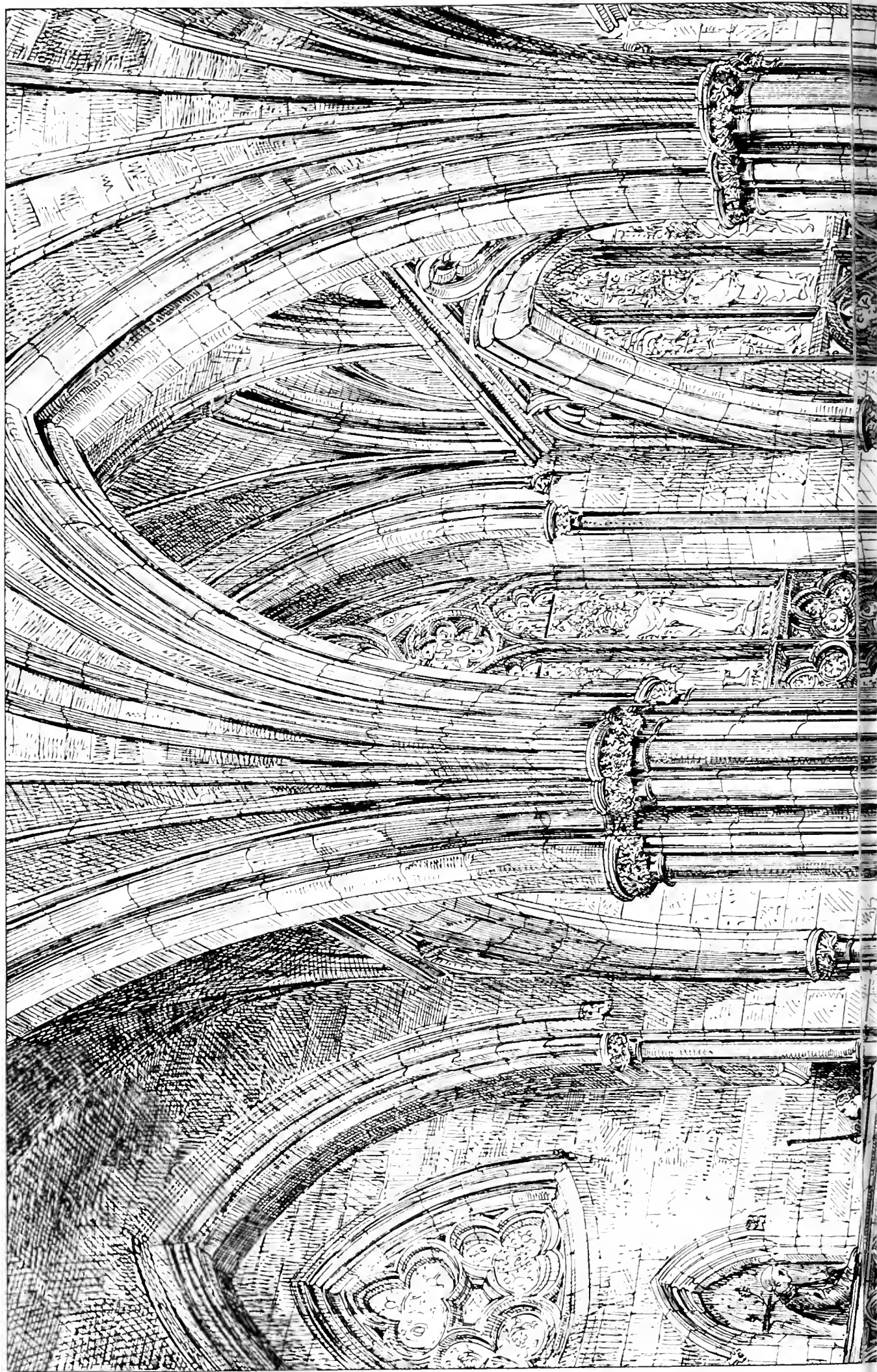
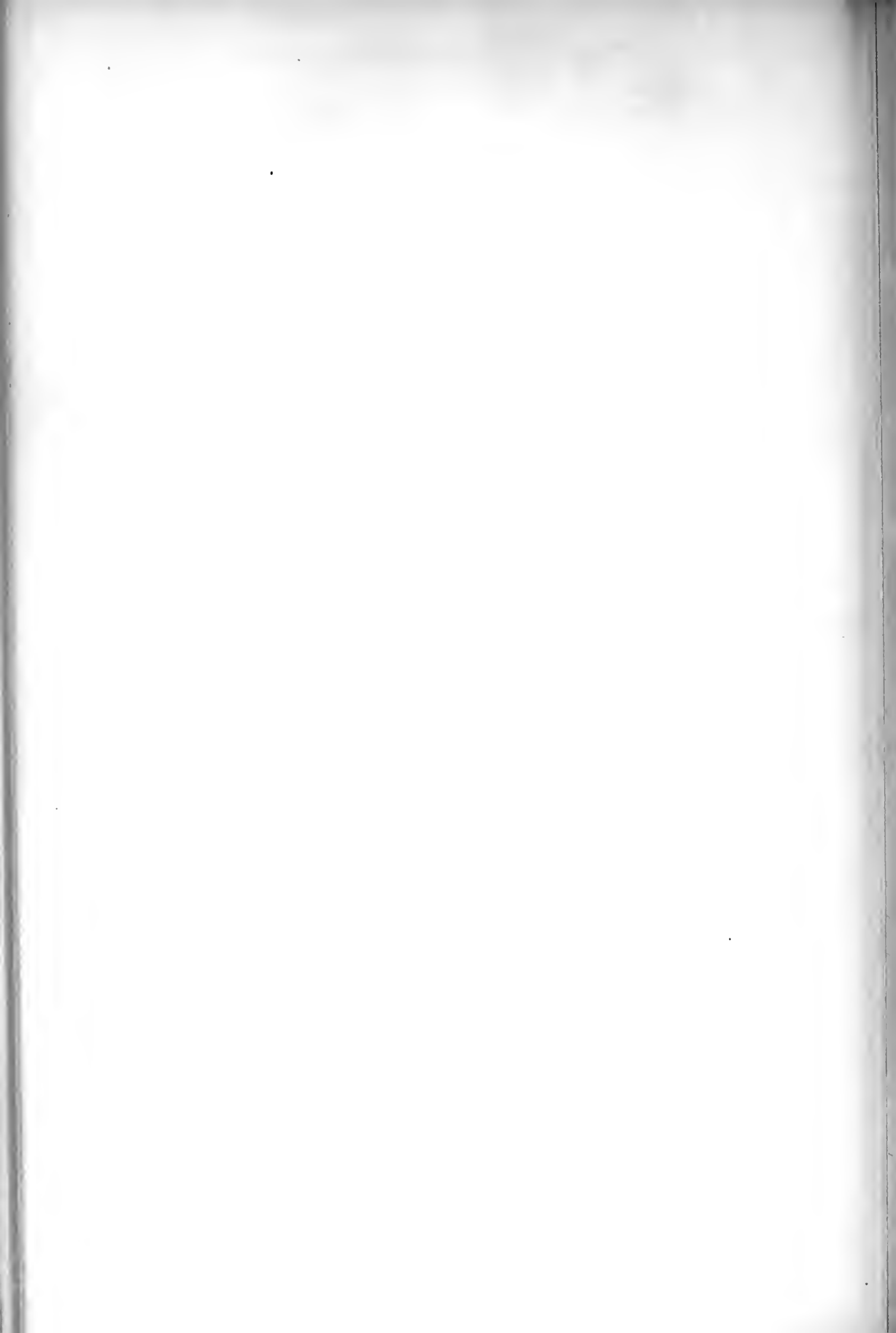


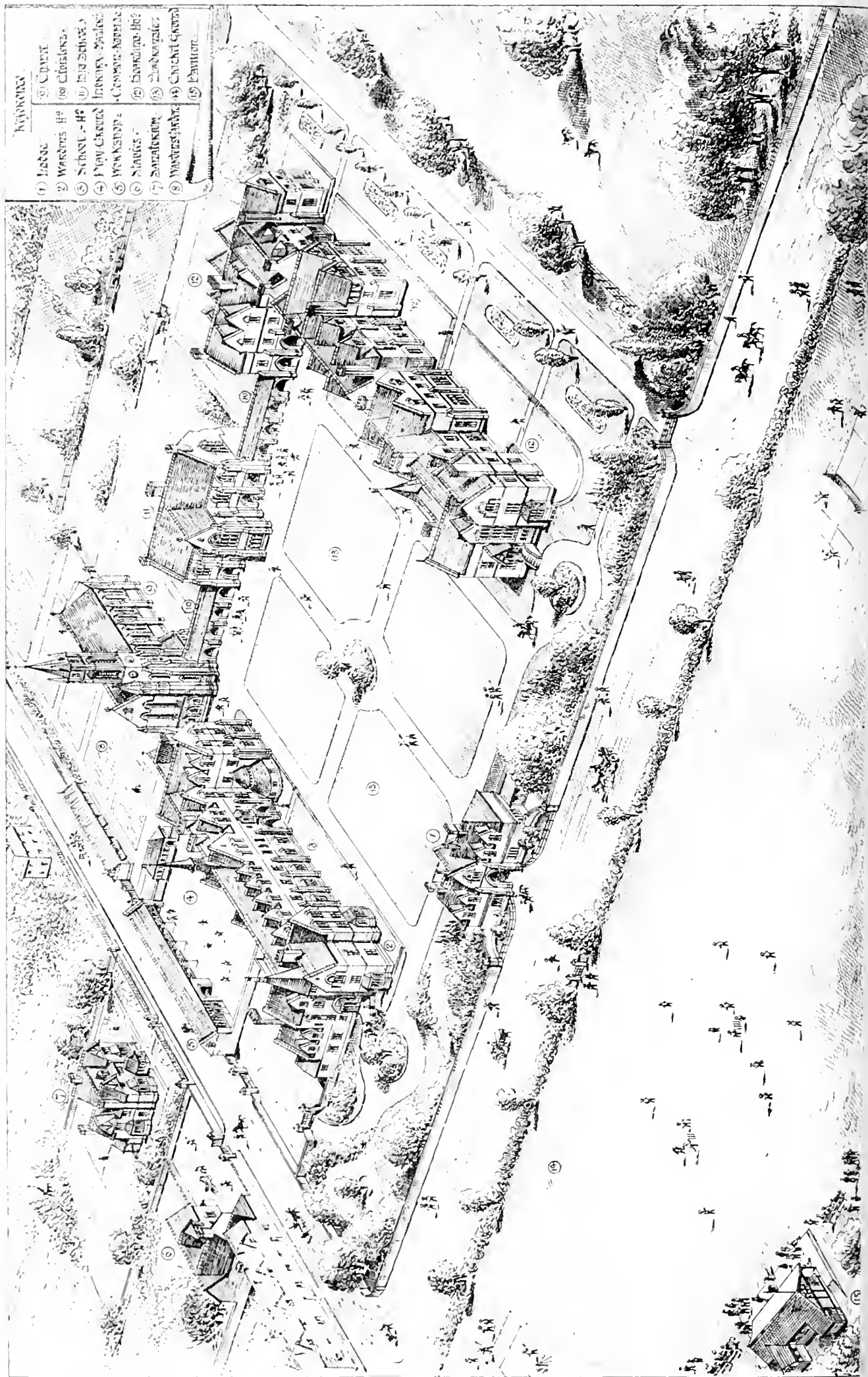


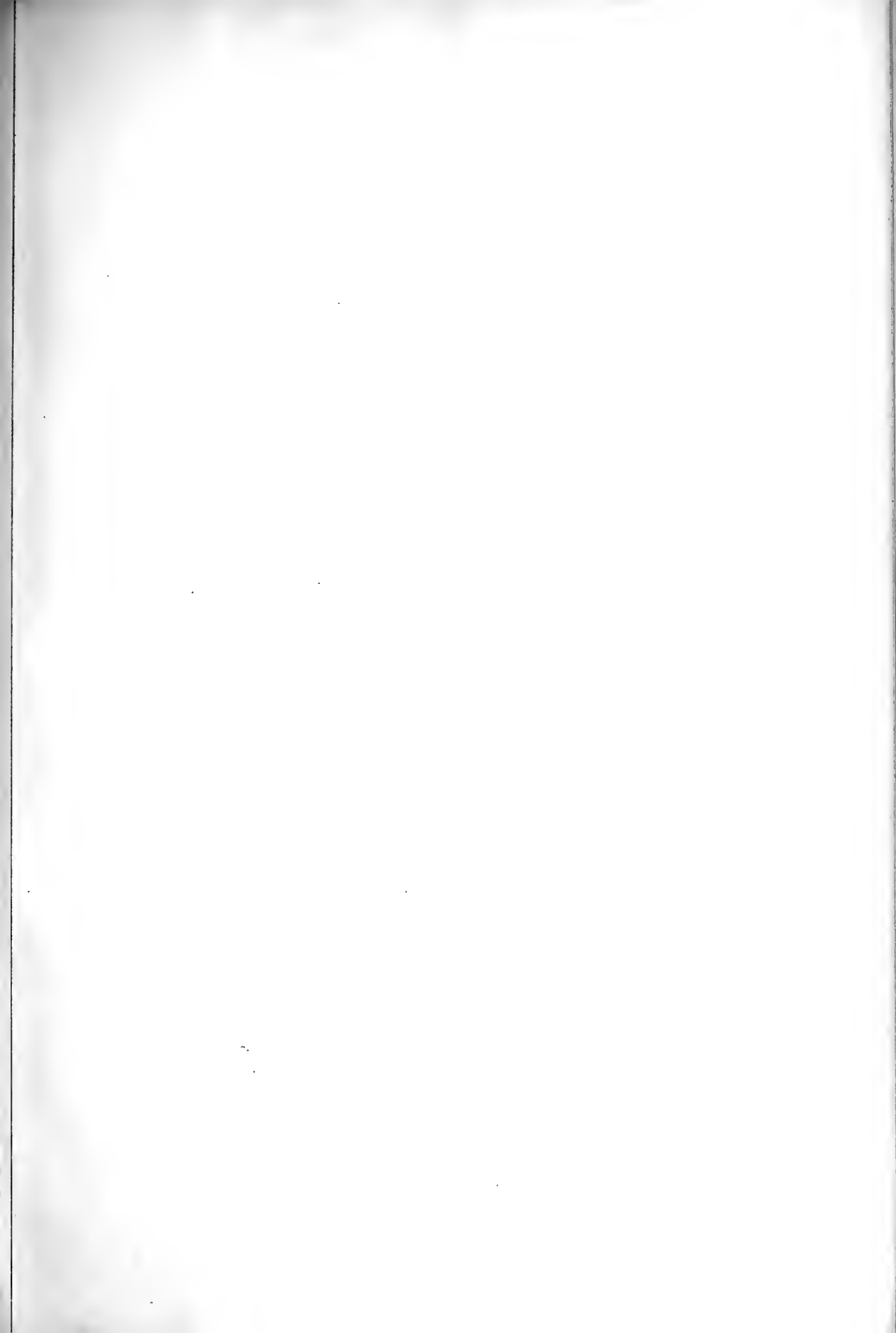
Photo Lithographed & Printed by James Alcorn & Co. Queen Square, W.

VIEW ACROSS THE NEW NAVE BRISTOL CATHEDRAL .
GEORGE EDMUND STREET R.A. ARCHITECT



THE BUILDING DEPT., SEP. 2, 1891.



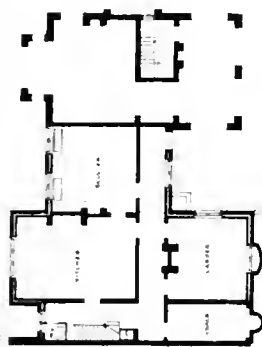


THE BUILDING DEPT., SEP. 2, 1881.



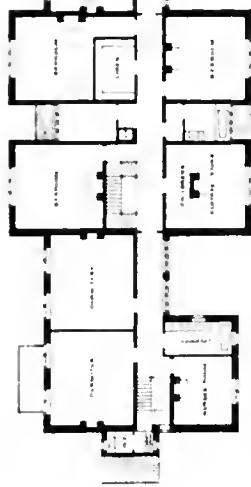
Girls' Wing

Ground Floor Plan



Boys' Wing

Basement Plan



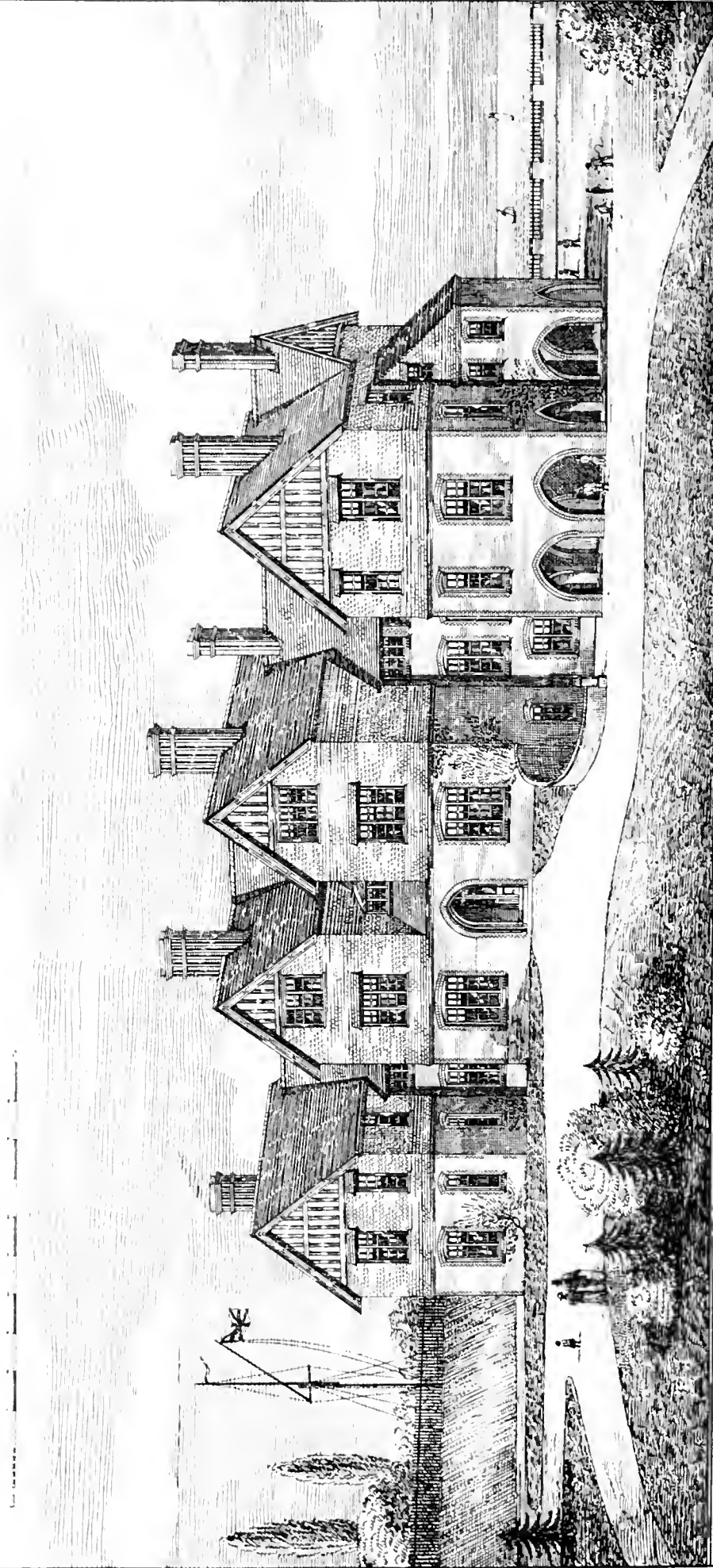
Girls' Wing

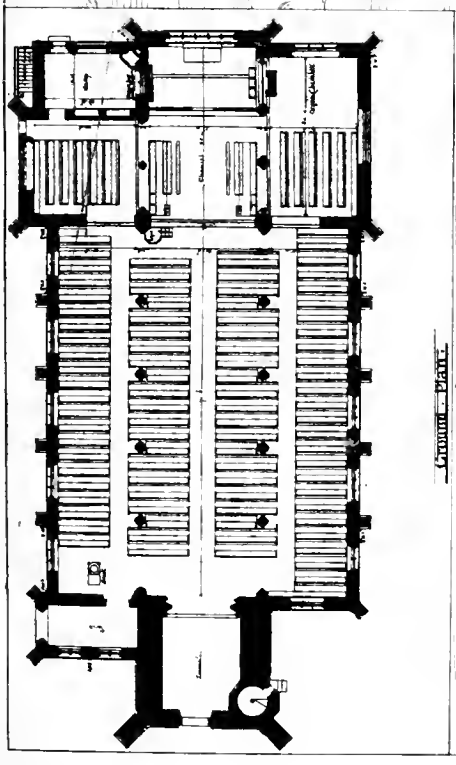
First Floor Plan



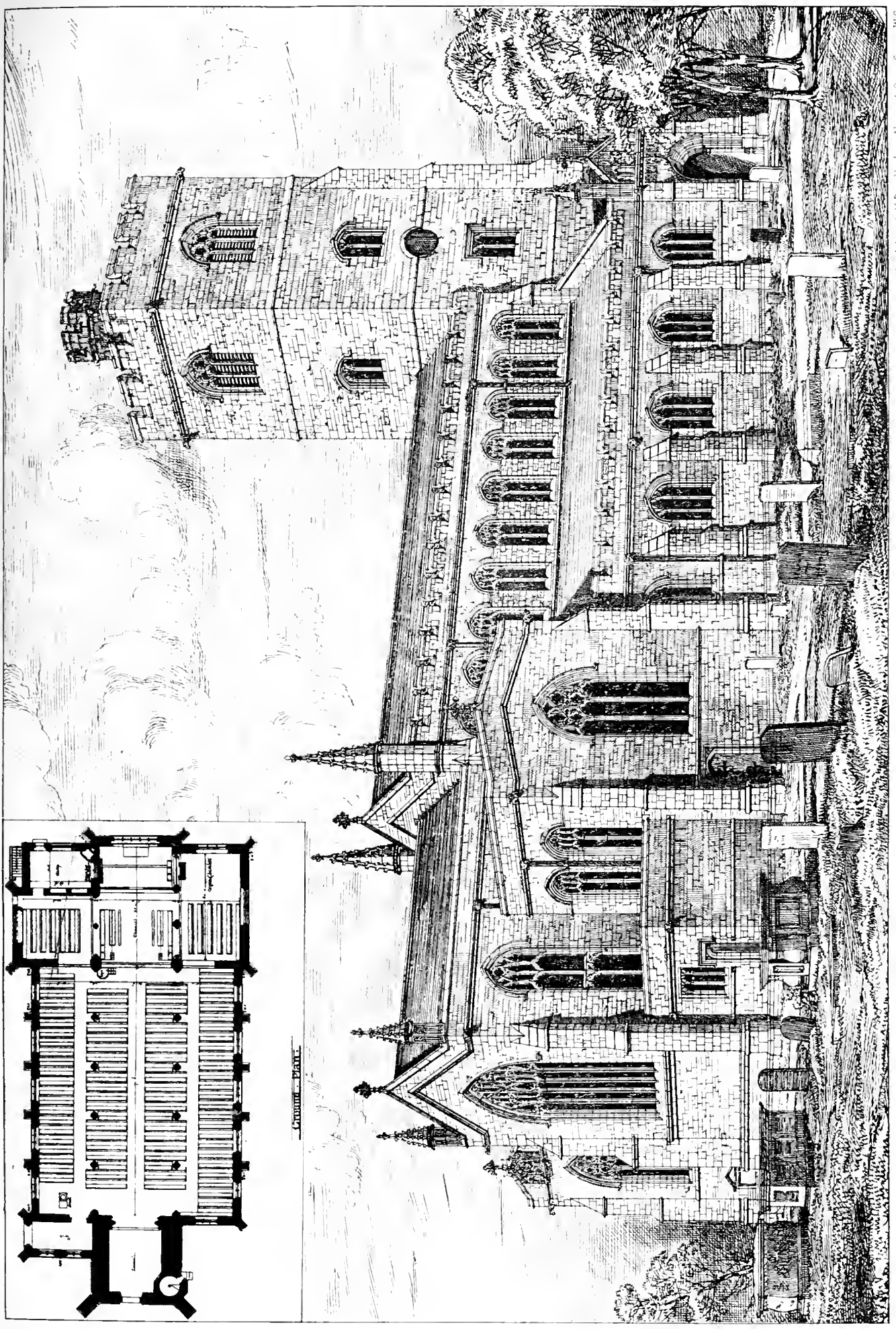
Boys' Wing

Scale 1/4" = 10'



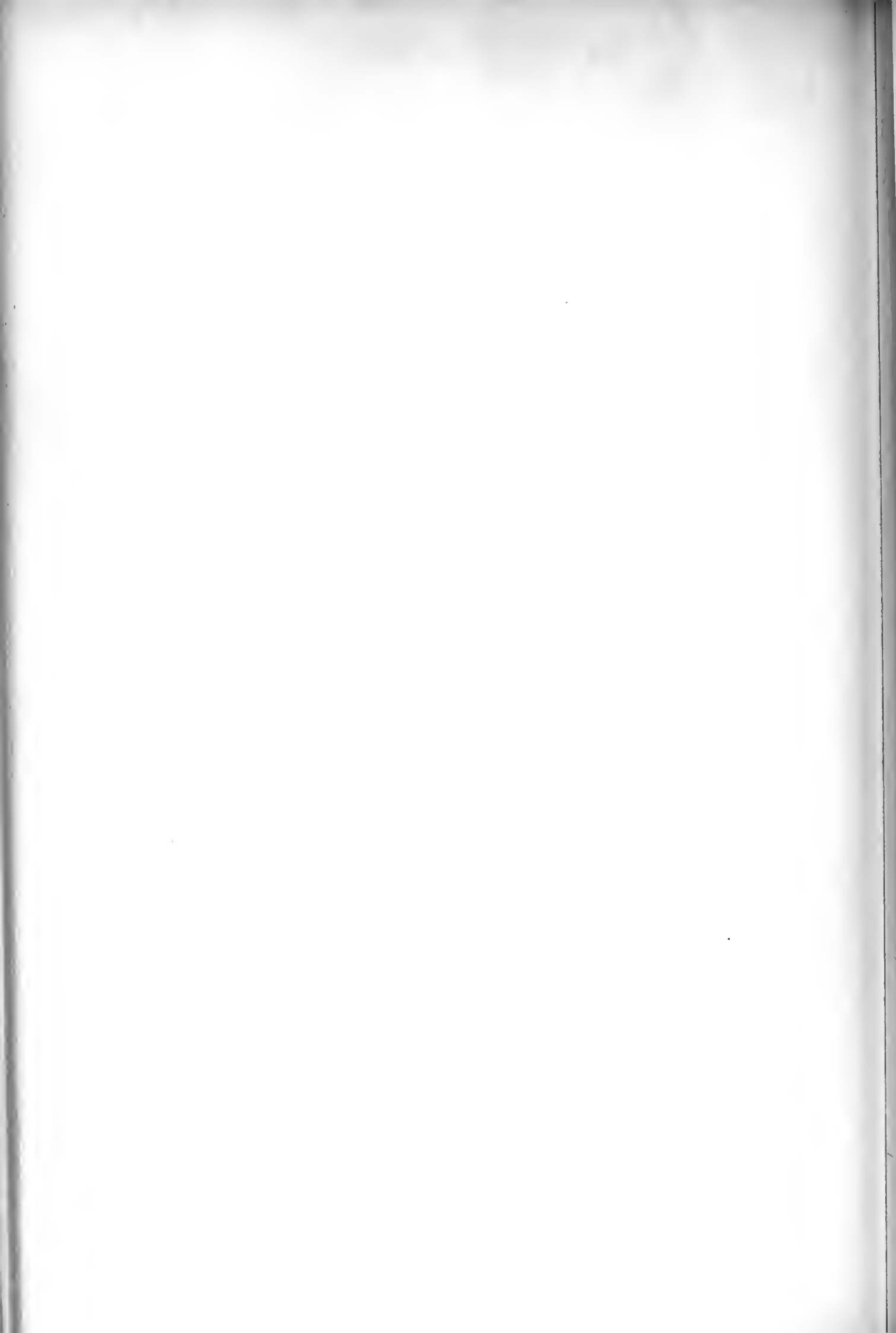


GROUND PLAN



THE CHURCH OF ALL SAINTS, FULHAM, LONDON. DESIGNED BY ARTHUR BLOMFIELD, ARCHT.

NEW CHURCH OF ALL SAINTS, FULHAM. ARCHT. ARTHUR BLOMFIELD.



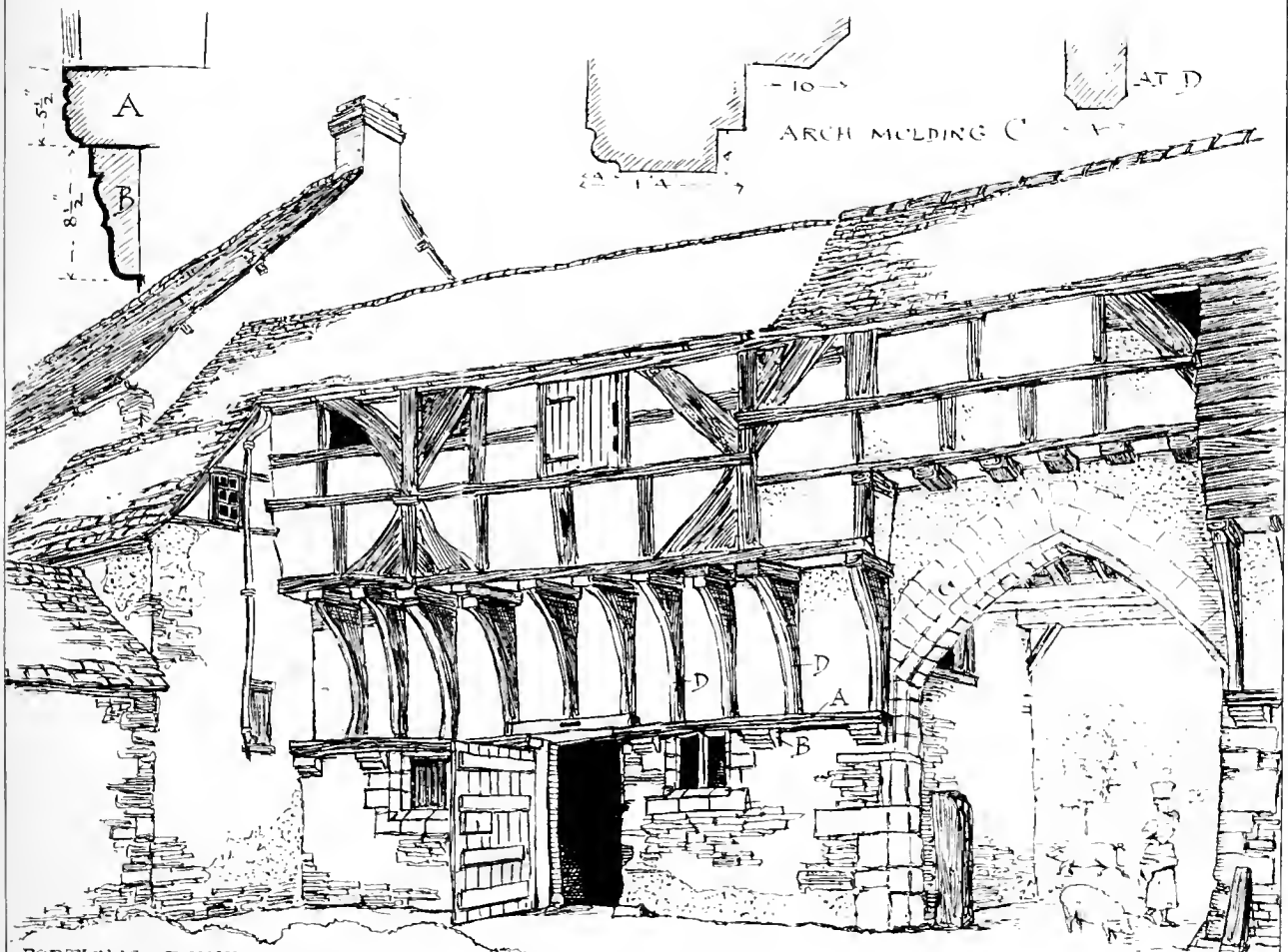
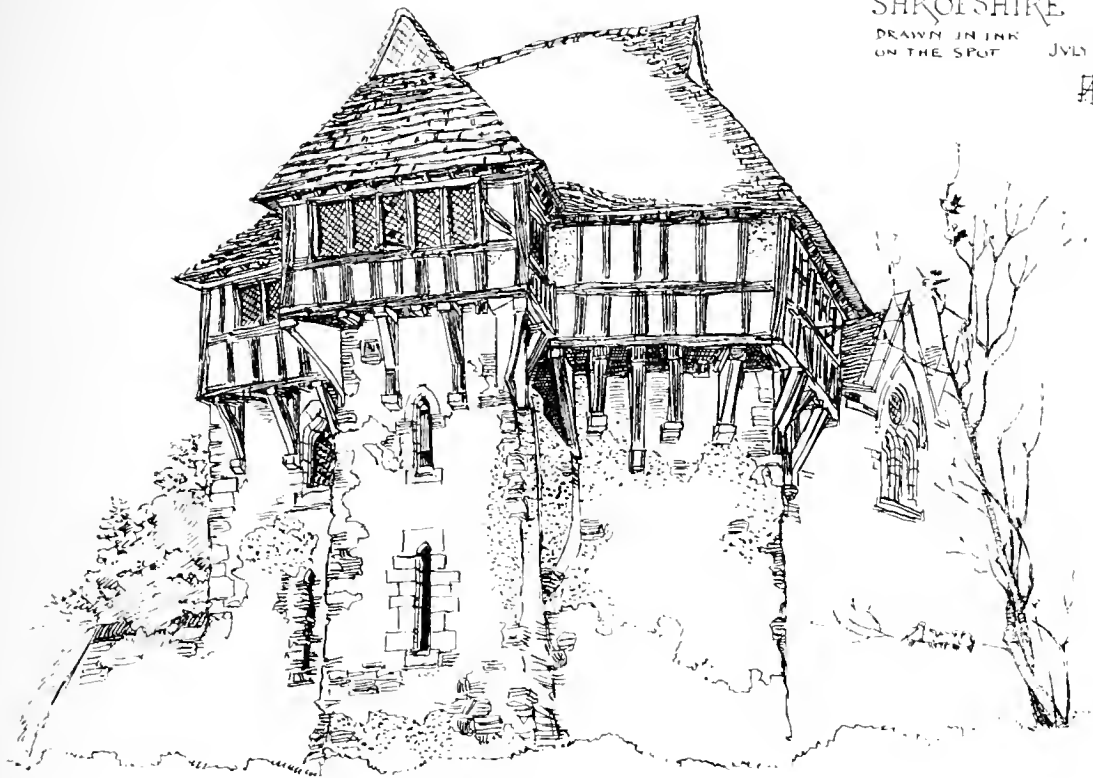
PART OF

STOKESAY CASTLE

SHROPSHIRE

DRAWN IN INK
ON THE SPOT JULY 1880

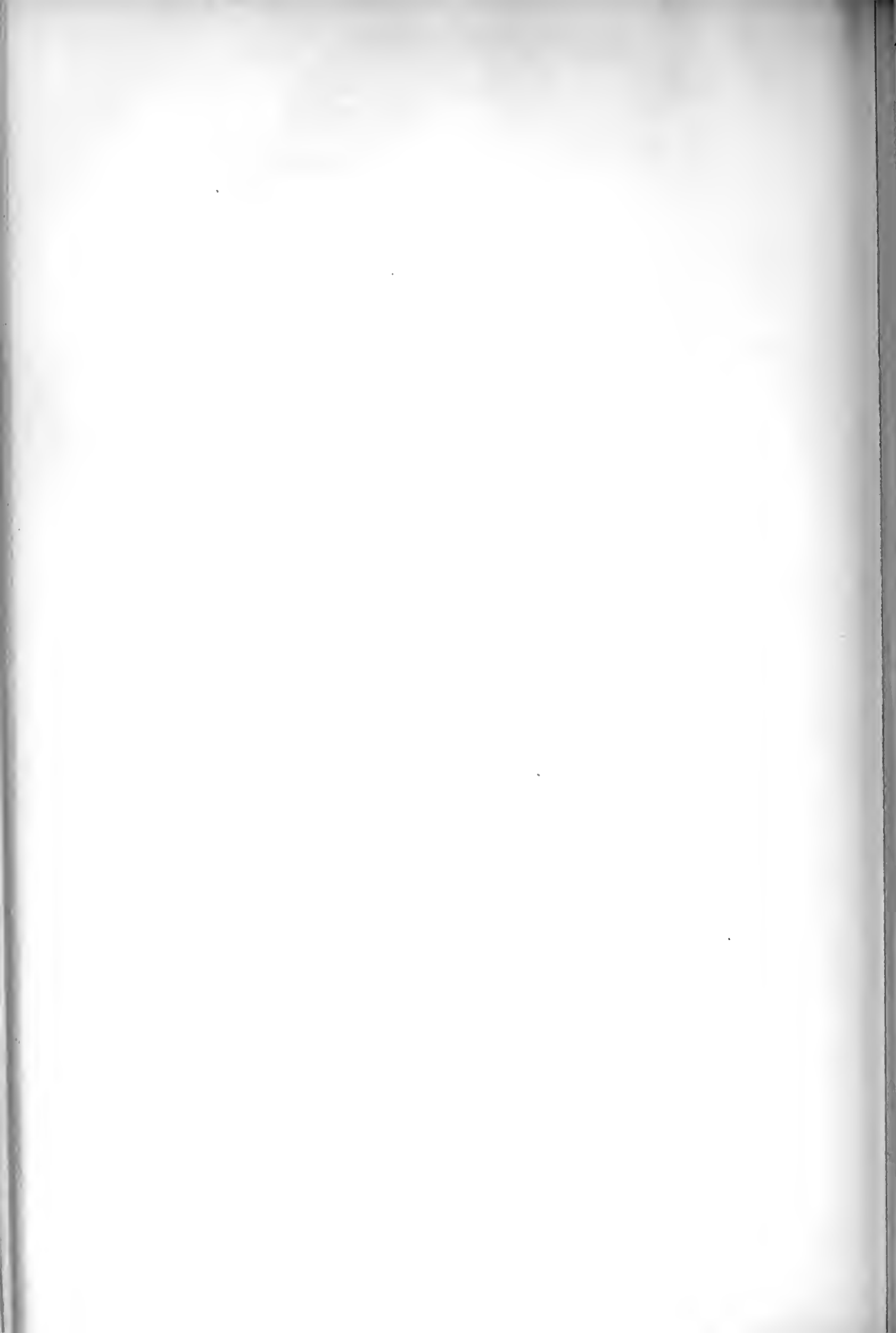
AN



PORTIONS OF THE REMAINS OF
WIGMORE ABBEY FOUNDED BY HUGH MORTENMAR C. 1170
HEREFORD

DRAWN IN INK ON THE SPOT JULY 1880

AN



OUR COMMONPLACE COLUMN.

ORIEL WINDOW.

THE word Oriel (Med. Lat. *oriolum*, probably dim. from *os, oris*, as if a small opening or recess) formerly meant a chamber or apartment, now used to designate a projecting window. An oriel window seems to be generally applied to a bay window carried on projecting corbels, and they were common in Tudor and Elizabethan times.

ORIENTATION.

We add to our former notice of this subject the following exhaustive remarks from "Chambers's Encyclopedia" under this head:—"Modern observation has found that few churches stand exactly east and west, the great majority inclining a little either to the north or to the south. Thus of three ancient churches in Edinburgh, it was ascertained that one (St. Margaret's Chapel in the castle) pointed E.S.E.; another (St. Giles Cathedral) E-by-S $\frac{1}{2}$ S.; a third (Trinity College Church, now destroyed) E. $\frac{1}{2}$ S. . . . Its origin or cause has not been satisfactorily explained. Some have supposed that the church was turned, not to the true east, but to the point at which the sun rose on the morning of the feast of the patron saint. But, unfortunately for this theory, neighbouring churches, dedicated in honour of the same saint, have different orientations. Thus All Saints at West Beekham, in Norfolk, points due east, while all All Saints at Thwaite, also in Norfolk, is 8° to the north of east. There are instances, too, in which different parts of the same church have different orientations—that is to say, the chancel and the nave have not been built in exactly the same line. This is the case in York Minster and in Lichfield Cathedral. Another theory is that orientation mystically represents the bowing of our Saviour's head in death, which Catholic tradition asserts to have been to the right or north side. But this theory is gainsaid by the fact that the orientation is as often to the south as to the north. Until some better explanation is offered, it may perhaps be allowed to hold that orientation has had no graver origin than carelessness, ignorance, or indifference." We are inclined to agree with this conclusion, in spite of the examples which are brought forward by some ecclesiologists to establish their favourite theory.

ORNAMENTS.

This kind of metal consists of 25 parts of zinc and 75 parts of copper, which has a nearer resemblance to gold in colour than brass. For ornamental mounts for furniture, clocks, &c., it is largely used. The colour of the casting is brought out by a pickle of dilute sulphuric acid, after which the acid is removed by water, and a liquor-varnish is put on to keep it from tarnishing.

PAINT.

For a general knowledge of this material we refer the reader to "Notes on Building Construction," Vol. III., "Materials," and to other textbooks. The bases commonly used are white-lead, red-lead, zinc-white, oxide of iron. The vehicles used for mixing are oils, spirits of turpentine, and sometimes a "drier" is added such as litharge, acetate of lead, sulphate of zinc, &c. White-lead is often adulterated with sulphate of baryta, which absorbs little oil and is rather gritty if rubbed between the fingers. For woodwork white-lead affords the best protection, and has a good body, but sulphur acids blacken it, and it is injurious to those who handle it. Zinc white has been lately much used and its advantages are beginning to be appreciated. This paint has been described in the BUILDING NEWS, and is known for its intense whiteness, its non-poisonous properties, and its being able to resist sulphurous fumes without turning black like white-lead paint. Oxide of zinc is the basis of zinc paint. The zinc-white does not combine so readily with oil as white-lead, and it is acted upon by the carbonic acid in rain-water, and therefore weathers badly. We refer to Dent's "Chemistry of Building Materials," and "Notes on Building Construction," for the advantages and disadvantages of zinc paint, though it may be sufficient to say it is now made of a superior quality, and is preferable to white-lead for painting on dark grounds. The Albissima White Paint Co., Lime-street, E.C. products were lately described in these pages. For adulteration of paints, see Art. by Prof. Cotton in B.N., Vol. XIX., p. 66; see also Vol. XVI., p. 558. We quote the following composition for

colouring gates, poles, brickwork, &c., from the "Arch. Diet.":—"Melt twelve ounces of rosin in an iron pot, and three gallons of train-oil, with three or four rolls of blinestone. When the rosin and blinestone are melted and become thin, as much Spanish brown, or red, or yellow ochre (or other colour) ground fine, with oil as usual, is to be added, as will give the whole as deep a shade as desired; it is to be laid on as hot and as thin as possible; some days after the first coat is dried, a second is to be given. It is well attested that this composition will preserve plank for years, and prevent the weather driving through brickwork."

To remove paint:—Paint is generally removed by red-hot irons or a flame from a lamp. (See B.N. 1870, p. 281.) A portable firegrate is commonly used, filled with burning coke, and chemical mixtures for softening paint are on request. For carved work, caustic potash is recommended, which comes off with the old paint in washing. Chloroform applied on wadding with gentle friction speedily exposes the surface of wood.—BUILDING NEWS, 1866, p. 125. To clean paint, whitening rubbed over the surface with a piece of flannel in warm water is a good means. Flatted work can be cleaned in this manner, and alkalis are to be avoided. For particulars of fresco, encaustic, and tempera painting, we refer the reader to Gambier Parry's paper, reported in the BUILDING NEWS, Vol. for 1866, 759.

PAINTED GLASS.

For an historical account of this subject we refer the reader to Winston's "Art of Glass Painting." Painted glass must not be confounded with coloured or stained glass; the former is glass painted upon its surface with vitrifiable colour and burning it in; the latter is glass coloured in manufacture. In stained glass, the colour sinks in and leaves it as transparent as at first. Glass-painting dates since the Christian era, and Mr. Westlake, F.S.A., in his recent "History of Design on Painted Glass," lately noticed in these columns, says, it is probable for nearly a thousand years after Christ this art was unknown. He is of opinion that the earliest painted windows were not, as sometimes thought, of German origin, but from the neighbourhood of Limoges, where a Venetian colony, under Doge Orseolo II., settled somewhere about the year A.D. 973. Mr. W. H. Brewer says the earliest figure-window in Germany is in Augsburg Cathedral, the nave of which was completed circa A.D. 1065. It is certain that great difference of opinion exists as to the origin of the art. Many have confounded the much earlier art of combining pieces of coloured glass together with painted glass. Mr. Westlake illustrates some fragments of a window from the cathedral of Le Mans, in France, as showing Greek characteristics in the figures, or a Byzantine rendering. One of the windows in question represents the Ascension, and was placed in the cathedral according to a manuscript in the library of Le Mans, in the 11th century. The fragments bear internal evidence, says this author, of belonging to the childhood of the art. The hair is painted in solid black, a crude manner of showing it, and anterior to the later conventional manner of drawing it in lines. Chartres was an important centre of the art, for the Jesse Tree is a remarkable example belonging to the 12th century. The ruby and blue tints are rich in variety of tone. The glass at Angers, St. Denis, and other French churches, is discussed by Mr. Westlake, who shows that the art is of French origin, and that it afterwards made its way to England and Germany at the close of the 12th century. Few English churches had any quantity of painted glass before 1200. In the 13th century "Medallion" windows became common, and beautiful examples are found in Canterbury, Lincoln, Salisbury, Westminster, Peterborough, and in many French cathedrals. These windows were composed of small subjects, representing a series of events in Our Saviour's life, or histories of saints, or typical emblems. The backgrounds are chiefly ruby or blue. Illustrations of these are given by Mr. Winston and Mr. Westlake; the medallions were arranged in geometrical forms upon iron frames of L-shape. The window in the crown of St. Thomas, Canterbury, is a good example, and is illustrated by Mr. Westlake. Grisaille work, and painted quarry glazing is an important development of the subject, and this kind of work may be seen at Lincoln Minster, Salisbury Cathedral,

&c. Grisaille was largely used in the 13th century, the chief part of the window is of white glass, slightly tinted, and the ornamentation is geometrically disposed. The earliest type of design consisted of interlacing bands, the next of a series of flat geometrical forms filled with foliated ornament, painted on whitish glass, and often outlined with bands of colour. In the latter type the foliation overruns the lead glazing of the quarries. Beautiful examples are to be seen at Salisbury. This sort of ornamental glass is less costly, and has the advantages of being translucent, and easily harmonised with the architecture, being entirely conventional and flat in treatment. The process of glass-painting is simple. White glass is laid over the design in pieces adapted for the subject, and joining together. The outline is traced on the glass with a black or brown pigment, the differently coloured parts are then coated with the proper tint, and the glass is then fired. The other necessary colours and shading are then put on, as in enamel painting, after which the glass is again fired. Glass coloured in the manufacture, called "pot-metal," is often introduced in the draperies and other parts, and touched up or shaded. The pieces of glass are then united by the leadwork.

PAINTING-ROOM.

Rooms for this purpose should be arranged so as to afford the artist the desired light he requires, and nearly every artist has his own views of the subject. The simplest room adapted for painting is one about 19ft. by 16ft., in which the painter can have a uniform light, without sun-line. A north window is, therefore, desirable, so that the direction of the axis of a painting-room should be east and west, or nearly so. A well-planned studio should be placed on the upper floor, accessible by two stairs, one being for the "model"; the windows looking north ought to be high, reaching to the ceiling, or, better still, partly above it, as a skylight, on the slope of roof. There should be carefully-fitting shutters to adjust light, a lobby, and a lavatory and sink, a dressing-room near, and a cupboard for brushes and the cleaning of palettes, &c. In some recently-built studios, the north slope of roof is entirely of glass, with windows below. Some useful descriptions of painting-rooms are given in the "Arch. Diet." under this heading, "The ordinary painting-room," one writer says, "is, whenever possible, placed immediately under the roof. It is usually provided with two windows only of varying widths, commencing at varying heights from the floor and extending as high as the roof, and into it as a skylight for a further distance of 5 or 6 feet. Each of these windows is fitted with shutters either folding in two or three heights, or hung with lines and pulleys, or revolving and rising from the sill. Thick blinds are also fitted to the skylights, descending from the top. It is well that the windows should be as free from shadow as possible; hence the desirability of omitting the wall-plate across the junction of the sash and skylight, which suggests external buttresses on either side of the window or other structural features, which shall indicate within or without the living want of the studio. At one of the windows described, the artist paints; at the other the model is placed, and near this latter window a stove or other means of creating a special warmth for the nude, or partially nude, figure must not be forgotten. Such a window, however, casts decided shadows upon the model it lights, and on this account is not always approved. An artist, indeed, whose pictures are noted among those of Royal Academicians for the delicacy of their tints and shadows, paints at such a window, in a studio 27ft. long, 16ft. wide, and 14ft. high to the collar of roof, while for the model he has had a bow window constructed at the east end of his studio. The opening leading to this window is 8 feet wide and 8 feet high, fitted with sliding doors, so that the whole window or any part of it can be excluded from the studio. The window on plan forms five sides of an octagon, 12ft. 9in. across. It is glazed all round and at top, the glass commencing at a height of 2ft. from the floor. It is well fitted with thick blinds, which can be drawn over any part, and in it is placed the stove for the model. Sometimes a curb roof is erected, the steepest slope being so inclined that the sun does not shine on it in the summer; a gallery at one end of a studio is useful. Wrought-iron

casements have been used to prevent shadow, and plate glass is preferable to any other. Windows of 7ft. wide are sufficient, and a south window with folding shutters is a useful addition. A recess for meditation, leading out of the studio, is sometimes added for the repose of the artist (see description of Studio in "Arch. Dict.") Two staircases, one for artist and his friends, and the other for the "model," leading to the dressing-room, are required, and a large trap-door ought to be provided for canvases to be let down and taken away (see *Building News*, Vol. XXX, 366), where particulars of Mr. Millais's house at Palace-gate, Kensington, are given, and also plans lately published of Artists' Homes.

PALLADIAN STYLE.

The distinguishing characteristics of this style of Italian architecture, introduced by Andrea Palladio, are arrangements in which columns are employed. These are usually superposed in tiers; the doors and windows are simply treated, the order is preserved in the details; pedestals with panels and carving were avoided, and a symmetrical setting-out is preserved. The proportions of orders are often varied, but never fall into the extravagance and licence of those of other revivals. The Palladian style occupies a place between the vigorous severity of the Classic style and the more florid examples to be found in Venice. The Barbarano Palace, Venice, is a good example of Palladio's style. There are some littlenesses in even his work, as windows cutting into architraves, weak balusters, offensively wide intercolumns, meagre entablatures, which have been pointed out. The style was introduced into England by Inigo Jones, whose fragment of the Banqueting House, at Whitehall, may be taken as a good example of this manner of building. Wren, Gibbs, Chambers, and other architects also worked in the style, and have reproduced its details.

PALMYRA OR PORCUPINE WOOD.

This wood is often used in veneers and inlaying. It is a speckled wood obtained by cutting transverse sections, chiefly of the *Coccoloba ferr.*, the cocconut-palm; the pieces are consequently small. ("Arch. Dict.," and "Chambers's Encyc.")

PAN-CLOSETS.

For particulars of these see any sanitary catalogue. The defects of this form of apparatus have often been pointed out in these pages. The pan is a metal dish worked by levers to receive the water, and to act as a trap at the bottom of basin. The basin has a metal receiver or "container," in which the pan works, and which is connected with the D-trap and soil-pipe. The container soon gets foul, and becomes a receptacle for sewer-gas; hence it has been superseded in all good closets of the "valve" kind. The by-laws issued by the Local Government Board 1877 for new streets and buildings expressly prohibits the fixing of a container under any pan or basin.

PANOPTICAL PLANS.

THESE are buildings arranged on the radiating system, so that a single person can supervise a large number of inmates. Jeremy Bentham's brother, Sir Samuel Bentham, brigadier-general, is mentioned as being the originator of the system about 1787. He prepared plans for a panopticon for 1,000 convicts, but it was abandoned. The Penitentiary in Coldbath-fields, London, by C. Middleton, 1788-94, is designed on this system; it has its central buildings and rays. The castle at Chester is said to have been the first prison built on this principle in England, 1793-1820. The Dartmoor prison is partly planned on this system, also the Pentonville prison for 520 prisoners on the separate system, designed in 1840, by Major Jubb. (See "Arch. Dict.")

PARADISE OR PARVISE.

UNCERTAIN in origin, but supposed to be a corruption of *par*, "an enclosed garden." A paradise or parvise is an open place surrounded by a stone parapet in front of a cathedral, and was probably used to keep the people from pressing on and confusing the marshalling of the public processions. That at Notre-Dame is irregular in shape, at Amiens it was round. Parvise is also the name of a small chamber over a porch. The cloister at Chichester is called a paradise. ("Encyc. Brit.") See also Hunt's "Fedor Arch."

PARGET-WORK.

This term is applied to the ornamental plastering between studwork of half-timber houses. The patterns or devices were impressed or scratched while the plaster was wet. Raised patterns or relief, such as are seen at Ipswich and other places, are another form of decoration in parget. We refer the reader to an article in *Building News* of last week, p. 251, and for interesting particulars of examples to "Notes on Pargetting" in Essex Archaeological Society *Transactions*, 1873.

PARQUETRY.

THE *Parquet*, an enclosure.—It appears that wood flooring laid in patterns is of ancient origin. Evelyn notices a room at Chisibury parqu岸ted with yew, 1680. On the Continent the ordinary method is to draw the pattern on the floor prepared to receive the parquet, and then to lay down piece by piece. We refer the reader to the solid parquetry of Messrs. Arrow-smith, to Messrs. Howard and Son's parquet, lin. and $\frac{1}{2}$ in. thick (Berner's-street), J. Eberhard and Co.'s excellent floors (Hampstead-road). Many of these we have described.

PARTY-WALL.

For information on the rights of adjoining owners, we refer the reader to the Metropolitan Building Act, 1855, c. 122, also to Gleason "Easements," Woodfall, "Landlord and Tenant"; Hunt's "Law of Boundaries and Fences," 1870; Woolrych's "Law of Party Walls"; Grady's "Law of Fixtures," also to article on "Party Walls and Fences," in the *Building News*, 1881.

PAVEMENT.

AN exhaustive article on the various sorts of pavements for foot-traffic will be found in the "Arch. Dict." *Brick-paving*.—Bricks are best laid dry, and then grouted with lime and sand, or with sand only.

36 bricks per super yard laid flat, $9 \times 4\frac{1}{2}$ in. = 36 in.
60 $\frac{1}{2}$ " " " on edge, $9 \times 2\frac{1}{2}$ in. = 21 in.

Marble mosaic and Roman mosaic pavements are manufactured by several well-known firms. We may refer to the excellent marble mosaic paving of Messrs. Burke and Co., Newmarket-street, Oxford-street; to the Roman Mosaic pavements of W. B. Simpson and Son, St. Martin's-lane; to the encaustic tile-paving of Maw and Co., Broseley; and of Malkin, Edge, and Co., Burslem; Carter and Co., Albert Embankment, and to numerous other manufacturers. For stable-floors, landings, platforms, and for fireproof floors the "Eureka" concrete, lately described by us, is well adapted; and concrete paving has taken the place of brick-paving for all sanitary and fireproof purposes.

PAVILION SYSTEM.

THIS describes a system largely adopted for the planning of hospitals, and it was recommended, says a writer in the "Arch. Dict." as far back as 1788. Each ward by this plan is separated, and is surrounded by light and air, being connected only by the corridors generally placed at one end. The chief hospitals built on this plan in England are the Military or Herbert Hospital at Woolwich (see *Building News*, Vol. for 1862), and the St. Thomas's Hospital, London, designed by Mr. H. Currey, many other hospitals have been designed and carried out on the same principle. The Royal Military Hospital at Netley, by W. Mordaunt, is on the "corridor" system, and represents another and rival plan of construction. Numerous plans and articles illustrating "the pavilion" system have been given from time to time in this journal. The same principle has been largely used for union infirmaries, as in the St. George's Union Infirmary, Fulham-road, by Mr. H. Saxon Snell. In this case a long corridor connects seven such pavilions at the ends of the blocks, between which are recreation grounds of about double the width of each block or pavilion. The staircase, lift, and nurses' room are placed at the corridor end of each pavilion. The pavilions are four stories in height, and each ward contains 28 beds.

PEEL-TOWER.

(W. *pell*, a stronghold, a fortress; Lat. *pila*, a stake, pillar.) This name is given to the towers erected on the Scottish borders for defence.

They are square, with turrets at the angles, and the door is sometimes at a height from the ground. The lower story is usually vaulted and formed a stable for horses, cattle, &c. In Scotland peels were built as late as the 16th century in close imitation of a Norman keep. The peel at Dornack is one of the best preserved. It has four floors, with an apartment in each; the original doors and locks are still in use. ("Chambers's Encyc.") See also "Hist. of Peebleshire," by W. Chambers, and "Arch. Dict."

HASTINGS AND ST. LEONARD'S-ON-SEA.

THE twin towns of Hastings and St. Leonard's are situated, as most of your readers well know, on the south-eastern coast of Sussex, some 60 miles from London. They are well-known as a seaside resort for invalids and others requiring change of air and scene. The towns have increased within the last ten years much in popularity and population, and consequently in area as well, and the natural result of this has been the development of much energy in building in and around the neighbourhood. The larger part of this building has been, of course, directed towards providing additional house accommodation for residents and visitors, and this in its turn has necessitated new public buildings of all descriptions.

I propose in this article to give short critical notes as to the architectural character and interest of some of these new buildings, which may be of service to such of your readers as may be visiting the towns. Cement plaster is the material most commonly employed to finish a large number of the houses here, and although used in the majority of cases, somewhat less offensively than is to be found in some towns, still presents the monotonous effect always characteristic, no matter how judiciously treated, of the almost endless quantity of plaster. Here and there, of course, there are exceptions, and these isolated buildings, in other and more cheerful material, possess a greater value from the dullness of their setting, so to speak, than would otherwise be the case had they been placed amongst more cheerful surroundings.

The Esplanade is, perhaps, one of the finest extant, extending as it does from the fish-market, the extreme eastern point of Hastings, to Bopeep, the westernmost point of St. Leonard's, a distance of over three miles. Along the whole of this frontage are built houses in terraces, finished entirely in cement, many of which, despite the monotony of the material, possess considerable dignity not to be found in the later and more extravagant treatment of houses finished in this material. At about the centre of this sea-frontage, and opposite Verulam-place, juts out into the sea the pier, a very large and important structure of its kind, constructed mainly of iron. At the seaward end, raised upon an upper deck, is a large and capacious saloon, capable of seating from 2,000 to 3,000 people. At the four corners terminating at the top in octagonal enpolas are accommodated the refreshment buffets, cloak, and rearing-rooms. A fairly good band discourses music here daily, to the pleasure and possibly instruction of the visitors and residents. The upper deck immediately outside the saloon forms a covered verandah, and with the lower deck in fine weather is the favourite lounge of many of the visitors and the town's. The whole of the construction of the saloon and pay-boxes, as the pier generally, is of iron and wood, treated in a Moorish style of architecture. The colouring, however, is very weak, and anything but characteristic of the style adopted for the architecture. The Hastings Baths, but recently completed, at Whitelock, under the Parade, are a great acquisition to the town, as well as a great improvement to the Parade. Admission is gained to them by descending flights of steps into two large open courts, one leading to the gentlemen's and the other to the ladies' baths. The gentlemen's swimming-bath is said to be the largest tepid-bath in the world. It is finished inside generally with e loured brick-work and ornamental tiling, the boxes being, if I remember rightly, stained and varnished. I think the tiling round the edge of the bath a great mistake, as, when wet, it is slippery, to a dangerous extent. Of this I can speak feelingly, having sustained, some time back, a very severe fall, owing to the slippery state of this tiling,

which I am not likely to forget soon. The roofs, forming the parade over, are constructed of concrete, bedded between small iron joisting, at very frequent intervals. The several baths, which comprise very many different kinds, are lighted by means of large skylights, constructed on the parade, around which outside are placed seats. These appear to be in great favour during the summer months, forming especially the morning lounge of the residents and visitors. Both of the entrances, together with the courts below, are finished in red brick and red and buff terra-cotta, rendered in a Romanesque form of Gothic. They are of a very ornate character, and of very fair design. The colour, however, of the terra-cotta and brickwork is not very good, the least agreeable in this respect being the buff terra-cotta and the brickwork. The architects to this work were Messrs. Jeffery, Skiller, Cross, and Willis, of Hastings, and they may be congratulated upon the result. Rock and Co.'s carriage factory, Whitelock, close by, attracts attention by its pretentiousness. The front towards the sea is executed in Bath-stone and red Mansfield, rendered in a sort of segmental Gothic, entirely devoid of feeling or refinement. The bays especially strike one as being extremely coarse and heavy. The insertion of the coloured-tile knobs into the stonework is not a happy idea. Apart from the details which spoil the whole front, the treatment of the elevation deserves some notice for its bold conception.

Turning into Robertson-street, we come to the Holy Trinity Church, erected some fifteen years ago from the design of the late Mr. S. S. Teulon. Although a clever treatment of a most trying site, the building is not by any means equal to the general work of its architect. It consists of a nave, chancel, and one side-aisle; the tower, or so much of it as is built, occupying the S.E. end of aisle. The material employed outside is Rag-stone, and, I believe, Caen-stone dressings. This last is decaying very rapidly, and serves as a warning against injudicious selection of stone. The style may be said to be Fourteenth-century French Gothic, with much feeling in the details. The chancel end, though small, is very cathedral-like in expression. In Claremont, immediately opposite the western entrance to the church, is the Free Public Library, recently erected at the cost of Sir Thomas Brassey, from the design of Mr. W. Vernon, of Hastings. The Science and Art School for the town is also accommodated. Here the building is red brick with stone dressings, Domestic Gothic in character, with scarcely enough unity in the design. The tile friezes somewhat unseal the front. The printing premises adjoining, by the same architect, should be noted for its sgraffito decoration. Proceeding through Robertson-street we come to the "Albert Memorial"—a clock-tower, built in stone, of a weak and undigested form of Gothic, otherwise incapable of description. The London and County Bank close by is a stone-fronted building possessing an unobtrusive Classic facade. The new Post-office, in the Meadow-road, is a very fairly-designed Classic structure of a rather bold expression, and thoroughly characteristic of the Post-office Administration. Proceeding along the Meadow-road, we come to the new municipal buildings just upon completion. I think that it is much to be regretted that the Town Council of Hastings, after having put the profession to the expense of two very large and important competitions, should have taken the work from the hands of the selected architects—viz., Messrs. Jeffery, Skiller, and Co., only to result in the present structure. The building has been carried out under the superintendence of the borough surveyor; the materials used are ragstone, with freestone dressings; the style is a very discordant form of French Gothic, entirely devoid of all feeling, congruity, or scale. The mullions and mouldings generally are of the weakest description imaginable, while many of the other features are coarse and vulgar in the extreme. Especially objectionable are the chimney-stacks to the front. The stone diapering to the elevation of court facing the cricket-ground is particularly weak and meaningless, and had better been omitted. Undoubtedly the best front is that towards the Station-road, which shows some power of composition and improvement in some of the details. The building generally is sadly wanting in the dignity and character that should and might have marked the chief public

building in Hastings. The middle-class girls' school in the Wellington-square has a well-designed exterior in red brick and stone; the style may be said to be a quiet domestic treatment of Gothic, of suitable expression. The entrance is happy, but the details would have admitted of a little more study. The architects were Messrs. Jeffery and Skiller, of Hastings. The old town-clerk's office in Bank-buildings, is an example of an appropriate treatment of stucco. It is treated purely as a plastic material, and the result is worthy of notice. The best piece of school architecture in the borough, I think, is the Robertson-street Chapel Schools in Priory-street, built from the designs of Mr. W. Vernon. It is a pleasing treatment in red brick and stone of a modified form of Gothic, the various parts of which are well broken up. The least satisfactory part is the parapet, which is out of scale, and far too obtrusive. Again, the effect of the pinnacles to side of dormers, cutting into the crown of the arches to first-floor windows, is scarcely happy. The little carving here is very good, and is, moreover, judiciously applied. The Holy Trinity Schools, near the station, are pleasing in colour and grouping, but are very toy-like in their proportion and effect. They are built in red brick and stone with green slates to roofs, from the designs of Messrs. Jeffery and Skiller.

The convent church in the St. Margaret's-road, St. Leonard's, designed, I believe, by the late Mr. Pugin, is a fine building in Decorated Gothic, and appears to be worth a closer inspection than is to be obtained from the road. The chancel windows have an especially good effect. Further on in the same road is the St. Mary Magdalen Church, built some years ago from the designs of Mr. Murrable, I believe. It consists of nave, chancel, two aisles, and a south-western tower; the style is Late Decorated. At the top of the Church-road (we are now in St. Leonard's) will be found the St. Paul's Church, perhaps the most fashionable church in the two towns. It is a large building, of a very ornate character, and was erected about 1868 from the designs of Mr. Norton; the style is Early Geometric French, well and boldly treated. It consists of a nave, chancel, two aisles, morning chapel, and a N.E. tower at present without a spire. The exterior is built with rag-stone in coursed rubble and stone dressings, the interior being finished in red brick with ornamental tile dados, &c. The chancel is very highly finished in much richer material. Above the church lies the Magdalen Charity Estate, where there are a large number of new houses ranging in value from £1,200 to about £4,000. The majority of these are built of red brick, with stone dressings, to very fair designs of great diversity in character. Their best features are their plans, which are very complete and effective in accommodation. With but one or two exceptions the whole of these new houses have been built from the designs of the estate surveyors, Messrs. Jeffery and Skiller, and are certainly a great improvement on the usual estate architecture. St. Paul's Schools, on the same estate, evidently provide for a large number of scholars, and are built in red brick and stone to a style harmonising with the houses just mentioned. The Crèche immediately adjoining them can scarcely be considered successful. The Warrior-square Concert-rooms, just opened, are built in red brick and cement to a crudely-treated design of French Renaissance.

The best church in the borough, to my mind, is that known as Christ Church, in the London-road, St. Leonard's—a very large and assertive structure, which, owing to its great height and the general simplicity of its design, has an expression of great dignity. It consists of nave, chancel, two side-aisles, narthex, morning chapel, and a north-eastern tower. This latter has the inevitable "money-box" till such time as funds permit of its being completed. The nave and chancel are barrel-vaulted in wood, running through to the same ridge-line, the chancel being emphasised by the addition of colour decoration. The aisles are unpierced, and entirely subordinate to the nave, which is of great height and has a very boldly-treated arched roof, with a clerestory over of coupled windows, of a bold lancet form. The church is built from designs of Blomfield, and finished inside and out with a sandstone taken from the site. The whole treatment of the design is of a very severe form of Early English, with a strong

French feeling infused throughout. Altogether this church is, to my mind, one of Blomfield's best, and is well worth careful study.

"Barrow," Quarry-road, St. Leonard's, is a large house lately built for the Rev. J. C. Tottenham, the proprietor of the St. Leonard's School. The building possesses all the characteristics of its architect, Norman Shaw, though it can scarcely be said to be one of his best works. The house is built of local sandstone on the ground-floor, the first floor being weather-tiled, and having boldly-projecting bays in half-timber work. The style is the Domestic form of Gothic which has been so successfully practised by Norman Shaw. The colour and grouping of the various parts are extremely effective. The swimming-baths, belonging to the before-mentioned school, lower down on the road, are, in my judgment, not to be commended. The Convalescent Home for Poor Children, at Bopeep, was only far enough advanced in construction to see they would be an effective group of buildings when finished. They are in red brick, with tile-hanging of a very quiet and domestic character, with a little half-timbered work here and there. The site is an extremely good one, and has been fairly taken advantage of. The Hertfordshire Convalescent Home, immediately adjoining, is an unpretentious group of buildings calling for no particular comment. The exterior has been rendered in cement, and some of the upper portions tile-hung. The architect is Mr. Thos. Chatfield Clarke. Returning from Bopeep towards Hastings, we come eventually to the Archway. This is a relic of the Old St. Leonard's Commissioners, and at one time marked the boundary between Hastings and St. Leonard's. This, together with the old assembly-rooms close by, is finished in cement, and a very severe form of Grecian Doric now happily discarded.

The district is anything but rich in old examples; but I would just mention a few which are within easy distance from the towns. Winchelsea, nine miles from Hastings—extremely interesting church and two old town-gates; Rye, three miles further on—church, grammar-school, town-gate, and one or two interesting pieces of domestic work in the town; Battle—eight miles, fine old abbey and church; Pevensey and Hurstmonceux Castles are both well worth visiting. Etchingam has a very fine church, not so well known as it should be. Space does not permit of my doing more than just naming these few examples.

A. H. T.

SANITARY ENGINEERING AND VENTILATION.

WE have received an illustrated and descriptive prospectus of sanitary and economic appliances prepared by the Sanitary Engineering and Ventilating Company, whose offices and exhibition rooms are at 115, Victoria-street, Westminster. As most readers know, this company was formed with the objects, 1st, of "furnishing the householder of London and the provinces with trustworthy advice on the subject of house-drainage, water supply, ventilation, and other sanitary matters, and the means for carrying out the necessary improvements in the most efficient manner; and 2nd, of providing the public with the most modern and approved appliances for ventilating apartments, for the storage and filtration of water, and for the exclusion of sewer-gas from dwellings, &c." Competent sanitary engineers are retained, also a large staff of specially-trained workmen. The scale of fees for sanitary inspection is certainly moderate, and within the reach of all householders. We find the fees vary from two guineas for houses of the annual rent of £50 within the London postal district, to six guineas for houses of the rental value of £600. Country inspections are made at the same rates, with the addition of the railway fare and expenses. After the report of the surveyor is furnished, the company undertake the work recommended, and they also make periodical examinations of the same to ensure perfect working.

Looking over the appliances, we notice an earthenware ventilator trap with a water seal of 3in., made in three sizes, namely, 4in., 7s. 6d., 6in., 12s. 6d., and 9in., 20s.; the siphon bend is rather deeper than required. A simple soil-pipe ventilator on the suction principle is shown, called the "Imperial," and an "improved stench-trap" in iron for surface drainage, with

a triple water-seal. The patent sewer-gas trap for lavatories and sinks we have seen and described before; the valve is a floating rubber bulb which is kept close up to the seat of ink-pipe by the pressure of water under. The section on ventilation in tubes several patent appliances, such as the "Imperial" ventilating tube for the admission of fresh air on the principle of vertical currents. The tubes have regulating valves, a horizontal inlet, wire grid, &c., and are made of triangular, rectangular, circular, and other sections of various sizes ft. high. The "Imperial" exhaust ventilators show the deflectors placed at various angles for producing the desired effect, and are made for gas-pipes, these varying in diameter to suit. Square forms for roofs are also illustrated. The company's system of ventilation is to admit air by the vertical tubes, either at the corners of room or elsewhere. The foul air escapes through openings near the ceiling, entering the smoke-flues or exhaust tubes. We notice an excellent contrivance for regulating the admission of fresh air to cabins of ships, a chimney exhaust for the cure of draught and of down-blows on a similar plan to the ventilator. The patent self-cleaning tank filter looks simple and effective, and some useful remarks are added on filtration and storage, and one or two portable filters are shown made of stoneware, in which a stratum of the filtering material is secured—one of the best we have seen. The sections on warming and lighting are illustrated by engravings of gas-stoves, and the "Imperial" slow-combustion grate, Griddle's ventilating register-stove with air-chamber behind, George's Chlorine stove; also of gas-meter governors, the "Albo-Carbon" light, billiard lights, &c. The catalogue will be found a useful addition to the architect's office, and the illustrations, sizes, and prices make it a generally acceptable guide to the public.

EXPANSION OF CEMENT AND CONCRETE.

OPINIONS of authorities differ much as to the behaviour of cement in setting. An examination of extensive concrete walls, such as those of the New Victoria Docks, discloses a number of vertical cracks, which seem to indicate that a contraction of the mass has taken place. From the experiments made by Messrs. Dyckerhoff, it would appear that expansion and not contraction had taken place. In Mr. Henry Fajja's little book, "Portland Cement for Users," which we lately noticed, two tables giving the results of experiments by Messrs. Dyckerhoff on a prism of cement of 10 centimetres in length and 5 centimetres square, lying in water, are introduced. These tests show the amount of expansion in 12 varieties of cement from one week to twelve months old. Mixed with three parts of sand, the expansion is much diminished, and for architectural works, the results need not cause any serious apprehensions. Mr. Fajja's remarks point to a possible contraction during the action of setting, which, however, is afterwards replaced by a slight expansion.

This expansion or contraction is not so great that architects or engineers may feel any distrust of the value of cement concrete. It is, in fact, so slight that in practice, as Mr. Fajja says, it may be disregarded, and we think it useful to quote the latter gentleman's observations on the experiments. "Ignoring, therefore, Messrs. Dyckerhoff's experiments (although they may have a theoretical value in practice, when laying any large piece, such as a courtyard or a length of roadway with a concrete paving, it is advisable to lay it in sections, separating each by thin wooden battens. These battens may be removed in a few days, or when the concrete is thoroughly set and hard, and then replaced up with a similar concrete to the already laid, by this means there will be no longer the apprehension of the work being spoiled by the shrinking of the concrete." For the walls of buildings this advice becomes of less importance, as the concrete is filled up in frames or panels, as we have more than once hinted. Besides which, the occurrence at intervals of doors and windows, &c., would relieve any large surface.

Where finished surfaces have to be made, Mr. Fajja deprecates the practice of putting a differently proportioned concrete as a finishing coat. It is nearly sure to crack or peel off. It is

preferable to make the concrete of a finer kind, and work the face up with a trowel or float. Thus treated, the surface may be made to have the appearance of rough-cast, or a smoother finish if desired. The crushing strength of concrete seems to have been repeatedly made the subject of experiment; yet architects and engineers, in applying the ordinary weights given in tables, seem to think that the same results ought to be reached in building everywhere, whereas those tests have only reference to a small cube of an inch each way. A one-inch cube of cement will bear a great deal more than a small pillar of it twice or three times the height and of the same base.

THE LONDON CARPENTERS AND JOINERS.

ON Wednesday night, at the "King's Head" Tavern, Ebury-bridge, Finsbury, a numerously-attended meeting of London operative carpenters and joiners (the fourth of a series to be held throughout the metropolis) was held, in response to the call of the committee of the United Societies of Carpenters and Joiners of London, "for the purpose of considering the present and future state of the trade, and likewise to discuss questions relative to combinations and benefits to be derived therefrom." The chair was occupied by Mr. James Orford, secretary of the Associated Carpenters and Joiners of Scotland. In his introductory address, the chairman reviewed the position of the associated trades at some length, and, in so doing, reverted to the problem as between labour and capital. This problem was easily solved, if but the right man in the right place, and at the proper time, took it up. Trade, he held, had its privileges, and, remembering these privileges, the responsibilities consequent thereon must not be lost sight of. As between capital and labour, the problem still unfortunately remained unsolved, though he would say the interests were identical. In view of these facts, the society points to its benefits, one of which is the security of the trade privileges which they had for so long enjoyed. With their system, not only would all unwarranted interference with their trade rates and privileges be denounced, but a powerful lever would be raised, not alone to improve their social condition, but by every means to raise the character of the trade, intellectually and morally as well. It was further shown during the proceedings that the present was not the time to stand idly by, while adhesion was demanded and the principles of the trade were at stake. Mr. Nightingale moved:—"That, owing to the majority of the men in our trade being non-unionists, and, owing also to the unity existing among the capitalists, the energies of the workers are exercised to their own benefit; but were every man in our trade to become a unionist, their social position would be improved, and the rights of honourable productive industry would not, as now, be usurped." Mr. W. Hepworth, secretary of the Organising Committee, seconded the motion, which was carried. Mr. Green and Mr. Eton, members of the combined trades, proposed and seconded the next motion:—"That, owing to the many evils existing in our trade, and the great disadvantages under which the workman labours, this meeting pledges itself to use its best endeavours to better our position by strengthening the ranks of unionism, believing that it would greatly improve our social and financial condition."

The blunders of our law-makers are as perplexing as the acuteness of the interpreters of the law. An English Act of Parliament recently declared solemnly that a new house was one which was pulled down or burnt down to within 10 ft. of the ground. In a burning case another court has decided that a "box" is not a "place." A man was arrested for mounting on a box at a race-course, and bellowing the odds and making bets, but the Court held that he had not infringed the law, though, if he had unfurled an umbrella over the box, that would have been a "place."

The tender of Mr. Garbutt, of Birmingham, being the lowest of six received, has been accepted at £1,631 by the local board of Brownhill, near Wolverhampton, for the erection of public offices. Mr. J. Siddalls is the architect.

St. John's Church, Southall, W., is about to be re-seated, under the direction of Mr. F. Shrewsbury, at a cost of about £300. Mr. Nye is the contractor.

Building Intelligence.

CARDIFF.—The Severn-road Schools, which are now in the course of erection for the Cardiff School Board, occupy a site fronting the Severn-road, and will accommodate 850 children. The buildings are being simply but substantially built, effect having been sought rather from a picturesque treatment than by any lavish display of ornament. Rubble-work masonry has been used for the walls; the large and small gables, cornices, chimneys, &c., are to be carried out in Bath-stone. Mr. Job Thomas, System-street, is the contractor for the works, which are to cost £6,523. The cost per head is £7 10s. nearly. The architect is Mr. J. P. Jones, 26, Park-street, Cardiff.

COCKINGTON.—A new reredos was unveiled for the first time in this parish-church last Sunday. It has been designed by Mr. James Hind, F.R.I.B.A., of Plymouth, and is in the Late Decorated style. It is made of oak; the lower parts are enriched by linen panels, surmounted by a projecting and richly-carved cornice. Above the altar-table the entire length of the reredos proper is formed, in the main, of seven continuous and connecting canopies. It is crowned by a foliated cross. From the lower junction of the various gables spring pinnacles, and loftier pinnacles of similar character are carried up from massive buttresses at either end. The recessed panel is of chestnut wood, and upon it is painted a representation of the Last Supper. This painting is by Mr. J. T. Pouracre, of Stonehouse, Plymouth. The new reredos has been made and carved by Mr. Harry Hems, of Exeter.

LANHYDROCK.—The rebuilding of the mansion of Lord Robartes at Lanhydrock, near Bodmin, is being prepared for by the contractor, Mr. Thomas Lang, of Liskeard. The house formed three sides of a quadrangle with a garden in the centre. The centre and the south wing were so much damaged by the fire that they are being entirely pulled down in order that they may be rebuilt. They will both of them be slightly widened. With this exception the house will be built on the old lines and in the same style—Tudor. But new buildings to a considerable extent are to be added on the south side, where there was always a large area between the out-buildings and the house. The floors will be supported by wrought-iron girders, and the ceilings of Dennett's patent. The walling-stone will be brought from a quarry at Margate, about three miles from the house, and the granite from Bolymen, in the parish of Lantivel. Three Cornish contractors were selected by the architect to tender for the work, and from them Mr. Lang was chosen. The estimated cost is not above £20,000. Mr. Richard Coad, of 3, Duke-street, Adelphi, is the architect; and Mr. Cooper, who has lately filled a similar position at Arundel Castle, the seat of the Duke of Norfolk, has been appointed clerk of the works.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

SOMERSETSHIRE ARCHÆOLOGICAL ASSOCIATION.—THE CLEVELAND MEETING.—At the evening meeting on Wednesday week, which was not commenced until a late hour, and a report of which we were, therefore, unable to publish last week, the Rev. H. G. Tomkins contributed some further information with regard to Worlebury Camp, near Weston-super-Mare. The Rev. Prebendary Seath read a paper entitled "A Brief Sketch of Parish History," relating more particularly to Wrington. Bishop Clifford complained that the programme was too lengthy, and did not allow sufficient time for the real and honest work of the society. Papers that would have occupied half an hour had to be got through in ten minutes in consequence of the long time occupied by the excursions, and discussion was also prevented. The meeting of the society was brought to a close on the 25th ult. The first place set down in the programme was Cadbury Camp, and the Rev. Prebendary Seath had promised to furnish the society with some particulars with regard to the ancient earthworks. In view of the long walk which a visit to the camp would entail, it was decided to omit that part of the programme; but the Rev. Prebendary Seath, at the request of

the members, consented to read his paper at the Public Hall before the start was made. A few particulars of Portbury Camp, another place intended to be visited, were also given by Preb. Searth. Soon after eleven o'clock about fifty members started on an excursion to Clapton-in-Gordano and Portbury. A visit was paid to Clapton-in-Gordano Court, the ancient family seat of the Claptons, who resided here from 1440 to the time of Charles the Second, 1615. Mr. E. Greene said the part of the house that was not inhabited was altogether new, but a small portion of it was evidently of the time of Edward II. It was built about the same time as Clevedon Court, in the middle of the 14th century, and there had been additions since. The tower was of the time of James, possibly late in Elizabeth's reign. An interesting feature was the screen, which was now to be seen outside the entrance door. It formerly divided the hall from the pantry, and it was the earliest wooden screen known in England. Consequently it possessed great interest. It was a valuable record, and seemed out of place in the position in which it was. There could be no doubt, although there had been so many additions, that it was a manor house of the time of Edward II. The "Two Ladies of Nash" had a kind of nunnery in Clapton, and here Bishop Ken used occasionally to come when tired of Longleat. Clapton-in-Gordano Church was also visited. The edifice is in course of extensive restoration, under the hands of Mr. Barnes, architect. It is an interesting-like structure, perched on an eminence. Its style is Early English, with Perpendicular additions. The party then drove to Portbury Priory, and Mr. Greene read a short account of the place, explaining that, when they last visited the priory, nothing was known about it. He could not even now give the date of the foundation, but, judging from the architecture, it was not very ancient. Not being a priory independent of itself, it was not noticed in the account of the chantries. This was a place for a few black monks, belonging to the monastery of Braemore, Hampshire. At the church some notes were given by the rector, Rev. E. O. Tyler. The leading features of this large edifice are the Norman doorway and Early English sedilia in the south aisle. This church, dedicated to St. Mary, was formerly appropriated to the abbey of St. Augustine, Bristol, and was granted to the bishopric of Bristol at the Dissolution. A few other places were visited, after which the party returned to Clevedon.

LEEDS ARCHITECTURAL SOCIETY.—On Saturday afternoon several members of the above society visited Huddersfield. Upon arrival they were met by Mr. W. Hoffman Wood, and the party afterwards inspected the principal buildings of the town, which include the Town-hall and Municipal buildings. They were kindly shown over the various departments in the Town-hall by Councillor Birley. The visitors next proceeded to the Borough Slaughter-houses, St. Peter's Parish-church and Schools, the new Theatre Royal, and several other buildings, and, after inspecting these, returned to Leeds, an enjoyable and instructive afternoon having been spent. The members of the society will visit York Minster next month under the guidance of Mr. George Bradley, the residential clerk of works.

ARCHAEOLOGICAL CONGRESSES.—The French Archaeological Congress was held this year at Vannes, where its forty-eighth session opened on June 28th and closed on July 3rd. Vannes is peculiarly well fitted as a place of meeting for a gathering of this sort, as its museum contains one of the most precious archaeological collections anywhere to be seen, and in its neighbourhood are to be found large numbers of megalithic monuments, the alignments of Carnac, grand menhirs and dolmens, the covered alleys of Gavrinis, with their enigmatical sculptures, and others. A large tumultus was opened before the members of the Congress on July 4th, near Vannes, and an excursion to Finisterre was planned after the meeting. The Congress was attended by French, English, Spanish, and Italian archaeologists. The Russian Archaeological Society held its last meeting at Tiflis, beginning on Aug. 20th, old style. The programme consists of the following divisions:—1. Prehistoric Antiquities; 2. Pagan and Classical Antiquities; 3. Christian Antiquities; 4. Mussulman Antiquities; 5. Art; 6. Monuments of Speech and Writing; 7. Linguistics;

8. Historical Geography and Ethnography. A temporary museum was organised for the exhibition of the antiquities discovered in recent years in various parts of the empire.

"To a practical man with a taste for mechanics, and the bumps of constructive fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Two pence of all newsmen, or post free 2½d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31 TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 5s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and SIXPENCE for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) for any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 8s. 6d. (or 8frs. 30c.). To India (via Brindisi), £1 10s. 6d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—B. and P.—M. and Co.—F. W. R. and Co.—W. L.—E. H. S.—J. S.—N. E. R. Co.

JOHN BLAKEY. (We do not know the limit as to age; but the Secretary of the R.I.B.A. could, doubtless, inform you.)—**STURGES.** (Banister Fletcher's books. See Batsford's advertisement.)—**A SLIP.** (If the advertiser who inclosed a remittance and an advertisement *without name or address* in a registered envelope bearing the postmark "Workshop," will communicate with the publisher, his instructions shall be attended to.)

Correspondence.

COOPER'S HILL v. THE ROYAL ENGINEERS.

To the Editor of the BUILDING NEWS.

SIR,—I am quite in accord with "Peter Playfair" in giving the palm to the Royal Engineers over most of the so-called Civil Engineers who are associated with them on the public works of India. It needs very little discernment to arrive at that conclusion, as the Royal Engineers are the picked men of their school, and their elementary training is good. It is for their want of practical knowledge of works that the Indian public have cause of complaint.

Notwithstanding this, I have no doubt they are more to be relied on than many of the so-called Civil Engineers who are associated with them, for the reason that the education of the latter has not been so good, nor their experience more extensive. These are not the kind of engineers required in India, but thoroughly trained, practical men, experienced in the conduct of large works before their arrival in that country, which is too poor to admit of its being used as a training-ground for any profession where a large and useless expenditure is

the consequence. What I wished to lay stress upon in my letter was the Royal Engineers expecting to escape their responsibility by throwing the blame on subordinates, be they called Civil Engineers or Supervisors of Works.

In describing the state of the public works of India generally, my language may have been somewhat hyperbolic—at least, I should hope that it was so; but, if the truth of the cases I have cited be admitted (and they were not disputed at the time they were said to have occurred), I cannot conceive anything more deplorable.—I am, &c.,

27th August.

JAALAM SMITH.

PRACTICAL NOTES ON PLUMBING.

SIR,—Mr. J. P. Davies has been doing good service for some time past by publishing in your columns his "Practical Notes on Plumbing," and I for one thank him very much for them.

I am afraid, however, that upon the question of general construction, upon which Mr. D. entered last week, I shall not agree with him. I certainly cannot agree with his arrangement of waste pipes, to which he refers on p. 278. In my opinion it is most objectionable from the fact that it is liable at any time to become a means by which sewer-gas can escape without interruption into the house, and is at all times the cause of a more or less offensive smell in the rooms.

The wastes should be disconnected outside the wall and again at foot, so as to run into, but not directly over, the surface gully.—I am, &c.,

DANIEL EMPTAGE, S.E.

Danehill Sanitary Works, Margate, Aug. 29.

MR. DAVIES AND HIS U-TRAP.

SIR,—I have read Mr. Emptage's letter on Mr. J. P. Davies' experiments with the U-trap, at the Plumbers' Discussion on Mr. Hellyer's lectures. I have only to say that I am sorry I was not there; but from what I heard from some who were, I availed myself of the opportunity of paying Mr. Davies a visit at his establishment, for the purpose of convincing myself of the merits of Mr. Davies' U-trap, and, from the test I put the same trap to, I have no hesitation in saying that it is the most perfect U-trap in practical operation, and I emphatically deny that the same trap takes more than a pint of water to clear away a handful of stones, or a piece of house-flannel. Now, this was done without the use of the plug in the container, in my presence, and any gentleman in the profession is at liberty to call at Mr. Davies' office and prove it for themselves.—I am, &c.,

GEO. COURT.

41, Leipsie-road, Cumberwell, S.E.

SIR,—I have seen Mr. Emptage's letter on page 281, and think he has a somewhat peculiar conception about the construction of my model U-trap—to wit, that I have failed altogether, &c. He says I used 1½ gallons of water to clear the pebbles, &c. out of this model on the 15th inst., at the Society of Arts room. If he had kept his eyes upon the outgo of the trap when the experiments were made, he would have seen the pebbles, &c. pop out of the trap with the first half-pint of water. However, there is one point in his own letter which, after my reply, will prove that this model was, and is most unquestionably the best form of sink-trap yet invented. I take the third paragraph of his own letter, which runs as follows:—"Had Mr. Davies taken the plug out of his tank and thrown in two pints only of water, the test would have been a fair comparison to an ordinary w.c. flush." I take these, his own words, and make them my trump card. And, further, as a strong supporting pillar of proof, bring in one of Mr. Hellyer's best foremen of plumbers, a gentleman well known throughout the plumbing circle, Mr. Gutridge, to testify that he has been sent to my office by Mr. Hellyer to see my trap in action, and that I have in his presence (and hundreds also), placed a handful of pebbles, rag, &c., into the body of this small or half-sized trap, and with only one pint of water cleared them out.

After this, I respectfully ask Mr. Emptage to acknowledge that he has been mistaken, and that my model will answer what I claimed—more especially as he so kindly gave me two pints instead of one to work with.

I am now in a position to prove that this trap

possesses five advantages over all others I have seen.

Firstly: It holds less water or sewage-matter than any other full-sized closet-trap known.

Secondly: The soil will pass more readily from the dip to the body of the trap with less water than any other make.

Thirdly: That the siphon-action is less than in any other kind of trap.

Fourthly: It cannot clog out.

Fifthly: Anyone can make it at a small cost.

I suppose this will also have some weight with my old friend H. B., who has not fully seen the merits of this model. I may mention that this gentleman has had many paper fights with me, and if he is at last convinced about the matter, I shall be pleased to know it; but, if not, I invite him or anyone else to make an appointment to come to my office, 2, Shaftesbury-terrace, Warwick-road, Kensington, W., and see the thing in action. I am generally at the above address Saturday afternoons, so that working plumbers may come. I am, &c.,

P. J. DAVIES, C.E.

VENTILATION OF SOIL-PIPES.

SIR.—Mr. Imptage's letter does not indisputably prove his case. He first states that to him it appears "rather strange that anyone should compare a simple water-siphon with the siphon-trap of a w.c.," and then proceeds to indicate the points of difference which, according to his account, are comprised in the *greater* length of the long leg of a w.c. siphon, and in the *large* volume of water rushing through. There can be no siphonic action without a vacuum, and a vacuum is impossible if the siphon-pipe is punctured, therefore the *length* of a long leg of siphon is immaterial. Mr. E. attributes great import to the *large* volume of water which, as he says, "rushes through" a w.c. siphon. The force which sends this water rushing through is not a siphonic or gently-drawing force, but an impulsive driving-action caused by the weight and fall of the water. As the trap is always fixed closely adjacent to the basin, it is difficult to conceive the possibility of any flash of such an impelling nature that it should run itself out of the trap-hollow. Mr. Hellyer proved by ocular demonstration that a trap having an apex orifice could not be a siphon. In the very improbable case of a volume of water forcing itself through the trap as to destroy the efficacy of the water-seal, the operation could only be of a very temporary character. The tail-end of the water volume would suffice almost immediately to fill up the deficiency. The "rushing force" of the water would clear the soil-pipe of sewer gases, driving them irresistibly up the escape-pipe of the apex orifice, and consequently "little or no harm" would be done in case of such a momentary unsealing of the trap; but without the apex orifice such an operation, momentary or otherwise, would be fraught with the most direful danger. I am, &c.,

MEADWELL DREW.

London, Aug. 29, 1881.

UNTRAPPED GULLY-HOLES.

SIR.—The letter from "C. F. M." on page 282, demands attention, especially if it can be certified as correct that the breathing of the sewer-air from the gully-hole really caused two persons to be taken ill with typhoid fever, one of whom died. We may, I suppose, take it as a matter of course that it was not the bad air itself that produced typhoid, but the contagion of the typhoid conveyed in the soil-sewer-air.

I have never been in favour of the sewer being ventilated by the gullies at the side of the pavement, but rather supported the idea of the ventilating openings for the sewer, at the street-level, being in the centre of the street.

I have often been distressed myself when walking at the edge of the pavement to feel the stink rising out of the untrapped gully in the gutter, and therefore to support the plan which traps these and makes the openings in the centre of the street. I am, &c.,

W. P. BISHAM, S.E.

Glasgow, 29th Aug.

BUILDING-STONES.

SIR, I have refrained from taking part in the correspondence so ably conducted on this subject for some weeks past in your widely-read columns. It seems, however, incomplete

without the information asked for by Mr. Philip E. Masey, in your issue of July 22, with respect to the Bath stone used in the construction of the Grosvenor Hotel, affording, as he well says, a good example for London, where the atmospheric influences are much more deleterious than elsewhere. This stone is an excellent specimen of the Bath Oolite, and shows a fine and uniform grain, from being deposited in the geological formation under favourable conditions and great pressure. It may be described as a calcareous sand-stone, with a small percentage of silica, and is therefore a free-working stone, and well adapted for ornamental purposes where fine moulding and carving are required.

Mr. Masey inquires: From what quarry did this stone come, and could more of the same be procured with certainty as to like durability? As none of your correspondents have furnished the information, I beg to say the stone was supplied by the enterprising firm of Randell and Saunders, from the Corsham-Down Quarry, situated near the east mouth of the Box Tunnel on the line of the G. W. Railway, of which, at the period referred to, they were the lessees, but which since the year 1871 has been worked by the present owner, to whom the property reverted at the death of the late proprietor of the estate. The property, although not an extensive one, is capable of yielding, as at present, a large output of the same quality of stone for many years to come. In regard to the strength of this stone for resistance under pressure, its capacity for carrying weight has been ascertained, by carefully conducted hydraulic test, to be equal to over 70 tons to the square foot, cracking slightly at 75.1 tons and crushing under a pressure of 102.8 tons.—I am, &c.,

AUGUSTUS YOCKNEY,

Present owner of the Corsham Down Quarry, Corsham, Wilts, Aug. 29.

DESTRUCTION OF THE LANTERN TOWER AT THE CHURCH OF ST. CUTHBERTA, WIMBORNE MINSTER, DORSET.

SIR.—Since the appearance of my letter, dated August 16th, in your columns respecting the above, I have received a letter from the architect informing me that where brown stone was taken away, it was replaced by that of the same colour, also that no Bath-stone is being used in the repairs.

I must admit that I was misled by the appearance of the western side of the tower, which presents a totally different appearance to the rest, being chiefly composed of white stone, which appears to have been restored at some subsequent period, probably when the spire fell down in 1600. Both the architect and a correspondent in last week's *Bournemouth Directory*, who signs himself "One of the Building Committee," seems to lay great stress on my assuming that Bath-stone was used. I care not what white stone is being used, but I question very much if any white stone should be used. What I object to, in fact the object of my letter, was to point out what a patchwork look the white stone has with the brown, destroying that charm the tower presented a few weeks ago.

The architect also demands an apology from me, for assumed vandalism. This I should object to give, because I think a great deal of vandalism is going on in this so-called restoration. But not to trespass too much on your valuable space, I may mention one thing: Just above the springing of the arches of the arcade, occur carved heads, in brown stone. Where these have perished, they have been replaced with a lump of cement, on the front of which is formed a face. This fact speaks for itself.

I must ask the person who signs himself "One of the Building Committee," not to quote the name of Mr. Ewan Christian, because he told me he had nothing to do with the restoration of the tower; he only reported on its condition.—I am, &c.,

MILLS ROBINS.

August 31st, Feast of St. Cuthberta.

P.S.—I may mention in my first letter I signed myself "Hon. Secretary of the Bournemouth Field Club," but I wish to say it was in no way connected with the Club, the letter being entirely my own.

OLDSWINFORD HOSPITAL-SCHOOL COMPETITION.

SIR,—Will you permit me, through the medium of your valuable journal, to ask any of

your readers to publish the results of the School Competition for the Oldswinford Hospital, Stourbridge, which was advertised in the professional papers a few months since, and oblige?—I am, &c.,
August 30th.
ARCHITECTUS.

THE ARCHITECTURAL ASSOCIATION AT WORCESTER—CORRECTIONS.

SIR.—In your report of the Architectural Association at Worcester, it is stated that Kington Church is as yet unrestored, and that Crowle Church was restored not long ago by Mr. Preedy. Kindly allow me to state that the former very quaint little church is at present being restored by Mr. W. J. Hopkins; and the latter is in course of rebuilding from the designs of Mr. Preedy. The foundation-stone was laid about three weeks ago.

The wings of the Worcester Guildhall, instead of being entirely rebuilt (as ought to have been the case), the front walls only are rebuilt: and it is much to be regretted that in consequence of the alterations suggested by the local authorities, they are not rebuilt as shown in Mr. Niven's very excellent drawing.

It is said that the architect (Thomas White) was the sculptor of the trophy of arms in the large tympanum. Whether or not such was the case I am not quite sure; but the initials and date, "T. W., 1722," are still to be seen cut in the stonework of the tympanum.—I am, &c.,

LEWIS SHEPPARD.

San-one-walk, Worcester, August 30th.

Intercommunication.

QUESTIONS.

[669.]—**Fumigating Oak.**—Will any reader state how this is done, and what chemical used?—G. S.

[6610.]—**Wood-Carving.**—Enquirer wishes to commence wood-carving. Will some of your readers give a few hints as to the best way to set about it, and what tools will be required, &c.?—Z. D.

[6641.]—**R.I.B.A. Preliminary Exam.**—Would a correspondent advise me what course of study I should pursue in preparing for the R.I.B.A. preliminary exam? Where could I obtain the necessary particulars?—NORTH-EAST STUDENT.

[6612.]—**Work Expected from Ex Pupils.**—What is a young man, just finished pupillage or apprenticeship expected to know—that is, the next office he goes to, what is he expected to know, and what work has he to do, and what wages might he expect? Also, is there much difference between a Scotch and English office.—SCOTCH YOUNGSTER.

[6643.]—**Land Agent.**—Will some kind reader be good enough to give me the name of a cheap and useful book for a young land agent?—ANXIOUS.

[6614.]—**Powers of Urban Sanitary Authorities.**—Will any of your numerous correspondents kindly answer the following question:—Has any urban sanitary authority power to prevent any one from erecting a balcony and bay window over the footpath? The proposed balcony, which is 12ft. from the ground, would overhang the footpath 2ft. 6in., and the bay window which comes over the balcony would project 1ft. 6in. from the face of the building. The proposed balcony would project about 13in. beyond the cornice of shop below. Has any case been tried on this point?—D. H. V. T.

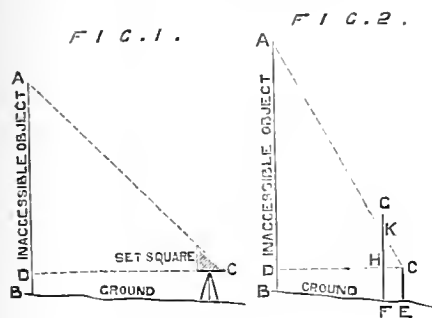
[6645.]—**Iron in Structures.**—I shall feel obliged by one of your correspondents kindly giving an opinion as to what is the proper designation of the artificers who bed, fix, or set up ironwork in structures where no smithing is required?—FRANCO.

REPLIES.

[6611.]—**Measuring.**—Use the hypsometer, made by Geo. Prescott and Co. (Limited), of Dublin. You hold the instrument in your hand and walk away from the object whose height is to be measured, till looking through the plain sights you see the top; then the distance from yourself to the foot of the object added to the height of your eye, will give you the object's height.—W. F.

[6611.]—**Measuring.**—Absolute accuracy may not be obtained by the following methods, but they may be sufficiently near for "C. F. M.'s" purpose. I give them because they are simpler than some of the plans suggested, and more accurate than others. If the space in front of the object equals the height of the object, take a set-square (a large one made of laths or otherwise, but the larger the better, with angle of 45°) set it so that when the square sides are plumb and level, the other side shall incline to the top of the object. See Fig. 1. Then the distance from C to D = height D to A. Add the height below D to ground I, at B, and the sum is the total height. Carefully performed the above will give the height correctly, as all the measurements are dealt with full size. If the space at base of object will not permit of the above method, the following may be adopted. See Fig. 2. Let A B be the object. In any convenient position set up a short pole E C, and a short distance between it and the object a longer one F G. Apply the eye at C, and mark where a line from A would cut F G, viz., at K. Mark also where a level line would cut F G and the

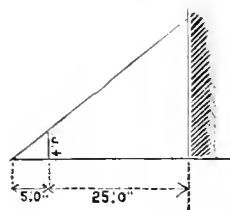
object, viz., in H and D respectively. Then the triangles CHK and CDA are similar, and their respective sides are proportional to each other. Measure the lines CH, HK, and CD; suppose them to be 3ft., 4ft., and 5ft. respectively, then by a question in the rule of three, as 3:50 :: 4 to the height DA, or 66' 8". Add the height from D to B, and the total is the height of the object. By this method the poles EC and FG must be set up perfectly plumb, and the measurements upon and between them very carefully taken, and the farther apart they are and the farther from the object, the less chance of error.



If the object tapers, say, a steeple, it will be understood that the line CD must be measured to the centre of tower, which can be done by adding half width of base to the distance from outside of wall to C. A good few years (eight or ten, or more, perhaps) ago there was described, in the *Building News*, a small instrument for measuring such altitudes, but I am unable to lay my hand on the place just now. The instrument could be carried in the vest pocket.—L. L. U.

[The instrument referred to was the Apomecometer, invented by Mr. R. C. Millar, of Dublin, and illustrated and described in the *B. N.* of Feb. 26 and March 5, 1869.—Ed.]

[6811.]—**Measuring.**—To obtain the measurement of an inaccessible height, take a station point at some convenient distance from object to be measured. At a distance of, say, 5ft. from station point, in a straight line with object, erect a perpendicular. From station point



sight a line to the top of object, and note where it cuts the perpendicular. In sketch it is 4' 0" from the ground. The height of the object = $\frac{4}{5} \times 25\text{ft.} = 20\text{ft.}$ In practice it is somewhat difficult to erect a rod truly perpendicular.

The best plan is to have a right angled triangle made of straight edges, and to shift it until the top of object coincides with the line of the hypotenuse. To obviate the inconvenience of grovelling on the ground to obtain the sight-line, the triangle could be stilted to the height of the eye as shown by the dotted lines on sketch. In this case the height = $(\frac{4}{5} \times 25) + 5\text{ft.} = 25\text{ft.}$ —

QC19.

[6612.]—**Laying Large Concrete Blocks.**—“J. K.” will find a full account of the method of laying down the big concrete blocks, will full descriptions and drawings of the machinery, in Mr. Stoner’s paper in the minutes of *Transactions* of the Institute of Civil Engineers, Vol. 37, page 332.—W. F.

[6822.]—**Building Construction.**—If “F. P.” resides in Edinburgh, surely a little inquiry would bring him the information he seeks. A friend of mine attended classes under the Science and Art Department in Watt’s Institution, and, doubtless, there are many others.—L. L. U.

[6933.]—**Curves in Perspective.**—Find points in the line of curve according to rule. Sketch in pencil freehand, and use French curves for “finishing” the lines, or for inking.—L. L. U.

[6635.]—**Architect’s and Valuer’s Licence.**—Being in doubt upon this point, I wrote, a few weeks since, to the Secretary of Inland Revenue at Somerset House, stating that I was frequently called upon to measure and value artificer’s work, and for my safe guidance I was anxious to know if it was necessary for me to have a valuer’s licence, and his reply to me was that “to enable me legally to measure and value work I required an appraiser’s licence,” also to the effect that stamps are needed on the valuation or award. It appears to me that this is an important point, and one that cannot be made too public, for I am sure there are many who are inadvertently acting without a licence or using stamps. It also appears to me that if an architect values a builder’s work he is equally liable, and if a dispute arose upon his award and it was produced in a court of justice not being stamped, the document would not be accepted as evidence, and then would crop up the question, Had the valuer a licence? with sundry unpleasant consequences to follow. I also learned from the same source that if a valuation is

arrived at from a schedule of prices previously agreed upon, then a licence is not required.—W.

[6636.]—**Books on Construction.**—Replying to “Architectural Pupil,” perhaps the following list of books on above will be useful to him:—“Notes on Building Construction,” to meet the requirements of the syllabus of the Science and Art Department of the Council on Education, South Kensington, 3 vols., 8vo., cloth, £1 15s. Vol. I., First Stage, 219 pp., and 325 woodcuts, 8s. 9d. Vol. II., Second Stage, 227 pp., and 277 woodcuts, 8s. 9d. Vol. III., Materials, 53 pp., and 181 woodcuts, 17s. 6d. “The New Guide to Carpentry,” General Framing and Joinery, Theoretical and Practical, edited by R. Scott Burn, architect, illustrated by 150 plates and 538 woodcuts, £1 15s. “The Architectural Sketch-Book,” edited by the Portfolio Club, with plates. There are several works published on Gothic architecture. Among them are: “The Gothic Model Book,” or the Architecture of the Middle Ages, with its associated arts, and contains 216 fine plates, some of stained glass, coloured small folio, half morocco, 32s. “The Principles of Gothic Ecclesiastical Architecture,” by Bloxham, 6s. 6d. The above books may be obtained from Mr. B. T. Batsford, 52, High Holborn. Send for his catalogue.—FRED. J. FREEMAN.

PARLIAMENTARY NOTES.

POLLUTION OF THE THAMES.—Mr. Causton last week asked the President of the Local Government Board, in reference to the statement contained in the report of the Conservators of the River Thames, “that Kingston and Richmond, and other places below the intakes of the water companies, still pass their sewage into the river,” whether any, and, if any, what steps were being taken to remedy the evil. Mr. Dodson.—The House is aware that in 1878 a joint Board was formed, known as the Lower Thames Valley Main Sewerage Board, for the purpose of providing for the disposal of the sewage of these as well as other places, and in 1879 they brought in a Bill for this purpose, which was unfortunately thrown out on second reading. Last year they proposed another scheme, which after a long inquiry the Local Government Board were unable to approve, and the joint Board have recently proposed another scheme for consideration.

LEGAL INTELLIGENCE.

LIBEL ON AN ENGINEER.—At the Liverpool Police Court on Saturday, Mr. Harold Furniss, the printer and publisher of a weekly paper called the *Wasp*, was summoned for libelling Mr. G. F. Lyster, engineer to the Mersey Docks and Harbour Board. The libel consisted of an implied assertion in the “notices to correspondents,” that Mr. Lyster had received commission from the manufacturers of cement used in the dock works. Mr. Lyster was called, and he denied that there was any truth in the insinuation. On behalf of the defendant a complete apology was offered, it being stated that he had now practically no connection with the paper, and that at the time of the appearance of the libel he was out of town and knew nothing about it. Mr. Lyster accepted the apology and the case was withdrawn, no order being made as to costs.

IN RE G. CRABB.—At the London Bankruptcy Court on Saturday, an application was made to Mr. Registrar Brougham, sitting as chief Judge, for the appointment of a receiver and manager of the estate of George Crabb, builder, of the Phoenix Works, Kingland-green, London. The petition was presented yesterday, the liabilities being stated at £53,800. The assets are valued at £46,000, and consists of stock and plant, also the amounts due under certain contracts.—Upon the application of Mr. Doria, supported by creditors for £24,000, his Honour appointed Mr. Child (Boyes and Child) receiver of the estate, but declined to appoint him manager in the absence of evidence that the creditors supporting were all unsecured.

ST. JAMES’S, PADDOINGTON.—(Before Dr. Tristram, Q.C., Chancellor of London.)—This was a renewed application on Friday last, for a faculty by the vicar and churchwardens of St. James’s Church, Westbourne-terrace, to reconstruct the body of the building in accordance with the plans of Mr. Street, the architect, at an expense of about £15,000, which has been subscribed or promised.—Mr. Smith, one of the Masters of the High Court, and other parishioners, opposed; and the case, which had been before the Court on a former day, was now concluded after a sitting of more than five hours.—Mr. Gainsford Bruce was for the faculty, and Mr. Blakesley opposed.—The question was raised whether the body of the church should be reconstructed or merely repaired, and externally decorated. It appeared that Lord Justice Cotton, Dr. Deane, Q.C., and others had liberally contributed, and the principal point was “reconstruction.”—Mr. Austin Leigh, a member of the Bar, and of the firm of Messrs. Spottiswoode, who had acted as one of the treasurers, said there was £8,000 in hand, and he had no doubt that the subscriptions would amount to £15,000. When the proposal was made Mr. Smith and other parishioners objected, and it was then thought that the expenses would exceed £20,000. That gentleman said he

had no scheme to propose, but he had strongly objected to the scheme on which the vicar, the Rev. Walter Abbott, had “set his heart.” Mr. Smith gave his view of the matter, and an application was made to postpone the case for material evidence. It was proposed to call scientific evidence (Mr. Christian, the architect to the Ecclesiastical Commissioners, being mentioned) to show that the proposed scheme was not necessary, and objections had been made. Several witnesses were called, and it was stated that if the alterations were commenced during the present vacation, the church need be closed only for a week or two, and next year from July to November. Recently the feuders had been opened, and they were all under £15,000, so that the expenses would be for the improvements under the sum subscribed. A material question arose as to the diminution in the sittings which would take place in the plans filed; but Mr. Street said he could make such alterations and galleries as would come up nearly to the original number of sittings. Dr. Tristram, after a long investigation, was in favour of the petition, except in the diminution of the sittings, which Mr. Street said could be replaced by additions to be made. He held that there must be a supplemental petition and citation, and if no appearance in a week the faculty would be issued. He knew that he could appeal; but he put it to Mr. Smith whether, after all that had been stated, it was reasonable to delay the proposed reconstruction. The learned Chancellor allowed Mr. Smith the costs on the point he had established.

ACQUITTAL OF A BUILDER.—The adjourned August Sessions for criminal business were held on Wednesday at the Sessions-house, Clerkenwell, before Mr. P. H. Edlin, Q.C., the Assistant-Judge, Mr. J. D. Fletcher, Chairman of the Second Court, and Captain Morley. Thomas Watkin Smith was indicted for stealing stone to the value of £1 ls., the property of Messrs. Aspinall and Son. Mr. Dr. J. Lewis prosecuted, and Mr. Burnie defended the prisoner. It appeared that for the past 12 months the prisoner, who is a builder, had been in the habit of buying stone of the prosecutors, who have a wharf close to the East-end, Finchley-road, Railway Station. On the 26th of July he was seen close to the wharf by William Powell, the prosecutor’s foreman. He did not then say that he wanted any stone, but the foreman afterwards discovered that three pieces, value £1 ls., had been taken from the wharf by a carman named Dodd, acting under the prisoner’s instructions. Powell went to the prisoner’s house and made inquiries about the stone. The prisoner at once admitted that he had it, and said he meant to pay for it. For the defence it was contended that the prisoner, finding himself suddenly in want of stone, had, in the absence of the foreman, caused it to be taken to his place, meaning to pay for it afterwards. Witnesses were called who gave him an excellent character for several years past. The jury at first could not agree, but after having retired for about an hour, they returned into Court and found the prisoner “Not Guilty.”

SCULPTORS AND TITHES.—The tithe question, which is pressing hardly upon some of the farmers, has been raised in the Midlands by Mr. John Roddis, of Aston. The present vicar, the Rev. W. Eliot, in October last, instructed his solicitors, Messrs. Rowley and Chatwin, of 11, Temple-row, Birmingham, to make application for the payment of the tithe due for the year then passed, and amongst others to whom such application was made was Mr. John Roddis, sculptor, of Aston-road, whose studio is erected on land belonging to the Rev. F. Smith, vicar of St. Mary’s Church, Aston Brook. The amount demanded of Mr. Roddis was £1 6s. 4d., but he declined, on conscientious grounds, to pay the money, and wrote to the vicar to that effect. Matters went on until about three months ago, when another demand was made for the tithe, and this not being heeded, the Rev. W. Eliot, a fortnight ago, caused a notice to be served on Mr. Roddis, informing him that unless the tithe was paid within ten days, together with 2s. 6d., the cost of the notice, he should distrain “upon the land and premises in his occupation, and dispose of the distrain when taken.” This notice expired on Thursday last, and as Mr. Roddis still refused to pay the charge, instructions were given to a local firm of auctioneers to make a distrain on his goods. Accordingly, at eight o’clock on Wednesday morning, the auctioneers, attended by a couple of bailiffs, drove in a furniture van to Mr. Roddis’s studio for the purpose of making the seizure. Before commencing proceedings they made a formal demand for the money—viz., £1 6s. 4d. the tithe charge, 2s. 6d. the cost of the notice, and 5s. 6d. the expenses connected with the levy, in all £1 14s. 4d. Mr. Roddis was not in at the time, but a messenger was sent for him, and upon his arrival he declared his refusal to pay the money, and said the bailiffs might make the levy. Before his arrival a large crowd had assembled in the immediate vicinity of the premises, and they were extremely demonstrative in manifesting their disapproval of the proceedings. Mr. Roddis cautioned

the officers against removing any valuable carvings which would be likely to sustain damage in transit to the sale-rooms, and they intimated that rather than run such a risk they would seize some rough stone, of which there was a considerable quantity. In the yard were some blocks of marble which had not been worked, and having been shown the invoice of their cost, the officers elected to take these. The crowd, however, pressed round the van in such numbers that the bailiffs found it impossible to carry out their object unaided; and as none of those present would lend a helping hand, nothing remained but for a bailiff to be left in charge whilst the others went for assistance. The crowd gradually dispersed, but some of them watched for the return of the augmented staff of officers and when they put in an appearance in the afternoon the people flocked to the place in even greater numbers than before. This time four other bailiffs were brought, making six in all, and they were enabled, after some little jostling, to place the blocks of marble, three in number, in the van. The crowd were very noisy; but Mr. Kelly, Mr. Roddis's manager, appealed to them not to interfere with the officials, and eventually they allowed the bailiffs to drive the van away. Before dispersing the crowd gave three cheers for Mr. Roddis, and groans for the Vicar. One man, who was carried away by the excite as to use threats to the bailiffs, and to be otherwise violent in his conduct, was taken into custody by the police. Notices were served on a number of persons informing them that a distraint would be levied on their goods unless the title was paid in ten days' time; but, so far, no attempt has been made to put the notice into effect.

WATER SUPPLY AND SANITARY MATTERS.

THE POLLUTION OF THE LOWER THAMES.—Mr. C. Wilson, Cheltenham, writes to the *Times*, making some brief suggestions towards the more satisfactory disposal of the drainage of London. He says:—"The first essential element would seem to be the separation of the storm-waters from the house-drainage, the former being discharged as soon as convenient into the Thames. Considering the tidal and other currents, such discharge could not become a nuisance; but wherever solid matter is discharged into the river, as at present or as hereby proposed, dredging may be requisite. If the solid matter were strained from the house-drainage, as it now is from the sewage at the Abbey Mills pumping station, the fluid portion could be lifted at intervals, by steam-power, to such levels as to reach land suitable for irrigation. It is found profitable to raise the present diluted sewage 30ft. to enrich the farm near Barking. The house-drainage alone, being of a more enriching character and more uniform in quantity, could probably be raised with profit to the height required to command suitable soil. If the cost were too great, London can well afford to supplement the outlay. It should be borne in mind that sewage irrigation affords double profit on a sandy or gravelly soil as compared with a clay soil. The present method of disposal of the London sewage is not only wasteful of enriching matter, but a foul blot on our civilisation. If the drainage of towns were properly utilised we need not import nearly so much meat and other produce as we are now doing. We thus submit to a great loss and permit an intolerable nuisance."

STATUES, MEMORIALS, &c.

BURSLIM.—On Wednesday week a new drinking-fountain was uncovered at Burslem. The fountain, which has been erected at the cost of the mayor (Mr. J. Maddock), is placed on three tiers of Kerridge stone. The height of the structure is 16ft. from the ground and 11ft. 6in. from the top of the three tiers of stone. The apex consists of a globular gas-lamp, and is supported by a fluted column, at the base of which are two dolphins entwined. Below this is a canopy 5ft. 6in. square, supported by four pillars with foliage capitals. The structure has been supplied by the Coalbrookdale Iron Company, and has been erected under the superintendence of Mr. Worth, the borough surveyor.

MEMORIAL OF THE LATE MR. ROEBUCK.—Shortly after Mr. Roebuck's death in 1879 a committee was formed of his principal friends in Sheffield to raise funds for the erection of a memorial to the right hon. gentleman. It was decided to erect a monument over his grave in Rushy Churchyard, North Ebbw, and to subscribe for a marble bust, to be placed in the Cutlers' Hall, at Sheffield. The presentation of the bust to the Cutlers' Company took place on Tuesday. The bust is the work of Mr. W. Ellis, a local sculptor.

Our Office Table.

We have received from the Science and Art Department the following list of candidates who have been successful in obtaining Royal Exhibitions of £50 per annum each for three years, and free admission to the Course of Instruction at the following Institutions:—(1) The Normal School of Science and Royal School of Mines, South Kensington and Jernyn-street, London. Thomas Mather, 21, pattern-maker, Manchester; Alfred Sutton, 21, engine-fitter, Brighton; William H. Littleton, 17, student, Bristol. (2) The Royal College of Science, Dublin. Arthur Whitwell, 19, ex-pupil teacher, Nottingham; Frederick J. Willis, 18, student, Bristol; Christopher J. Whittaker, 21, pattern-maker, Accrington.

The construction of another great Alpine tunnel, which should bring Paris and the north of France into more direct communication with Italy than is afforded by the existing tunnel through Mont Cenis, is under consideration with the French Government, the projects including not only one through Mont Blanc, but also through the Simplon or the Great St. Bernard. The tunnel under the Simplon would be 60,719ft. long, while that under Mont Blanc is only 41,292ft. As compared with other Alpine tunnels, Mont Cenis is 40,093ft., and St. Gothard 18,952ft. The Simplon would, therefore, be longest of all; but, on the other hand, it would be on a lower level than the others, the entrance at Brieg being only 2,333ft., and that at Iselle 2,253ft. above the sea-level. The entrance to Mont Blanc tunnel would be 3,345ft. at Montquart and 4,215ft. at Entrèves above the sea-level. The Bardonnèche entrance to Mont Cenis is 3,970ft., and that at Modane 3,799ft., while in the case of the St. Gothard tunnel the northern entrance at Goeschenen is 3,638ft., and the southern, at Airolo, 3,756ft. above the sea. Thus the Mont Cenis tunnel is shorter, but 330ft. higher, than the Mont Blanc, while the Simplon would be about half as long again, but about 1,000ft. lower. Supposing that the operations would be conducted at the same rate as they have been at St. Gothard, the boring will take 4,218 days, or, working at both ends, 2,109—nearly six years. The total sum for the execution of the work is estimated at 45½ millions of francs (St. Gothard having cost 54 millions).

A SPEECH delivered by M. Turquet, the French Minister of Fine Arts, at the opening of an exhibition at Lille, is interesting with reference to a recent discussion in the House of Commons, to which we alluded on p. 189, ante, as an illustration of the manner in which the question of State aid in provincial art schools and museums is understood in France. In 1870 the number of French art schools was 20; in 1880 it was 250; it will exceed 300 in 1881. But the Government is not content with this, the object which it puts before itself being, according to M. Turquet, no less than the introduction of drawing as a compulsory subject into all primary schools without exception. Along with the great development of art education must naturally go a development of the means of the higher art culture—that is, of museums. Of the expenses of provincial museums "the Government will bear a considerable part. But you must do your best to help yourselves from the first; then we will do the rest." Here the true principle of self-help to be followed by State-help is succinctly stated. The one does not go without the other, but in France at all events the one follows the other.

PROF. EMERSON REYNOLDS describes a process for the protection of lead against corrosion, which is done by coating it with a film of sulphide of lead. He recommends the following method:—Take 16 grammes of solid caustic soda, dissolve it in 175 litres of water, and add to the liquid 17 grammes of nitrate of lead, or an equivalent of other lead salt, with 250 cubic centimeters of water; raise the temperature of the mixture to 90° C. If sufficient lead has been added the liquid will remain somewhat turbid after heating, and must then be rapidly strained or filtered through asbestos, glass-wool, or other suitable material, into a convenient vessel. The filtered liquid is then well mixed with 100 cubic centimeters of hot water, containing in solution

4 grammes of sulpho-urea or thio-carbamide. If the temperature of the mixture be maintained at about 70° C., deposition of sulphide of lead or galena, in the form of a fine adherent film or layer, quickly takes place on any object immersed in or covered with the liquid, provided the object be in a perfectly clean condition and suitable for the purpose. When the operation is properly conducted a layer of galena is obtained which is so strongly adherent that it can be easily polished by means of the usual leather polisher. It is not necessary to deposit the galena from hot liquids; but the deposition is more rapid than from cold solutions.

ANOTHER culprit has been sentenced to seven days' imprisonment for knocking off the "doll's heads," as the presiding alderman called them, on the Temple Bar memorial. The damage done amounts to one shilling, according to the testimony of one of the clerks from the City architects. Some member of the Court of Common Council might profitably move for a return of the expense to the Corporation, up to the present time, of protecting this precious specimen of civic art. The Griffin must have cost already, for police supervision, as much as a dozen ordinary bad characters.

MR. SEYMOUR HADEN has half made up his mind to go over to America, possibly in August, 1882, to repeat there the lectures on etching previously delivered in England. He also thinks of publishing these lectures in America. "No man," says the *American Art Review*, "would meet with a more cordial welcome than Mr. Haden, should he conclude to carry out his plans, and his coming would no doubt be a most powerful help in forwarding the movement which he and those who are interested in etching in this country have so much at heart."

The first sod of the Charnwood Forest Rail was turned on Wednesday by Lady Alice Packe, daughter of Earl Kimberley, at Loughborough, Leicestershire, in presence of a large company of spectators. The line will be eleven miles in extent, running through Charnwood Forest from Loughborough to Coalville. It will open up the collieries and the granite and sandstone quarries which abound in the neighbourhood. Lady Alice Packe was presented with a silver spade with which she turned the sod, amid cheers. The line will be completed in eighteen months.

It is proposed by the Viennese Society of Artists to open, from April 1 to September 30, 1882, in their enlarged galleries at Vienna, an exhibition of the chief works of national and foreign art that have been produced since the last great exhibition of 1873. The exhibition will comprise works of architecture, sculpture, die-sinking, painting, and drawing, as well as those of the various arts of reproduction. The Imperial and Royal Government, which has encouraged the undertaking with its warmest patronage, has notified its intention of giving prize medals to the most prominent of the exhibitors under the award of a jury.

The autumn exhibition of the Birmingham Royal Society of Artists opened its doors to the public on Monday. It is the largest, and in many respects the most interesting and generally attractive which has yet been held, thanks, in great measure, to the large proportion of noteworthy pictures from London and other exhibitions, which have been liberally lent by the owners for the enrichment of the collection. Among these special benefactors may be named the President of the Society, Sir Frederick Leighton, who sends the portrait of himself, painted by Dupuis, which formed the last Academy Exhibition, and Mr. Millais, who is represented by his "Sweetest Eyes were ever seen," from the late exhibition at the Grosvenor Gallery. Including some 150 water-colours, the exhibition comprises altogether 910 works.

MARBLE is generally considered to be a very rigid material. A remarkable case, however, is given by M. Guebbard, in *La Nature*, in which a marble slab at one side of a door in the Alhambra of Granada has been bent considerably out of position by superincumbent weight, without breaking. The slab is 3 metres high, 235mm. broad, and 64cm. thick. The greatest separation is about 8cm. It would be interesting to know how the slab would behave if the pressure were removed.

THE BUILDING NEWS.

LONDON, FRIDAY, SEPTEMBER 9, 1881.

ARCHITECTURAL COHERENCY.

AS we admire a literary composition because it is coherent and well knit together, or dislike it because it is loose and inconclusive in its method and arrangement, so in the same sense we can justify our admiration of a building which is well bound together, and which, if large, affects us as much by its continuity and appearance of sustained repetition as by the actual beauty of its details. Somehow, whenever we see a structure in which its architect has been trying to do his best to bring as many different fancies as he can together, and to show us the exhaustless resources of his imagination, we are inclined to put the attempt down to a conscious weakness of purpose and intention. A building of this sort only impresses us by its size and the vanity exhibited in attempting to foist upon us foreign features to make amends for the paucity of invention in the plan and distribution. As these forms have all been brought in and engrafted upon the plan, so we may be sure the plan, to that extent at least, has been rendered weak. Exactly the same effect occurs when foreign idioms and phrases are dragged in, head and shoulders as it were, into our vernacular without a due correspondence of meaning. It is impossible to carry a tangible line of thought or of design through the composition or the structure, because no distinct conception has been formed or worked out with integrity and honesty by its author.

To explain more practically what we mean by coherence in architecture we may consider a few of the terms used by architectural writers from Vitruvius downwards to designate certain qualities of design which have reference to the general relationship of the parts. Vitruvius speaks of "disposition" (*dispositio*) and "order," besides "eurythmia" and "proportion"—terms which express definite ideas, though they partly overlap one another.

The late Sir Digby Wyatt, in his *Slade Lectures on Fine Art*, discusses what we here call cohesion in speaking of Vitruvius's third quality of architecture—namely, "Order," as one which he interprets style; and we here quote what Sir Digby Wyatt has said of it. "To proceed to design without determining style is to waste both time and invention, since, as it is obvious that an expression of unity of thought should be manifested in the completed work, unless a certain definite mode of using materials which we understand as style is determined upon and adopted as a rule throughout our subsequent operations of thought, the work will be but a medley, a thing of shreds and patches." Style, however, does not exactly express what we mean by cohesion, and the same writer qualifies the sentence we have quoted by stating that what the Greeks "understood as order became a much more coherent and imperative principle than anything equivalent to what we can understand as style." Though the Doric and Ionic represent two distinct styles of Greek architecture, we are truly impressed more with their points of resemblance than difference, and we owe this sense of harmony to the orderly arrangement of the parts of each of these styles. The author, indeed, we have mentioned expresses the hope that, great as the differences may be between the styles in which we work, "time may so reconcile our varieties of practice as to give an appear-

ance of cohesion and harmony of principle to our system of architectural progression by antagonism." The diverse styles which the modern architect employs make him indifferent to follow in his work any definite mode of using materials. In working in so many forms he cannot, or will not, see that there is a system or grammar to each, and we are thus constantly witnessing the most astounding mixtures of structural expression. But the Greeks had another principle called by Vitruvius "Eurythmia," which architects in the present day no more care to understand than the ordinary letter-writer troubles himself about the meaning of the figure of speech called metonymy. Eurythmia simply meant the succession and grouping of parts; it was, in fact, a kind of measure of the parts of a building, an equivalent idea to measure in music. Although this term would be regarded by most artists in the present day, as expressing an abstract or ideal refinement of no practical value whatever, the Greek architect used it to express precisely the same thing or quality which the modern architect regrets the absence of when he says a design or building is wanting in harmony.

There are certain distinct methods by which a design may be made coherent. The most important is continuity or repetition of features. If we take a long façade, we say the design is coherent when the same parts are repeated throughout, not necessarily in consecutive order, but when the same series recurs at intervals—as, for example, a series of windows, or a tower, or roof; and one of the best modern instances of this continuity or repetition is to be seen in the river-front of the Houses of Parliament—a design which, whatever may be its faults in excessive elaboration of detail, is thoroughly coherent in its composition. For instance, the angle-towers balance the ends of the river-front of the palace, while the same form of window-bay is repeated, though broken in the centre by a variation, which prevents the appearance of monotony. The general horizontal lines of tracery and stringcourses and panels between the windows are continued; yet we do not feel burdened by a sense of mere mechanical balance of feature when we take into view the Victoria Tower of dominant height and size at one end, and the variety of forms of central lantern and Clock Tower, which destroy anything like monotony in the composition as a whole. All artists who love to paint the scenery of the Thames tacitly acknowledge, at least, the artistic grouping and outline of the Palace at Westminster; they all like to show its broad masses of gable, turret, and tower against the sky, and they all prefer to obliterate its detail by shadow, or to show it under the thick veil of mist and smoke in which it is generally enveloped. In spite of its wearisome detail, it is coherent. To take another admirable example—the river-front of Somerset House—we may notice the same continuity of line and feature, but broken at intervals by the porticos into a composition of an extremely rhythmical kind, a sort of regulated succession, such as we observe in musical composition, being evident. The whole secret of designing coherent façades of any length depends on carrying out an analogous succession or measure to that we find in music, where there exists a certain timed movement; to attempt here to lay down any precise rule of harmonic ratio, as some have done, would be out of place and unnecessary, as every architect with any artistic sensibility knows how to vary his features in pleasing proportions, an expression or part of the elevation being caught up, repeated or emphasised at intervals. There is a law of interchange and symmetry which an artist understands, though he may laugh at the term and prefer his own mode

of expression to it. Coherence can also be obtained by emphasising certain features preserving a symmetrical arrangement or balance of them, and it would be useless to enumerate examples of this principle, which seems to be expressed by the law of unity in variety.

In narrow lofty elevations of street houses the principle must be looked for not in horizontal lines and repetitions, which of course are extremely limited, but in the vertical direction. We frequently find that a number of strongly marked horizontal divisions, accompanied by a varied design of window in the several stories, destroy the coherence of a front. The parts are piled up one over the other, and as they present no similarity in the forms and details, there is a painful sense of incoherency. Attention to the division of the stories, strongly marking the basement by a cornice and then defining with less strength the divisions of the upper stories, till we come to the main cornice of the façade, at once removes the disagreeable sense of the "piling up of agonies" we often see in street-fronts. It may also be found that by repeating the same form of window, though of different proportion, in the middle stories, a vertical continuity is preserved, the composition seems to grow upwards, and does not appear to have the disconnected piecemeal effect it would have had if the strings and cornices were all equally spaced and emphasised. All good Classical or Italian buildings observe this rule even when stories are marked by distinct orders of columns. It is easy to vary the proportions of the height of order and the projections of the cornices by breaking back, &c., and to so vary the succession of window design, that vertical homogeneity or connection is not lost sight of, and in the best works of Italian and French Renaissance the vertical features were so well related that the composition seems to be a succession of well-marked bays, the piers, or pilasters being more prominent than the horizontal lines. One may see the want of this quality of design in any of our streets. Cheapside abounds in examples of incoherent jumbles, and so does Oxford-street, Fleet-street, and the Strand, though it would be a vain wish to expect any approach to architectural consistency under leasehold tenure.

In tower designs cohesiveness is of great importance. Very many costly towers have been spoilt by an incongruous piling up of stories, having nothing in common to lead the eye upward, and the designs *in esse* and *in posse* we have seen for towers in buildings for municipal purposes frequently suffer from strongly-marked divisions. Mr. Street has instanced the campanile of Giotto at Florence as showing a rhythmical principle in the division of the seven principal stages, which are not regular but arranged in groups. The upper stage here is equal to two of the under ones, which are coupled. Enough has been said to indicate the value of the principle held so tenaciously by both the Greek and the Gothic architects in their best days. Modulation with them was something more than a mere fancy; it was a system reduced to something like scientific rule, by which the parts were related to one another by gentle approximations so as to avoid discordance and to produce a pleasing gradation, either from the basement to the summit, or through the whole length of a composition.

TOWN DWELLINGS AND WAREHOUSES, AND THEIR DANGERS.

TWO or three serious fires, one attended with fatal consequences, and the others leading to a disastrous conflagration and loss of property, have again given us warning of the dangers to which householders

in towns are constantly exposed. Even the regulations of the Metropolitan Building Act are impotent to render a house in a dense thoroughfare safe from the risks of fire; and it is not very assuring for occupants of the upper floors of town dwellings to be so constantly reminded that they stand a poor chance of escape in case of a fire in the lower part of the premises. When the only means of escape can be so very easily cut off as to render descent impossible, the owners and builders of houses in streets can derive but trifling advantage from fire-resisting party-walls, and other precautions found in the miscellaneous provisions of the Building Act. To confine a fire between two party-walls, and to make it impossible for a fire breaking out in one property from imperilling the adjoining houses, is, nevertheless, a great point in the construction of towns, and this practical limitation of risk is what has given the metropolis a guarantee of security not enjoyed by many large cities. It is some satisfaction for an adjacent owner to know that in case of fire next door he stands little risk of having his property destroyed, and he feels contented if the only inconvenience he suffers is the breaking of a few window-panes, and the damage done by heat and water to a part of his stock. He places some confidence in the rule which makes it incumbent on the builder of every party-wall, that the said wall shall be carried up above the roof or gutter of the highest adjoining building to a height of 15in., measured at right angles to the slope of roof; and he believes that no timber has been placed within ignitable distance of any flue, and that all combustible materials have been shielded from harm. But with regard to what happens between his own walls he has not any protection whatever. If a fire breaks out in his cellar or in any part of his premises, he is completely at the mercy of the fire-brigade, and their vigilance is the only chance he possesses. We are of course alluding to houses built in the ordinary manner, and where a staircase, generally of wood, is the chief communication between the several stories. Built in the manner the usual dwelling-house is, there is no possible check to the progress of flames upwards through the opening of the staircase well-hole. It forms a shaft fed by the openings below, and the fire originating in a lower room naturally finds its way through it. The recent case of the fatal fire at Notting Hill, which occurred a few days ago, affords an instance of the manner in which a dwelling-house and its inmates may fall a prey to a fire accidentally kindled below the staircase, which ought to have been capable of being easily extinguished. In the house in Blagrove-road the fire originated in a cupboard which it appears was immediately beneath the staircase, and although at first confined to a small space, the efforts made by the affrighted inmates were quite unable to subdue or even check the flames, which ascended the staircase and burnt out the interior. As this house was constructed in precisely the same manner as thousands of dwelling houses in towns, we may take it as a typical instance of the danger to which occupants are daily exposed. It is hardly flattering to our knowledge of scientific construction to suppose that a fire of this kind could not have been easily placed under control if the proper means had been adopted to confine the flames. Cupboards under staircases used by several tenants are, under the best of regulations, liable to accidents through the mischief of children with lucifer-matches, or the carelessness of persons who enter often with lighted candles. Even in private houses the small cupboard often under the first flight is a dangerous receptacle for combustible materials with which they are frequently stored. But why should they be the lurking-places of a foe so formidable? Why should builders

still go on erecting houses by the row and making closets under stairs, without the smallest precaution to protect the woodwork of the main access, also the means of escape to the whole house? When a lighted candle is taken into a closet of this kind it is sometimes left on a shelf, or its flame is brought within a few inches of the most inflammable part of the interior. Naturally dry, ignition is only a question of a few moments; a spark may be left which is speedily fanned into a flame by the draught. But there is no by-law or regulation which makes it imperative on builders to construct staircases with fireproof materials, or to protect from ignition the underside of wooden stairs. In nearly all dwelling-houses of a low rental, we seldom find plaster ceilings to the lower flights; the bare risers and treads are left without protection just at those parts at which the chances of danger from fire are the greatest. The only section which refers to accesses and stairs in the Metropolitan Building Act (sect. 22) applies to public and other buildings which contain a larger cubic space than 125,000 cubic feet, such dwelling-house being used for separate families. In such dwellings, the lobbies, corridors, passages, and landings, also the stairs, are provided to be of "stone or other fire-proof material," carried by fire-proof supports. Now, an ordinary four-story dwelling-house would not contain 10,000 cubic feet, and to houses of this class, numerous as they are, as well as to others of much larger size and accommodation, the rule does not afford any help. Here there is undoubtedly a serious omission in the Act, and one which needs attention; and we think that every town dwelling-house should be built in such a manner that its entrances, lobbies, passages, and staircases, should not only be made between brick or other incombustible walls; but that the stairs and the landings at least should be constructed of fire-resisting materials. The wooden stair, with its closet under, filled up with matchboarding, ought not to be possible; and it ought further to be required that for dwellings intended for separate families, whatever the cubic contents, the floors dividing the stories should be constructed of concrete or iron joists. There is the "Dennett," and one or two other systems of flooring, which would be quite as inexpensive as good flooring of timber; while dwellers in large town houses would then sleep in peace, without the disturbing fear that a careless lodger or tenant below him might have accidentally left a light below the staircase, or ignited the curtains in his own room, and have cut off the only chance of escape. The risks of living on the upper floor of a four- or five-storied house, as ordinarily built, with other tenants below, are great indeed, in London; but these would be considerably diminished or entirely eliminated by requiring that every story should be so independent of those above and below it, that in case of a conflagration, its occupants and furniture might at least be saved from destruction. We are sure houses of this class would pay a good return for the additional security to life and property guaranteed, and the saving in insurance would more than compensate the owners.

To take a second recent instance: The extensive destruction of property in Cheapside last week affords another startling proof of the imperfection of our building regulations in the construction of fire-resisting warehouses. People gaze up into an empty, fragile shell of burnt and crumbled stonework held together in a very feeble manner by a few wrought-iron plate-girders, and wonder that of all the apparent solidity of the structure but lately reared at the corner of Cheapside and Bread-street, it is the only surviving witness. Well may a bystander, looking at the ruins, inquire, Where are the inside walls—surely there must have been

apartments? The eye, at least, sees none, but pierces through large openings which make the small piers and mullions look like the bars and rails of a huge iron cage. The surface of window and glass is so great as to appear out of all proportion to the flimsy piers and the connecting lintels of stone which constitute all that remains of a once large building of five or six stories in height. In such a serious and alarming conflagration which lit up the City last week at the corner of Cheapside and Bread-street, the whole interior of a large wine and spirit warehouse was burnt out in a remarkably short space of time. The party-wall on the west side looks intact, and but for this barrier the fire must have extended its ravages to other similarly-built premises. On the east side, facing Bread-street, the frontage of stone is calcined to such a degree that it presents quite a crumbling mass of ruin; the pilasters which divided the window-openings and the carved entablatures are completely undistinguishable; the angles and surfaces have everywhere crumbled away, leaving a rough core of stone that looks as if it had become disintegrated from time and the weather. The remaining piers and entablatures are held together by the cross iron girders, but the whole has so very tottering an appearance that the authorities have wisely closed the side thoroughfare and barricaded a considerable area of the roadway in Cheapside. We simply allude to this case to show that it is possible for a large building to be completely gutted by fire in spite of building rules, and to positively endanger property within a few feet of it in the street adjacent, which has seriously suffered. The first thing which strikes the spectators of the ruin is the large superficies of window-openings to the solid parts of the walls, the openings amounting to nearly three-fourths of the entire area, and the small size and area of the piers, which are only prevented from falling by the horizontal lintels and arches, and the cross plate girders. Had the windows occupied the usual proportion of the wall area, the burning and scorching of the adjacent property would have been much less than it is, and the fire would have in all probability inflicted little external damage. Then the rapidity and completeness with which the flames have swept away every thing from basement to roof, leaving only a few iron beams, columns, and principals, leads one to the conclusion that the enormous space presented nothing to interpose or check the progress of the flames from the place where they originated. Apparently, at least, no wall of brick is seen; and on this point we are led to inquire if other buildings used for warehouses in the City are similarly constructed? There is a wholesome rule which provides that every warehouse or building wholly or partly used for trade or manufacture, should contain not more than 216,000 cubic feet; that is to say, that larger buildings shall be divided by party-walls. Unfortunately, as we have said before, we have no proof that this rule is vigilantly enforced in some cases, and the meaning of this rule has unfortunately been interpreted in different senses, as in one or two decisions we find the courts have sanctioned openings in party-walls above the roofs of town-houses. But what we desire to say here does not concern the "imperforate party-wall," a principle which is rightly adhered to in most cases, and has often prevented conflagrations of an alarming character. Our contention now is that huge warehouses may be built, conforming in all respects to the letter of the Building Act, yet virtually without any real fireproof qualities whatever. We know how large blocks of buildings, intended partly for warehouses and partly for

offices, are built. No definite internal arrangement is made or partitions constructed; the floors are let to the best bidders; and the entire area, apportioned in the most convenient way, is decided upon after the main structure has been built; the consequence of which is each tenant of a floor has his match-board partitions erected, and the whole interior within the four walls is at the mercy of an accidental explosion, gas-escape, or carelessly-thrown light. As a poor and worthless subterfuge, the floors may have iron girders; but these are only introduced for structural reasons, and the rest of the floors being of wood instead of concrete, the fire, if one breaks out, cannot be confined to its immediate quarter. What we say is, large buildings can be erected with adequate means of security, as we recently showed in the case of the stores in the Haymarket, by staying the spread of flames from devastating the whole building, and it is not too much to expect a Building Act to cope with cases of this kind, instead of allowing buildings to be erected which are really little better than huge tinder-boxes.

With regard to the question of the danger of stone becoming calcined and the area of window-opening, the recent case we have referred to might be profitably considered in future erections. Another element of danger is here added. A well-built brick warehouse, though with numerous openings, is known to stand without any serious damage, though the interior has been burnt out; but in the building in Cheapside the standing masonry is only prevented from toppling over by the few iron ties which connect them at the floors. The stone on the east side has been reduced to quicklime, and has suffered in a manner which would hardly have been expected, and the whole will probably have to be rebuilt. The piers look decidedly small and fragile since the fire, and they can scarcely be designated as portions of wall. Their surface at least was insufficient to become an effectual barrier to the flames which shot up round them with marvellous rapidity, and enveloped both the front and back, so that an intense heat was brought to bear upon all sides of the stonework. Possibly the broken parts of cornice and piers on the east side may have been twisted off by the action of the heat on the lighter ironwork of the roof; we have here at least an instance of a fire which has left a very pathetic and instructive memorial of its ravages.

NEW FURNITURE AND DECORATION.

RECENT works in furniture and decoration indicate a decided departure from the heavy and somewhat crude forms which have had a considerable run of public patronage under the name of "Queen Anne." We have no hesitation in affirming that the style, both in building and decoration, has already seen its best days, and that the future artistic taste will be towards a rather purer form of art. Italian, and the style which in England took its rise from the Cinque-cento and Louis Seize, appear to occupy the attention of our leading manufacturers. Messrs. Gillow, for instance, Messrs. Jackson and Graham, Messrs. Holland, and other West-end firms chiefly work in these styles, and in a few years probably heavy Stuart furniture will be in less request than the French work of contemporary date. The very spacious and handsomely fitted-up showrooms of Messrs. Gillow contain some choice modern articles of furniture and decoration. We just allude to some beautiful Italian cabinets of inlaid work, which fill up one of their rooms. The Certosa work is superb, as may be seen in a handsome cabinet in that style, richly inlaid with ivory. Other cabinets, inlaid with marquetry of ivory, &c., are excellent

examples of the Certosino work. The fine scrolls and wire-stalked flower-work, and the conventional rendering of the artists of this school may afford useful lessons to modern inlayers. Some French work of modern manufacture in the Italian style, also of ebonised wood, inlaid with ivory arabesques, lack breadth, the details look overcrowded, and they ill compare with the Italian cabinet ornamentation. In decorative work the visitor to Messrs. Gillow will find much that will interest him. He will see both Italian and later styles of decoration. We need only mention a small room decorated in the style of the Adams Brothers, the ceilings and walls being relieved with light tints of grey and green. We notice a design for decoration to a picture-gallery at Great Malvern. There is a bold coved or lantern ceiling, with ribs of wood, and the plaster-work is to be relieved with scrolls and diaper-work in light tints on a grey ground, the patterns alternating. The walls are covered with a dark rich red or deep chocolate fabric. Painted woodwork, in the style of the 18th century, in a semi-Classic style, in which Pompeian arabesques are introduced, is another style of decoration which seems likely to be revived. The objection to decoration of this kind is that it is likely to fall into the hands of incompetent artists. Excessive and elaborate designs are reproduced upon every plain face of the woodwork, and all character and breadth become lost. Delicacy of feeling in design and colour and decision of handling are required to produce good results in painted decoration if we desire to emulate the work of Louis XVI.; and marquetry being only an art that can be practised for the wealthy, our artists of furniture may turn their attention to relief of this kind. It was, indeed, the cost of the cabinet-work of the latter period which has driven manufacturers to reproduce the sideboards, cabinets, chairs, and tables of the Stuart or Flemish style.

In the production of cheap furniture of artistic design, Messrs. Jackson and Graham, among other manufacturers, have endeavoured to meet the requirements of those who cannot afford to furnish their houses with Italian, French, or Chippendale furniture. They are making some very excellent buffets and other furniture of exceedingly simple design, the lines of the framework being relieved by plain flutings and moulded work. A buffet of this description we recently described, designed by Mr. R. W. Edis, and we now draw attention to the chimney-pieces of various woods, wall-panelling in painted deal; suites of bedroom furniture, made in pine, and stained green with black mouldings; some excellent painted bedroom furniture, all produced by machinery, at reasonable cost. A combined cabinet bookcase and cupboard is a useful piece of furniture, in good taste, and well suited for small houses, and instead of bad carving we have panels and other details of Japanese design introduced to give lightness, and variety. Fabrics for wall-decoration, hangings, coverings, and other purposes form another branch of decoration, which has made considerable progress. The "Lincrusta-Walton" and the more recent "Papyrotile" decoration we have only lately mentioned in favourable terms, and we must not omit improved textile fabrics. Those who want to see what English manufacturers have done to compete with foreign work of this class may take a glance at the exceedingly bold, fresh, and artistic designs for wall-papers, chintzes, embroideries, and hangings manufactured by Messrs. Morris and Co. Besides a really conventional treatment of foliage applied to surface, Mr. Morris's designs show a thorough feeling for harmonious colouring. We just have room to mention a bold wall-paper, with acanthus leaves and scrolls; another of chrysanthemums and poppies, a poppy-pat-

tern in gold on a light salmon ground, also printed in a rich red, and several admirable chintzes and carpets, all breathing an Oriental spirit, and of highly pleasing and harmonious colours. The patterns are all flat, the drawing is bold, yet refined, and the surfaces are well covered in a true decorative spirit.

We have this week inspected some new furniture manufactured by Messrs. Jenks and Wood, of 65, Holborn Viaduct, for a gentleman's residence. The designs have been prepared by the artists of the firm, and the furniture comprises bedroom suites, dining-room, library, and billiard-room furniture, besides hall-table, cabinet, and seat, in English oak. The bedroom suite is of Renaissance design, and includes some costly and handsome pieces of furniture, in which relief has been obtained by combining choice pieces of figured or burr walnut, with plank or straight-grained walnut, the lines of framing being brought out by ebony mouldings in a sort of French style. A large wardrobe comprising a pedimented centre with two wings has been executed in this manner; the doors and drawers below have panels of burr walnut, with straight-grain rails, and stiles relieved by ebony mouldings. The Arabian bedstead which is made to match has a large canopy carried by carved pillars and brackets of walnut; the footboard is very effectively relieved by the two varieties of walnut in panels on a framing of mahogany; and the top and ends are carved in a free and spirited manner. The toilet-table has also a mirror with broken pediment over, supported by carved brackets and small drawers. This piece of furniture has been constructed for a bay or oriel window, and no cost has been spared, as may be inferred when we say the table and glass are finished equally well on both sides. Below the table are pedestals with drawers, and the details and receptacles for nic-nacs have been studied as much for convenience as for elegance. In connection with this suite are cupboards for the bedroom-ware, also executed with the same thoroughness. Another choice piece is a circular table of large size in wood, stained to imitate ebony. The top is supported by four massive carved trusses, resting upon cross foot-rails. In the centre a massive vase-shaped pedestal, richly carved, rises from the intersection of the cross pieces and helps to support the table. For the same suite we notice a writing-table of quiet and sensible design with drawers.

An American walnut suite may be mentioned, for the spirited and thorough manner in which the style, Queen Anne, has been carried out, and we remark with satisfaction a pier or cheval-glass frame, executed and carved in the spirit of the style with a freely-curved broken pediment; a sofa-table with carved standards of elegant, rather Italian design, and an oval table of more English detail. A very handsome and massively-framed table, octagon in shape, made for the library, covered with leather, is noteworthy for the manner walnut and rosewood have been introduced. The moulded edge of the table is of walnut, with inlays of rosewood, and the supports of the table rest upon five pillar-legs, framed into cross rails. Four of these rest upon the ends of the rails and are solid balusters, the ornament being chiefly confined to moulded caps and bases, and inlaid rosewood flutings. The centre pillar is very massive, of octagonal shape, similarly relieved. The book-waggon, intended also for the library, has been designed in the same sort of 16th-century Italian or Elizabethan style, with the angle-pillars placed diagonally, and with a scroll-supported upper shelf. Among the other manufactured articles for the same house, we can only mention a very massively-designed hall-table and seat of English oak,

carried out in a thorough Elizabethan spirit, and evincing much knowledge and feeling of the details of that style. The seat has a plain back relieved with carved panelwork under a fluted-curved pediment-top from end to end; there is a carved frieze or band running below this, and the end arms are carved with grotesque lions. The legs are executed in the solid Tudor style, forming stout pillars with Ionic volutes at the top. The hall-table legs are also bulged in the same grotesque style, supported by carved scrollwork. In looking at the handsome hall cabinet, a bulky piece of furniture, in the same style, even a connoisseur might imagine he had before him a real piece of antique furniture. The massive pillar legs of the bulky type met with in furniture of this date, and common to the Stuart or Flemish character, supporting the massively-carved shelves, and the scrollwork top, are excellent reproductions of the details of this period, heavy and cumbersome perhaps, and yet so suitable for hall fittings. In a similar style is a handsome dining-room buffet, of brown oak, polished. It has a centre convex mirror and side tiers for china, besides richly-carved shelves for larger bronzes or pottery below. Surmounting it the mouldings are turned to form a circular pediment, the whole being crowned by a sort of attic, carved with bold leaf-ornaments at the angles. Carvings of birds and foliage fill up the pediments and spandrels of glass, which is further heightened in relief by gilt balls in a hollow moulding of the dark oak. Messrs. Jenks and Wood have also manufactured furniture for a billiard-room, in which the Elizabethan style and grotesque carving have been introduced; and we may speak highly of the general manner in which the furniture has been made to suit the rooms, of the ingenuity which has been exercised in introducing a perforated brass coil case for heating purposes below a table, so as to represent a centre pillar, and of the moderation and taste shown in preserving harmony throughout the house. The furniture, which has been manufactured by Messrs. Jenks and Wood from their own designs, at least serves to show that the public are beginning to prefer well-made solid furniture to the poor, feeble stuff we used to see in the warehouses a quarter of a century ago, and we note with satisfaction that the exceedingly crude forms of Jacobean and Dutch articles are beginning to be set aside by the leading firms of the trade for a kind of Renaissance treatment, which unites the best of the florid types of the 16th century with the common-sense, lightness, and elegance of the 18th-century taste.

RACK-RAILWAYS ON THE CONTINENT.

It will be remembered with what interest a few years ago the opening of the line from Vitznau up the Righi was regarded. Since 1873, when it came fully into operation, this line, so bold in design, and offering such splendid views without the concomitant of fatigue, has proved a great attraction to tourists, and up to the present, we learn, some six hundred thousand passengers and twenty-five thousand tons of various goods have been conveyed on it. Thus experience has completely sanctioned the enterprise, and any fears that were felt at the outset have been dissipated.

It is not wonderful, therefore, that the attention of engineers and the public generally has been attracted to the feasibility of applying the same principle of railway locomotion for ascent in various other places, and so saving the long detours and expensive constructions that are required for locomotives acting by mere adherence. Thus, several new lines of the same type have been

constructed on the Continent; in 1871, the lines of Kahlenberg, near Vienna, and of Schwabenberg, near Buda, the gradient of which is about 10 per cent; and in 1875, that of Arth, on Lake Zug, to the Righi, the gradient of which is about 21 per cent. These lines, designed chiefly for the transport of tourists, like that of Vitznau-Righi, are worked only in summer. They are furnished with a rack-rail throughout their length.

More recently (according to *La Nature*) M. Riggenschach, the director of the works at Aarau, whose name is now closely associated with the construction of rack-railways in Europe, has devised a new type of mixed locomotive, capable both of going like an ordinary locomotive, on the usual lines (by simple adherence), and of engaging in a rack-rail when necessary, on the parts of a line furnished with such a rail. Under these conditions it becomes possible to connect such lines with ordinary lines, and to construct them inexpensively, placing the line directly on the ground, and merely adding a rack-rail for steep inclines.

In this way have been made the industrial lines from Ostermündigen to Berne, that of Wasseraflingen, in Wurtemberg, designed for transport of ores and scoria, that of Rütli, in the canton of Zurich, and the line of Oberlahnstein. Perhaps the most important of all is the line from Rorschach to Heiden, which is a railway for permanent traffic, serving both for carriage of passengers and of merchandise. It is connected at the Rorschach Station with the line of Swiss railways which goes along the Lake of Constance. For some way it is on level ground, then it rises in a part furnished with a rack-rail, through some very picturesque scenery to the town of Heiden, well known to tourists, and also to invalids (for its whey-cure). The total length of the line from Rorschach to Heiden is 5 kilometres 600, and the average incline is about 9 per cent.

The success obtained on this line, which has been worked up to the present without any interruption even in winter, has recommended the application of rack-railways for connection of greater lines; and a serious investigation has been made with a view to constructing such a railway over the mountains of the Black Forest, from Fribourg to Neustadt, so as to connect the valley of the Rhine with that of the Danube. It has even been a question to apply the principle on the approaches to the St. Gothard tunnel. It is certain that the adoption of rack-railways, while involving great difficulties in the working of an important line, allows, on the other hand, of reducing the cost of construction in a very large proportion, for the cost of establishing the rack-rail hardly exceeds 30,000 francs per kilometre; and, on the other hand, the length of line to be constructed is very much reduced.

A locomotive with vertical boiler, designed by M. Riggenschach for the mixed lines with variable slope, is represented in *La Nature*. The form given to the boiler presents the advantage of diminishing the amplitude of oscillation of the water after passage from level ground to the incline; and the crown-plate is never uncovered.

The arrangement which is of primary interest in the mixed locomotives is that for transmission of the movement, which must vary with the nature of the way. The piston generally actuates an intermediate axle which, by means of wheels and gearing, transmits the force either to a drum catching in the rack-rail, or through a second false axle to the wheels acting by adherence. A clutch-system, ingeniously arranged, allows of changing the mode of action at will; but, in any case, the two transmissions do not act simultaneously; otherwise slipping would occur, the traverse of the smooth wheels on their rails being different from

that of the motor pinion on the rack-rail, supposing there is a slight difference in diameter.

In another arrangement adopted by M. Riggenschach, the toothed wheel is keyed on the axle of the wheels acting by adherence; but the latter then carries two supplementary wheels not keyed, which, in the parts of the line having a rack-rail, turn on special rails raised above the others, the adherence wheels then turning freely in the air, without hindering the action of the motor pinion.

M. Riggenschach's locomotives are all provided with an air-brake, peculiarly sure and efficacious, which prevents any dangerous acceleration in descent. The cylinders are then isolated from the boiler, and the pistons act by drawing air from the atmosphere; this is compressed into the admission-tubes, and given back into the atmosphere through a narrow orifice, which the engine-driver can open or close at will, so as to modify the retardative pressure as needed.

The entrance on the rack-railway from the level portion, in these mixed lines, presented certain difficulties, for it was necessary to stop the engine, and place (with the hand) the free end of the rack-rail under the toothed wheel, so that the latter should catch. By the arrangement now adopted, however, this passage is effected automatically, without shock, and without its being necessary to stop the engine.

The fixed rack is prolonged in a piece of rack which is mobile, and the teeth, instead of being simply steps riveted at their extremities in the two lateral cheeks, are supported on a continuous bar without cheeks. This bar is articulated to the fixed rack, and it rests on two springs, one laminated, the other spiral. Two lateral guides prevent deviation of the movable rack. By virtue of the springs, the movable rack yields softly under the impulse of the toothed wheel, which comes to engage regularly before reaching the fixed rack.

THE BRITISH ASSOCIATION.

THE Jubilee meeting of the British Association at York ended on Wednesday. The meeting has been a very successful and interesting one. Full reports of the best papers will be found in the *English Mechanic and World of Science*. We have, of course, only space to spare for a few extracts more especially pertaining to matters of interest to our readers.

BAROMETRIC PRESSURE AND SPRING WATER.

Mr. Baldwin Latham, M.Inst.C.E., F.G.S., F.M.S., read a paper before the Geological Section, the subject being the "Influence of Barometric Pressure on the Discharge of Water from Springs." The author of this paper mentioned that it was alleged by some of the long-established millers on the chalk streams, that they were able to foretell the appearance of rainfall from a sensible increase in the volume of water flowing down the stream before the period of rainfall. He had, therefore, undertaken a series of observations to investigate the phenomena, and he found, in setting up gauges in the Bourne flow in the Caterham Valley, near Croydon, in the spring of this year (1881), and selecting periods when there was no rain to vitiate the results, that, whenever there was a rapid fall in the barometer, there was a corresponding increase in the volume of water flowing, and with a rise of the barometer, there was a diminution in the flow. The gaugings of deep wells also confirmed these observations; for where there was a large amount of water held by capillarity in the strata above the water-line, at that period of the year when the wells became sensitive and the flow from the strata was sluggish; that a fall in the barometer coincided with a rise in the water-line, and that under conditions of high barometric pressure the water-line was lowered. Percolating gauges also gave similar evidence, for after percolation had ceased and the filter was apparently dry, a rapid fall of the barometer occurring, a small quantity of water passed from the percolating

gauges. The conclusion arrived at was that atmospheric pressure exercises a marked influence upon the escape of water from springs. The author remarked that the mineral constituents of water only varied very slightly from year to year, notwithstanding the volume of water which flowed.

Professor Prestwich, F.R.S., did not feel convinced that sufficient evidence had been supplied for the determination of the question; but he hoped that Mr. Baldwin Latham would continue his experiments towards the elucidation of this interesting point. Dr. J. Evans, F.R.S., however, believed that the author had brought forward sufficient facts to substantiate the theory raised. Mr. Bateman, C.E., agreed that barometric pressure had, to a certain extent, an influence on spring water issuing through absorbent strata like chalk. They must not forget, however, that the amount of water in wells must be influenced by the proportionate rainfall over a certain period. Professor T. McK. Hughes having said that hydrometric conditions would be exceedingly important in such an investigation, other speakers considered that the result of the inquiry would be of great public utility. Mr. Scott, of the Meteorological Office, considered that Mr. Baldwin Latham had proved his case. The only difficulty with him was how the Bourne in the first instance began to flow. Mr. Baldwin Latham said he had found no analogy whatever between water and the hydrometric state of the atmosphere. He had been led into this investigation by the fact that although Croydon took its water-supply from a chalk formation, it was visited with typhoid fever every ten years. He found that at an interval of every decade there were marked periods of low water, and these were marked periods of fever in the country. The underground water had an immense bearing on the public health of the country. If persons would take measurements in wells it would be found to be of great value with regard to sanitary results. The Bourne flow had nothing to do with barometric pressure: it was simply owing to the super-saturation of the North Downs with water.

YORK AND RIPON CATHEDRALS SAFE.

In the course of a discussion on a paper by Mr. Cameron on some remarkable land-shrinkages between Ripon and Hartlepool,

Professor Hull said that an uncomfortable feeling had sprung up in his mind whilst listening to the paper with regard to Ripon. It was fortunate for York that it was a considerable distance beyond the confines of the magnesian limestone formation. The formation did exist under York; but it was at a great distance from it, and was separated by other strata, and they might therefore assume that the York Minister was safe from excavations caused by underground waters percolating through the limestone. He would like to know if it was at all feared that an excavation was taking place under the Ripon Cathedral. At present while other portions seemed to be settling, the Cathedral still remained in its ancient magnificence. The Rev. W. H. Oxyer, Grewelthorpe, Ripon, said one of the holes at Ripon caused by subsidence was at first between 80ft. and 100ft. deep, and 200ft. in diameter, and the sides were quite perpendicular. There was, however, not much danger with regard to the Cathedral, as the pits were in a different line to the sacred edifice.

THE VIKING SHIP.

Mr. J. Harris Stone, M.A., read a paper before the Department of Anthropology on "The Viking Ship." He said that instead of an antiquated vessel with primitive-drawn lines, they found that the ship now lying at Christiania was a smart, trim-looking craft, built on what sailors would call beautiful lines, and well adapted for speed and general seaworthiness. It was difficult to believe that the vessel, which was well preserved down to the smallest details, was about 1,000 years old. It seemed, from the discovery of this ancient galley in such a perfect state, that the progress of mankind in ship-building had not been great. Mr. Stone said he had paid several visits to the ship, and had carefully examined her. After fixing as near as possible the probable date of the vessel by referring to the Viking period, he shortly alluded to the Frithiot Saga, and gave a few extracts bearing upon the ships for the purpose of showing the feeling of the people of the period towards the vessels, and also as explaining the

careful and thorough workmanship so clearly evinced in this ship, which was discovered at Sandefjord, in Norway, last year. The vessel was found in a mound, a Viking having been buried in her. It contained a sepulchral chamber, in which were found a number of loose articles, which Mr. Stone described. The discovery of the ship threw a light upon a dark period of history; and when they imagined such ships, manned by the Vikings, they no longer wondered at their inroads upon our coasts. Mr. Howarth said that last year he happened to be in Christiania, and paid a visit to the ship. The shields which were found on the ship were too thin to have been anything but part of the panoply of a funeral. He regarded it as fortunate that at last they had got an example of this kind; they had previously had a ship—which was in many respects similar in construction, and was found in Jutland—representing the Iron Age. It would seem to have been a burial rather than a case of a body having been burnt on a pyre; and, therefore, he concluded that it was probable that the burial took place after Christian times. Dr. Phéné pointed out that it seemed to have been by custom, and not by accident, that the ship was immured; but it was an accident that it was immured in blue clay, which preserved it. He regarded it as an open question whether this ship might not be attributed to Norsemen in some way or other.

INTRENCHMENTS OF THE YORKSHIRE WOLDS.

General Pitt-Rivers, F.R.S., read a paper on the "Intrenchments of the Yorkshire Wolds, and Excavations in the Earthwork called Danes' Dike at Flamborough." After describing the topography of Flamborough, he said that, assuming most of the low ground to have been occupied in prehistoric times by marsh and jungle, there would remain only the plateau land on the hills for the inhabitants to live upon; and here they found the ground covered with their remains, consisting of tumuli, pits, camps, and entrenchments, which perhaps were more abundant here than in any part of England, the Wolds having only recently been brought under cultivation. Much of these have already been destroyed by the plough, but they had been well delineated on the Ordnance maps, and it was important to consider the condition of things implied by the direction of the intrenchments before they had entirely disappeared. Flamborough Head and promontory must, of course, have formed the base of operations for warlike purposes in any case, whether they were with an invading or retreating force. In the former case it would be the first, and in the latter it would be the last, point occupied by any people at war with the inhabitants of the interior, its high cliffs precluding all possibility of attack from the sea, and leaving only the land side to be attended to. They would naturally expect to find an intrenchment facing westward, and occupying the first suitable position westward; and they found such intrenchment in the Danes' Dike—a misnomer, but not more erroneously named than others which were attributed to those pirates and ravagers of the sea-coast of England in other places. This dike ran north and south, a distance of two miles and a half from sea-cliff to sea-cliff, and at a distance of three miles from the centre of it to the point of the promontory. It had a ditch on the west or inland side, showing that the enemy was expected from that quarter. Its position appeared to have been determined by a deep but not very broad ravine, which ran from the interior southward into the sea, and protected the left end of the intrenchment for seven furlongs, or about one-third of its entire length. The west of the line of the dike was well chosen for defence, following the slope of the ground, so as to command a good view of land on the outside. There were twelve gaps through it, some of which, no doubt, were modern. The gap through which the road from Bampton to Flamborough passed appeared to be an old entrance, because the road there turned as if had been diverted in order to pass through the gap. The intrenchment was of nearly uniform height, being about 15ft. above the level of the ground, and having a ditch 60ft. wide on the outside. Of the defensive character of this intrenchment there could not be the slightest doubt; it was a work of great strength, probably surmounted originally by a palisade, and implying a large and well-disciplined force for the construction and defence of it. At Argam were found the remains of the great

earthwork known as the Argam Dike, running along the edge of the hills in the precise position for defence as they went inland from Danes' Dike. After further tracing the course of the intrenchment, the paper stated that a combination of circumstances, including its generally strong position on the side of the valley, the fact of its being the first position inland from Flamborough Dike, the position of the ditch—its strong flanks and general direction—united in favouring the opinion that the Argam Dike was in reality a defensive work, and not a mere road from Filey to Rudstone, though it may undoubtedly have served both purposes, both places being of great antiquity. Passing to the North Wold, there was found an intrenchment running along the escarpment of the Derwent Valley. It originally extended from Hummanby on the east to above Heslerton on the west, and guarded the North Wold hills from an attack from the Derwent Valley. A branch of this dike ran in a south-westerly direction from the high ground above Sherburn to the high ground at Linton, and there turned to the west along the hills to Thorpe Basset Wold, thus defending from attack by the north-west up the valley at Winttringham. But the most instructive portion of the whole district was the oolite range to the north of the Derwent Valley, which hills were cut up by deep ravines affording numerous strong positions for defence. After describing the results of a cutting into Danes' Dike in 1879, General Pitt-Rivers said from these discoveries they had evidence that the defenders of the earthwork used flint, and consequently that the work itself was not later than the bronze period, but that it was in fact of the same age as the tumuli of the Yorkshire Wolds. Whence did the people come who invaded the coast at this place? Having noticed the theories raised on this subject, he remarked that in his opinion the invaders of Flamborough—if invaders they were—were the same people who landed on the south and south-east coasts of England; or else, that these dikes belonged to the people of the country who, having imported the Bronze culture from elsewhere, were driven to the coast by another and more powerful race who occupied the interior, and that the defences under consideration were associated with their last occupation of the soil of Yorkshire. Further than that he did not venture to particularise. They had seen that notwithstanding the traditions which connected this place with the Danes, and notwithstanding the prevalence of a Danish element in the population of this county, this ground was the scene of the military operations of a much earlier people, who—though ruder in their culture—were much their superiors in the art of war, formidable in their means of offence and defence, and in the discipline necessary to construct the great works he had been speaking of.

ANCIENT DWELLINGS IN YORKSHIRE.

The Rev. E. A. Cole read a paper, prepared by Mr. J. R. Mortimer, giving an account of the discovery of six ancient dwellings found under water and near to British barrows on the Yorkshire Wolds. In the first dwelling it was evident that the work of construction had preceded the excavation of the trench, and was therefore older than the barrow. There were in the dwelling many streaks of burnt wood, a human femur, portions of an urn, and many animal bones. The second dwelling was within 30ft. of an oval barrow, in which were cremated interments. The third and fourth were of simpler construction, having no entrance passages, and consisted of nearly circular excavations in the rock, in which were found the bones of stoted deer and the urus. The fifth was of an entirely different type, consisting of an inner and outer circle of upright posts. In the centre of the two circles there was an oval grave, containing the flexed human remains of a large male. The sixth dwelling resembled the latter in its chief features.

CHEAP GAS FOR GAS-MOTORS.

Mr. J. E. Dawson read a paper on "The Economical Means of Using Cheap Gas for Gas-motors," in which he gave a description of an apparatus is referred to by us last week on p. 287, now in the Exhibition at York, for producing such gas. He said that the apparatus was small in size, easy to work, and gave a strong gas of uniform quality. For boiler and furnace work the gas could be used direct from the

generator; but where uniformity of pressure was essential, as for gas engines and burners, it should pass through a holder. The writer stated that a gas-engine driven with this gas would cost about 15 per cent. less than with the use of coal-gas at 3s. per thousand cubic feet, and about 17 per cent. less than a steam-engine. The most striking feature, however, he pointed out to be that with a steam-engine consuming 4lb. of coal per indicated horse-power, 217 tons of coal were required to give the same power as 32 tons converted into gas by this process, and afterwards used in a gas-engine. This represented an actual saving of 88 per cent.

Sir Fredk. Bramwell said that, having prophesied that in fifty years the steam-engine would be a thing of the past, he was glad to hear of another mode of utilising the energy residing in coal. The Otto gas-engine was an extremely useful machine, which could be worked with great economy; but the suggestions made by the writer of this paper bid fair to render the gas-engine still more economical. Unless great improvement was made on the steam-engine, there were many things to recommend the gas-engine. One was that it got rid of all possibility of boiler-explosions.

Mr. Heywood asked whether there was any way of getting a cheap illuminating gas by this process, as it would thus fill a great want. Mr. Dowson, in reply, said that he had not proposed to refer to the question of an illuminating gas, although he had succeeded by carburetting the gas in getting a lighting gas.

THE SERPENT MOUNDS ON THE SCOTTISH BORDER.

Dr. Phéné read a paper on "Scandinavian and Pictish Customs on the Anglo-Scottish Border." After adverting to the persistent retention of curious customs, and the handing down from generation to generation of the traditional lore of ages long past, the author of this paper referred to those which were corroborated by ancient monuments of an unusual kind still famous on the Scottish border. These consisted of sculptured stones, earthworks, and actual ceremonies. Quoting from former writers, from family pedigrees, and other documents, it was shown that the estates to which such strange matters, as follow, pertained, had been held alternately by those claiming under the respective nationalities or more local powers, and which, from their natural defensive features, must have been places of border importance earlier than history records. The district is occupied by the descendants, often still traceable—of Danes, Jutes, Frisians, Picts, Scots, Angles, and Normans; and by a comparison of several of the languages of these people, as well ancient as now existing, and also of the Gothic, it was shown in relation to a particular class of the most curious monuments, that the Norse "ormr," Anglo-Saxon "wyrm," old German "wurm," Gothic "vaurm," pronounced like our word worm; and the word "lint," or "lind," also German, and the Norse "liani," are all equivalent, and mean serpent; and in some cases the two words are united, as in modern German "lindwurm," and the Danish and Swedish "lindorm." On this apparently rested the names of some of the places having these strange traditions, as Linton or serpent-town, Wormiston or worm's (form's) town, Lillisham, the Furze serpent island, now Holy Island, &c., and also the various worm hills, or serpent mounds of these localities. It was shown that the contest like that of St. George was sometimes with two dragons, as shown on a sculptured stone in Linton Church, and on a similar stone at Lyngby in Denmark, in the barbyard, where there was a tradition that two dragons had their lair near the church. From these and other facts the author concluded that the contests were international; and in the case of two dragons, an allied foe, either national, religious, or both, was overcome. He showed from the Scottish seals, that Scotland used the dragon as an emblem, apparently deriving it from the Picts; that the Scandinavians also used it, and that these nationalities were antagonistic to the Saxon. In the time of David the First of Scotland the first great centralisation of Saxon power took place, and the powerful family of the Camyngs took, apparently by conquest, at least two of the localities having these traditions. And as the political object was to suppress the Celtic and Scandinavian or other local national feeling, there could be little doubt

that, however they obtained them, the persons dispossessed were of one or other of the Northern tribes. Hence, probably, the middle-age tradition of the slaying of the serpent or dragon, or the serpent or dragon bearer, on the Anglo-Scottish border. But he considered such traditions would hardly have originated through such conquests, had not previous marvellous stories existed of the prowess and conquest by the dragon (berrers) of the lands they invaded, all the wonders of which would be transferred to the conqueror's conqueror. Hence these stories were not to be set aside with a sneer, as in them was a germ of history, giving us, perhaps, the only insight we could obtain of the prehistoric customs and mythology of some of the ancient tribes of Britain. Earthen mounds, tumuli, standing stones, &c., still existed in some of these localities, with all of which the dragon serpent or worm was associated in the legends. The author then described his personal experiences in the still existing dragon ceremonies in the south of France and Spain, which were always either on the present national or former less important provincial frontiers, and which still formed the subjects of great ecclesiastical ceremonies. One of the high ecclesiastical dignitaries of the North of England—the Bishop of Durham—is in the position of having to take part in such a ceremony. Whenever a Bishop of that diocese enters the manor of Seokburn for the first time, the Lord of the Manor, who holds under the see of Durham, subject to the following tenure, has to present the Bishop, "in the middle of the river Tees, if the river is fordable, with the falcion wherewith the champion Conyers destroyed the worm, dragon, or fiery flying serpent, which destroyed man, woman, and child" in that district, and an ancient altar called "Greystone," still marks where the dragon was buried. The subject was illustrated with views of all the places referred to, on the Anglo-Scottish, French, and Spanish border countries, as well as drawings of the sculptures, funeral urns, and other antiquities belonging to each locality.

ON SOME OBJECTS RECENTLY EXHUMED IN BRITAIN OF APPARENTLY PHOENICIAN ORIGIN.

Dr. Phéné read a paper on the above subject. The places at or near which the objects were discovered were described as having in one case natural, in the other artificial, hillocks or tumuli of earth or stone simulating rude animal outlines. One of the localities was the vicinity of Dartmoor, the other that of the great serpentine mound, containing a chamber in the head, found by the author some years since not far from Loeh Ettive. In the first—Newton Abbot in Devonshire—had been found some years since, at a depth of 25ft. below the surface, leaning against a prostrate oak-tree, equally deeply buried, a rudely carved black oak figure, under two feet in height. At the last—North Ballachulish—a similar figure, nearly five feet high, including an attached pedestal. As to the simulation of animal forms, natural and artificial, both were referred to in America and in France, and in or near them in each such case had also been found figures somewhat similarly designed, but not in wood. But there were still existing figures in wood and stone of almost identical sizes and outlines in places long held by the Phœnicians, as Minorea, &c. A remarkable piece of evidently Assyrian sculpture found on Lord Mount-Edgcombe's estate in Devonshire, lent further probability, from its locality of once-Phœnician occupation, and necessarily of importation in exchange for export tin, of the object at Newton Abbot being made or imported by those people; and the bronze head of a cow found in a bog in Ireland, having the Phœnician emblems upon it, seemed a further example of their importation. The figure at North Ballachulish had a clearly Oriental feature. The eyes were formed of white stone inserted in the dark oak or ebony—and a recess at the base of the figure seemed evidently formed for a reliquary, and, with the sign of a crescent on the head, was pointed out by the author as a proof of its being an object for worship. This figure was also found at a depth from the surface indicating a date as far back as the Phœnician traffic; the thickness of peat under which it lay has been estimated at 12 feet. It was shown that North Ballachulish and Newton Abbot were both secure and therefore valuable harbours, and the gold of Sutherland and tin of Devonshire were sufficient inducements to attract

Phœnician traders. All the subjects were illustrated by drawings.

Mr. John Holmes called attention to a case of pottery from Cyprus, which was being exhibited in the Philosophical Museum. He would venture to say that three-fourths of that pottery was of Phœnician manufacture. Upon the oldest of that Phœnician pottery the serpent was distinctly marked, and there were figures like those exhibited by Dr. Phene. The section then adjourned.

UNDERGROUND WATERS.

In the Geological Section on Monday, the report of a committee appointed in 1874, with regard to the circulation of underground waters, was read by Mr. C. E. De Rance (of Her Majesty's Geological Survey), Secretary of the Committee. The results of the investigation of the committee show that the Permian, Triassic, and Jurassic formations of England and Wales are capable of absorbing from five to ten inches of annual rainfall, thus giving a daily average yield of from 200,000 to 400,000 gallons per square inch per day. The area occupied by the formations was, in round numbers—Permian and Triassic, 8,600 square miles, and Oolite, 6,600 square miles. These were capable of yielding 1,720 million gallons, and the lowest rate of absorption was 1,320, or united, affording a supply for 100 million people, or 39 gallons per head. Mr. De Rance then described the water-bearing conditions of the Yorkshire area.—Professor Prestwich, Dr. Wright, and Mr. Baldwin Latham having spoken, Professor Hull, the Chairman of the committee appointed to make the investigation, said that the results of its conclusion would be tabulated, and he believed they would prove of great value to men of science, engineers of towns, and all persons requiring water from underground sources.

EXCAVATIONS IN EPPING FOREST.

General Pitt-Rivers gave an account of some excavations in the earthwork called Ambresbury Bank, in Epping Forest. He said that there had in times past been much discussion respecting the camp in Epping Forest, owing to its being situated in the region in which it had been suggested that Boadicea made her last stand against Suetonius; but there was very little evidence to fix the place in connection with that event, which appeared to have been a great battle rather than a camp. The Epping Forest Natural History Club had taken the matter up, and it was at the request of its president that he had made some suggestions for the examination of the place. Within certain limits the investigation had established the age of the intrenchment, and that it was British; but if the society wished to settle the question whether the camp was erected before or after the Roman conquest, further excavation could alone decide the point.

ANCIENT BRONZE BUST, IMPLEMENTS, &c.

Professor Hughes submitted to the Anthropological department on Tuesday, a Roman bronze bust of a helmeted warrior, and pointed out that the face on the helmet was of a different type from that of the bust, being similar to that of the "Dying Gaul." The occurrence of that face on a Roman helmet had never before been recorded. Professor Hughes also exhibited some ancient bronze socketed spears from China, and made some remarks on a supposed inscribed stone near Llanerchymedd, in Anglesea, expressing the opinion that the marks were due to the structure of the stone itself.

THE TOWYN STONE.

Mr. J. Park Harrison gave a long description of some objects engraved on the Towyn Stone, expressing his belief that they were of late Celtic character, and that the rude figures represented articles which were deposited with interred human remains.

BRONZE IMPLEMENTS FOUND NEAR LEEDS.

Mr. John Holmes read a paper on certain discoveries of bronze implements in and about Leeds. He remarked upon the fact that the subject of bronze instruments was at present of great interest, as instanced in recent publications and research. He said the last discovery of a hoard was made at Carr Moor Side, near Leeds, in May last. These implements he exhibited, together with others, among which was a spear-head found at Thwaite-gate, at a depth of 20ft., in 1878. In 1846 a hoard was dis-

covered, in an unfinished state, at Churwell. These showed the process of casting, hammering, and finishing. He also exhibited other specimens found during the last forty years in a direct line of four miles. He likewise called attention to a fine dagger found at Lakelock in 1842, and a very significant celt found at Sandal Magna in 1852, of which Mr. J. Evans entertained a high opinion. Mr. Holmes compared this collection with implements found elsewhere, and said that the use and intention of these bronze implements was obviously two-fold, viz., weapons for offence, and tools for manufacturing purposes. He thought they might assume that at a time remote from the present, in the West Riding of Yorkshire, and within a circle of twenty miles south and east of Leeds, there dwelt a considerable number of bronze-using people, who probably lived in clans or tribes, and who roved on the hills and fished in the extensive lakes and rivers.

WIND-PRESSURE ON FIXED PLANE SURFACES.

In the Mechanical Section, over which Sir F. Bramwell presided on Wednesday, Mr. T. Hawksley read a paper upon "The Pressure of Wind upon a Fixed Plane Surface." The conclusion arrived at by him was that for structural calculations a maximum wind-pressure of 40lb. per square foot might be safely adopted, notwithstanding some common anemometrical observations to the contrary. With regard to these observations, the author remarked that the instruments in use were little better than philosophical toys; that in general they afforded no direct comparable or reliable indications in either velocities or pressures; and that they were often so injudiciously placed as in many instances to record the effects of combined and therefore locally accelerated currents, whilst in other instances they recorded only the effects of obstructed currents. As the acquisition of accurate data was of great and increasing importance, the author suggested that the British Association, and other learned societies interested in physical investigations, should unite in providing the necessary funds and observers for the purpose.—A discussion followed, in which Mr. G. J. Symons questioned the conclusion to which Mr. Hawksley arrived as to forty pounds per square foot as a maximum for wind-pressure being sufficient for structural calculations.—The President thought that engineers could not build strong enough to resist the greatest wind-pressure; all that they could do was to build their structures as strongly as they could.

ABATEMENT OF SMOKE IN LARGE TOWNS.

A paper was read by Mr. W. R. E. Collis on "Coals, and the abatement of smoke in large towns." The author said that the requirements of civilisation necessitated the greater use of heat agency, and statistics proved that the consumption of coal of the civilised nations of the world had largely increased, whilst the production both at home and abroad, notably in the United States, was also increasing. The production of coal in Great Britain in 1860 was 80,000,000 tons, and in 1880 149,000,000 tons. It had just doubled in thirty years, whilst in 1830 the production was only 10,000,000 tons. The use of coal for manufacturing purposes and the evils of smoke were described, and the author then referred to the suggestions which had been made that the development of electricity was likely to supercede the use of coal, both as an illuminating agent and a motive power. He, however, thought that although we might confidently look for an enormous development of the application of electricity as a motor as well as an illuminator, it did not appear at all reasonable to view electricity as an effective power dissociated from coal, and it would seem more accurate to look upon electricity, great as its value might be, as but an aid to the effective power of coal, upon the use of which electricity at present depends for its creation and application to every one of the useful purposes to which it was adopted. He believed that coal might be better utilised for all purposes, especially for domestic fires, both on economical grounds and in order to improve the sanitation and social comfort of our growing towns. A society had been formed in London to deal with the smoke nuisance by promoting improvements in the whole art and practice of heating, and as a practical measure an international exhibition of all the most modern heating appliances, suited both to domestic and industrial purposes, was to

be held at South Kensington. By this means it was hoped that much would be done to bring about a change for the better, and stay the present wasteful and injurious consumption of coal.

SOME OXFORD CHAPELS.

WE hardly know any buildings more completely *sui generis*, says the *Saturday Review*, than the typical Oxford College Chapel, such as the Chapels of New College and All Souls. We question whether the type referred to is to be found anywhere in England but at Oxford. As a rule, like causes produce like effects; and the circumstances of mediæval collegiate life were much the same at both Universities. But the builders at Cambridge contented themselves with the simpler plan of the unbroken parallelogram, the antechapel being formed by screening off one or two of the western bays. Even Henry VI.'s colossal chapel at King's is of the same unambitious type. It is one long hall from end to end, without aisle or transept. The side chapels are entirely external to the main walls, filling the recesses between the gigantic buttresses which sustain the vault. The Chapel of Jesus is a cruciform conventual church, adapted in the fifteenth century to collegiate use, and therefore finds no real exception. At Oxford, too, we find this simpler arrangement, as in the former chapel of Balliol, and those of St. John's, Jesus, and University; but the grander and more fully-developed type was evidently the favourite, and continued to be adopted from its introduction by William of Wykeham at New College, at the end of the fourteenth century, till the beginning of the 17th century at Wadham, and almost its close at Brasenose. At Queen's, also, we learn from Logan's bird's-eye view, an "outer chapel" of the New College type was added in 1518 to the simple oblong chapel of rich Decorated architecture finished in 1382, almost contemporaneously with Wykeham's buildings.

The plan of these buildings is, in block, that of a cruciform church, deprived of its nave, such as Merton Chapel at the present day, and of Bristol Cathedral before its recent completion. But the similarity is superficial. The western limb is no transept, but a very short nave of two bays, the apparent transeptal projections being formed by the aisles. If carried further westward to their normal length, these chapels would become churches, comprising an aisled nave and an aisleless chancel, of the common type. The superficial likeness to the arrangement at Merton, which is an unfinished building, consisting of the choir, transept, and central tower of a cruciform church, of which the nave was never built, has led some to the erroneous conclusion that Wykeham, struck with the convenience of this plan for collegiate purposes, adopted it with modifications in his Chapel at New. This theory, however plausible, is completely refuted by chronology. The buildings of Wykeham's "New College," more properly "Sainte Marie College of Wynechestre in Oxenford," the fulfilment of his grand design for raising the standard of education in England, were completed when on the vigil of Palm Sunday, 1386, the first warden and fellows entered on their new home. The cloisters, the last completed portion, were consecrated by Nicholas, Bishop of Dunkeld—one of Edward III.'s creatures, unrecognised by the Scotch Church—October 19, 1400. At this time Merton Chapel consisted of the choir only; nor was it till about seventeen years later that the suspended work was resumed, the transepts not being finished till 1424, when the whole was "rededicated with great pomp." The central tower is later still, dating 1448-1450. We may therefore safely ascribe the plan of this chapel to William of Wykeham. The great convenience of the spacious antechapel for the performance of the various functions, almost as much secular as ecclesiastical, of which college chapels were the appointed place in mediæval times, was self-evident. The college chapel, as Mr. Clark has reminded us, was the recognised place for meetings, acts, disputations, lectures, and even for dramatic performances. When Queen Elizabeth visited Cambridge in 1564, the "Aulularia" of Plautus and other plays were acted before her in the antechapel of King's, and that, too, on a Sunday evening. Ruggles's "Ignoramus" was performed in the same sacred precincts before her successor.

There is a survival of the custom even to our own day in some colleges, in the election of Fellows, the signing of leases, and the delivery of declamations on secular subjects in the chapel. Still, the incongruity between the sacred and the profane was less conspicuous when secular actions were transacted in an antechapel, separated by a screen from the chapel proper. The suitability of the plan is proved by its having been adopted successively by Chicheley at All Souls, and by Waynflete at Magdalen, as well as in the already mentioned additions at Queen's. It was also revived at a much later date (1613 A.D.) at Wadham—that remarkable and, at first sight, almost staggering reproduction of pure Perpendicular forms and details side by side with a composition of the most Debased character—where the two side-arches, dividing off the aisles of the antechapel, are evidently copied from those of New, and in less completeness at Oriel; and, last of all, in 1666, in that strangely heterogeneous, but not unpicturesque, medley of the Classical and Gothic styles at Brasenose. The former chapel of Exeter, built in 1624 (which has given place to Sir G. G. Scott's attractive, but somewhat tame, adaptation of the Sainte-Chapelle), a building remarkably good for its date, which we should have been glad to see preserved, had exceptionally the antechapel at the side, forming a south aisle, divided from the main body of the chapel by a row of pillars and arches.

It was a further recommendation of Wykeham's design that by this lateral extension of the antechapel the architectural effect of the western façade was greatly augmented, and the chapel assumed much greater dignity and importance than if it had terminated in a simple gable. No one can have noticed the grand effect of the west-end of New College Chapel, towering above the low cloisters, or that of Magdalen Chapel from Pugin's entrance gateway, without appreciating the feeling which dictated the arrangement.

The one modern chapel in which the typical Oxford plan has been in any way attempted is that of St. John's, Cambridge. Here, however, Sir Gilbert Scott has preferred the rudimentary Merton type. The western wings are real transepts, opening into the lantern space by broad single arches, and there is a tower which would have been central if the nave had been built. The effect is stately, but, as at Merton, incomplete.

The earliest colleges at Oxford, very humble foundations, had no chapel. The members worshipped in an adjoining parish-church. When chapels began to be added they were nothing more than small oratories. To Wykeham must be ascribed the introduction of the more stately ideal to which, after his time, most of the subsequently erected colleges sought to conform themselves. According to his arrangement, the two edifices essential for the common life of the society, the hall and the chapel, formed one continuous building standing end to end. At University and St. John's the chapel stands to the east of the hall, and an east window, that feature so specially dear to the English mind, was possible. This arrangement was also adopted by Hawksmoor in his stately Classical design at Queen's. But in the three earlier examples of New, All Souls, and Magdalen, either local circumstances or the caprice of the designer dictated another arrangement. The chapel is placed to the west of the hall and ends in a dead wall. The absence of an east window, however, instead of being allowed to be an injury to the architectural effect, has given an opportunity for adding greatly to its internal magnificence. The end wall afforded a field for that luxuriance of tabernacle work in which the architects of the Perpendicular Period revelled, and which may be regarded as the chief glory of the style. When fresh from the carvers' hands, every niche filled with its appropriate statue, the whole glowing with colour and bright with gilding, and rich with "busy entail," few more magnificent spectacles can have been presented than the reredoses of these chapels. The whole end-wall was the reredos, and the composition, rising tier above tier from basement to roof, displayed the combined skill of architect, sculptor, and colourist, at its highest and best, in a triumph of decorative art.

But while few of our mediæval architectural works can have been more deserving of admiration than these noble chapels, few have suffered

chapel represents very graphically the events of the creation of the world. In Square 1, the Almighty is seen with a huge pair of compasses marking out the world; chaos is all around Him, and in obedience to the command Let light be, light is streaming down from a great luminous fountain, in the presence of Deity. Squares 2 and 3 show trees coming into existence, and some animals. 4th. Birds are seen, and the Father's blessing is being given to the inhabitants of the waters. 5th. The creation of Eve is depicted; the bone in the Almighty's hand has drawn upon it the picture of woman. 6th. The Garden of Eden, with our first parents walking, and abiding with God, without fear or misgiving. Next, 7th. The temptation. A human-headed serpent deceives the woman, whilst Adam is partaking of the forbidden fruit, represented by a large golden pippin. 8th. The hiding beneath the trees of the garden; the cursed serpent, no longer disguised with the human countenance divine, as a dragon, is lying prostrate on the ground. 9th. The expulsion. Our first parents are, by the flaming sword, driven from the garden—Eve looking back, as if with desire, for the lost inheritance. 10th and 11th squares show us Eve, with the infant Cain on her knee, at a spinning-wheel, and Adam, as husbandman, is thrusting a spade into the ground by the aid of his naked and unprotected foot. The middle window of this chapel gives the history of Noah. 1st. Taking the animals into the ark: birds, of many kinds, amongst which is the dove; camels, lions, pigs, deer, goats, &c. 2nd. The Ark floating on the waters, Noah looking out at one of its windows, his wife at the other. 3rd. Noah is seen offering sacrifice, the kid or lamb, with crossed fore legs, is fastened on the altar as if to symbolise the Crucifixion. 4th. Noah, very beautifully painted in glass of a deep hue, is represented as digging in the midst of the vines. 5th. In another part of the window the Patriarch is prostrate on the ground, in his drunkenness, in the presence of his sons. In the same window is Abraham sending away Agar. Lot in the cave with his daughters. The Babel builders. The marriage of Abraham, and two squares in the centre of the window, represent in most marvellous painting, Esau and Jacob, before their patriarch father. In the most westerly window of the chapel, in the midst of much that is broken and despoiled, are shields held by Angels, containing—1st, An illustration of the Betrayal; 2nd, the Club or Staff crossed with bulrush; 3rd, the Lantern; 4th, the bloody Spear crossed with the Sponge and Reed; 5th, the Saviour blindfolded, the face lovingly painted, the beard and general contour of the face most delicately outlined; 6th, the *Three hands*, one plucking off the hair, the other with the open palm, smiting the blindfolded Saviour; 7th, are the Sacred monograms; 8th, Judas' purse overflowing with the thirty pieces of silver; 9th, the pierced hands, the pierced heart and feet; 10th, St. Veronica holding her legendary veil, on which is impressed the Saviour's likeness. In other parts of the church there are several more of these memorial shields, containing, in the following order, 1st, the Cock crowing; 2nd, the Crown of Thorns in a flood of holy nimbus; 3rd, the two Pikes, crossed; 4 and 5, the Ladder, the Seamless Coat, the Scourges, the Club and bloody Spear; and the Scourging post in form of a cross. In the great north window on other shields are represented the Hammer and Nails, the Pincers, and the Cross.

The great east window, the windows of the clerestory of the choir, the great west window, and others in different parts of the church, are more or less filled with glass, dating, without doubt, from the middle of the 15th century, making the time of the reconstruction of the church in the Perpendicular period. Prior John of Malvern helped greatly with these windows and a legend in Latin, believed to be by his mother, is in most of them. In the most westerly of the north clerestory windows of the choir, belonging to this period, is recorded the famous legend of St. Werstan, about which so much has been said and written. The window is still, for the most part, unbroken. This St. Werstan window has been so often described, and was so fully delineated by the late Mr. Albert Way, that it is quite unnecessary to do more than to call attention thereto. It forms a most interesting link in Malvern history, and but for it—the story of St. Werstan, who was in fact the founder of Malvern—would be almost a blank.

The lower parts of what is known as St. Werstan's windows are filled with paintings illustrative of the dedication and early history of Malvern's Norman Church. The window also contains what are believed to be large full-length portraits of the following eminent personages:—King Edward the Confessor, the good St. Wulstan, and King Henry I. Others of these clerestory windows have fine paintings of bishops and archbishops, the why and the wherefore of whose appearing is a matter of conjecture; but probably they represent eminent ecclesiastics who were, in a way unknown to us, connected with the monastery. Large figures representing the Annunciation are very choicely delineated in the most easterly of these windows, as are also four representations illustrative of the legend of Joachim and Anna, containing 1st, the Altercation in the Garden; 2nd, the meeting under the garden-gate; and the birth of the blessed Virgin Mary. In the most easterly of the south clerestory windows are designed illustrations of the four Latin Doctors, and scenes connected with the history of the Israelites, such as the gathering of the manna and the smiting of the rock, the manna being represented as falling in the shape of loaves of bread. In the middle window is the Crucifixion, in which angels are shown catching the shed blood. On one side St. John supports the fainting Virgin, and on the other the Centurion, looking on the Crucified One, exclaims "Truly this is the Son of God."

The great east window, also of 15th century date, tho' sadly broken, has many a charming picture. A beautiful Annunciation is at the top, a little lower down there are the twelve Apostles, and the emblems of the Evangelists. The entry into Jerusalem, and the Last Supper, are both very finely depicted. Following these are the Betrayal; the Nailing to the Cross; and the Appearance among the Doctors. The last picture is surrounded by the Scriptural quotation of "Wonderful, counsellor, the mighty God, the everlasting Father." All these pictures are unbroken, tho' in some cases they have been displaced. The confused mass of broken fragments of other pictures, filling up the remaining portions of this great east window, gives but a faint idea of its former magnificence.

In the great west window are usually large figures of the blessed Virgin and Child, and St. John the Baptist; St. Michael; St. George and the Dragon; St. Christopher; St. Nicholas and St. Catherine, with a great deal of fragmentary glass of interesting character.

In the great north window, the date of the construction of which is 1504 or 5, and which has been said to have been given by Henry VII., there are still remaining very bold representations of the most noble Prince Arthur, and Sir Reginald Bray. There are traces also of pictures formerly existing, of Henry VII., his Queen, and the Princess Elizabeth; but all except those mentioned figures have long since disappeared. This window also contains the Nativity, which as a picture is quite a study. The Salutation; the Visit of the Magi; Christ in the household of Martha, Mary and Lazarus; the opening of the Prison-house of Purgatory; and much of very fine fragmentary remains. In the west window of the north transept is a "Nativity," a beautiful "Last Supper." Large full-length figures of St. Paul, St. John, St. John the Baptist; a Pope's head, probably that of St. Gregory; a very beautifully designed Annunciation; Christ healing the sick, lame, and blind; the Presentation in the Temple, and much besides of beautiful broken glass remains.

These are but a summary of the beautiful paintings still remaining in Malvern Priory Church. Any one desirous to know more, may consult a little book on the subject, published some years since. But no mere description can afford anything like a clear conception concerning these windows, or do them justice; to be understood, they must be carefully examined.

GARWAY AND THE KNIGHTS OF ST. JOHN.*

IN a peaceful, secluded Herefordshire valley, on the confines of the county of Monmouth, lies the very ancient church of Garway, or

* A paper read by E. H. LINDEN-BARKER, architect, of Hereford, at the Malvern Congress of the British Archaeological Association, Aug. 26th, 1881, as noted on p. 291 ante. For illustrations and further description of the church, see BUILDING NEWS for May 13, 1881 p. 51b. Vol. XL.

Ellan Garewy, dedicated to St. Michael, and near to it are a few scattered fragments of what has evidently been at one time or another a religious house of considerable size and pretensions. It is commonly supposed to have been a preceptory of the Knights Templars, though possibly upon barely sufficient grounds; at any rate, I can find but little documentary evidence, and the architectural features may or may not point that way. With the exception of the tower, chancel-arch, and two of the eastern windows, which are all of undoubted Norman or Transitional date, there is nothing belonging to the church of an earlier period than the commencement of the 14th century. The Templars were expelled from Palestine in A.D. 1291, and were finally abolished by Papal Bull at the Council of Vienne in A.D. 1312. Amongst these ruins of what may have been a preceptory of their order is a remarkably perfect circular columbarium honeycombed for 666 pigeons, and on the tympanum of its southern entrance may be read even now (though every year unfortunately renders it more illegible) the following inscription:—"In the year of our Lord, 1326, this Dovecote was erected by Brother Richard." It is evident, therefore, that Brother Richard could not have been a Templar, because his order had ceased to exist some fourteen years previously. In all probability, however, he was one of the Knights of St. John, for the Garway Estates were without question in their hands twelve years afterwards, seeing that in the year 1338 detailed allusion to the property is made in the report of Philip de Thame, the Prior of the Order, in London, to its Grand Master at Rhodes, Elyan de Villanova. Silas Taylor, who lived about 200 years since, mentions having seen "stately ruins of a religious house at Garway," but these have now been taken down to build the present farmhouse and barns with, and the columbarium alone remains, a most valuable witness to show what the style of the remainder must have been, and the period at which they were probably erected. It is at present used for penning in sheep and pigs; but I am glad to say will shortly be restored to its original purpose upon a suggestion that I ventured to throw out in the proper quarter.

I now pass from the historical division of my subject to the architectural one, and propose drawing attention to some of the most interesting and puzzling features of a church which, but for its distance from Malvern, would, I am sure, have amply repaid a visit from the British Archaeological Association. The Cambrian archaeologists made a flying visit at the far end of a long day in 1857, but with this exception I cannot learn that it has ever been examined by a body of gentlemen capable of theorising in any successful way upon its many peculiarities; but I should mention that both the *BIRMINGHAM NEWS* and *Church Builder* have recently published some interesting illustrations of it.

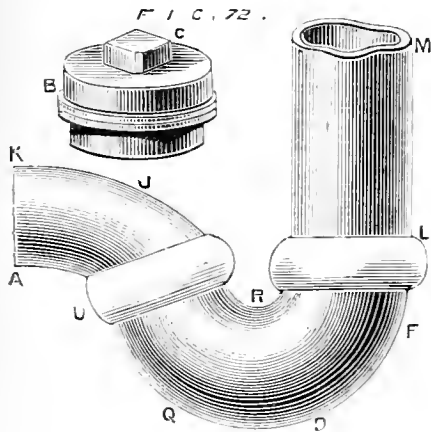
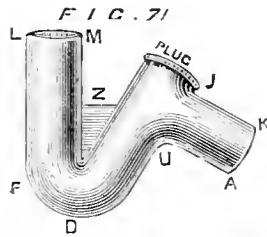
Commencing at the west-end, the remarkable position of the massive Norman tower first demands notice. It stands 8ft. or 9ft. away from the N.W. corner of the nave, is 27ft. square externally, and 42ft. up to the roof, which is of a hipped character. The staircase appears to have been added about a hundred years afterwards, when I take it the bells were furnished. The lower portion of the wall is 5ft. thick, and the building was originally quite detached from the nave, the covered passage connecting the two being of evident 11th-century execution. There is a tradition that during the Border Wars it was used for a condemned cell, while the rest of the church served as a prison, and it is also reported to have been connected with the preceptory by an underground passage.

The nave possesses several ancient oak benches, the ends of which are as much as 4in. thick, and the seat-boards only an inch less. Behind the curved plastered ceiling I have been fortunate in discovering the original oak roof, consisting of arched ribs in excellent preservation, which of course it is hoped shortly to be able to restore. There is very distinct evidence of a doorway, and externally also of a porch once existing on the north side, and the latter must, from its covering a portion of the lancet window near it, have been added at a later period. The ground here is some 6ft. or 7ft. above the level of the interior, and in recently clearing the damp soil from the walls no evidence of either steps or burials were come across. It seems a little difficult to account for the selection of this

tie, Z, across the throat, to prevent its being pulled out of shape.

GO-TRAP MADE IN TWO PIECES. (Fig. 72).

First, you require a block the shape of your trap, or block in two halves, the seam being on the side (that is, if you have many to make), and two rings made in such a manner that they can



be slipped over the block and the lead, and with thumb-screws screw together, so as to hold the lead upon the block, while you are working it to the shape of the block.

Now for the size of your lead: Take a strap of lead, say, 4in. wide, and measure round the trap from MFD to A (Fig. 68). This will give you the length for the bottom. Now take the circumference of the trap to get the size. Half this will be the width for you to cut the lead, which must be cut truly, and with planed edges. Next, just where the lid is to fit D, take the mallet and hollow your lead a little, not to thin the lead, but just to fit the bottom of the block, then offer it on the block and end up the inlet end; take the ring and fix it on this part of the block. Next bend up the part from D to A, and with the other ring fix it there, then with your tools (a bossing-stick will do) work the lead to the shape of the block, taking care to drive the molecules of the lead in the direction you require them to flow, and be sure that the lead is of uniform thickness; in like manner do the throat or top part. Care must be used to hollow and fit the lead to as nearly as possible the proper shape, by first turning it back, and with the bossing-stick well drive up the throat part, C in plan (Fig. 68). This will thicken the lead; after which place it upon the block and bend over the back to the out-go, and with the rings fix it there, then work it to fit the block.

I have before said this should be in two halves; this will give you a line to trim your lead to, should you require it trimmed off for soldering.

The next thing to do is to solder it up, which may be done with the copper-bit, wipe it, or burn it. The last-named is much the best.

(To be continued.)

ADAMS' AUTOMATIC TROUGH FLUSHING CLOSET.

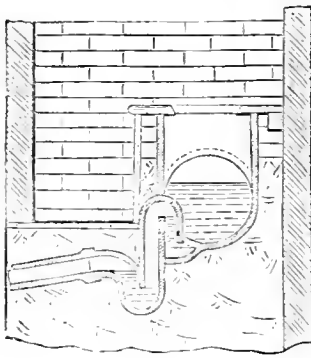
THE necessity for an efficient Automatic Flushing Closet has long been felt, and we believe that in the form introduced by Messrs. M. J. and S. H. Adams, of Leeds, this want is met.

The trough is made of the best fireclay, or is supplied in iron, to which a specially high glaze is given, both internally and externally.

It is readily fixed by any workman. It is so constructed that the full length is utilised for

seats, none being wasted by the valve-chamber as in the ordinary trough flushing closet.

When waste water from yard sinks, slop water, &c., is led into the trough, only a very



limited amount (if any) of other water is required for use in the after-flushing: where no such connections are made, the closet works with the amount of water usually allowed for such purposes by Water Companies (this being regulated by a plain ball-tap, unless otherwise ordered). The trough, when ready, discharges its contents by means of the patent siphon, which is fully charged on the instant. The siphon is equal to a 4in. pipe, and will therefore carry off all matter without the fear of choking. The closet will work without attention for an unlimited time. It may be built to any length. The cross section given herewith shows the construction.

THE PROMENADE EXTENSION AT SOUTHPORT.

LAST Wednesday Southport, the fashionable watering-place of Lancashire, was *en fête* on the occasion of the opening of the new markets and marine promenade. The Southport Promenade extension was commenced in 1879, at the beginning of which year our readers may remember the corporation invited architects to send in designs for extending the parade from the old promenade to Park-road. The result was that nearly seventy designs were sent in, and three designs were awarded prizes. The author of the successful design was Mr. G. Heaton, architect, of Wigau, but the work of construction has been carried out under the supervision of the engineer to the corporation, Mr. William Crabtree. From the plan of the reclaimed land before us, showing the suggested building-plots, we see the promenade extends in a northerly direction from Seabank-road close to the convalescent home, and returns to Park-road by a circular sweep at the north end. The triangular area thus reclaimed has been divided into plots of rectangular shape, intersected by roads, the main ones of which run from Adelaide-street to the promenade. A considerable building frontage to the water is thus obtained, giving 28 plots large enough for detached villas. These plots vary in area, the largest measuring 2,773 square yards in area, and the smallest about 1,000 yards. In all there are 144 plots of various sizes fronting good roads, intended for detached houses.

The contract which has been carried out included an embankment from Seabank-road along the line of promenade to its junction with Park-road, the making of approaches to the various abutting roads, and the embankments at the different junctions and at the convalescent hospital. The main embankment was formed in 18in. layers, and Portland cement concrete is largely used in the footings of the promenade and in face of embankment, steps, and splayed plinth. The proportion used for the rough work was one of cement to six of aggregates, and the face of embankment is finished with one to three. The cement was specified to be of the best quality from Messrs. White Brothers and Co., or from Messrs. Francis and Sons, it was to be finely ground and to weigh not less than 112lb. per struck bushel "when filled quietly from a hopper." The cement was tested by proper apparatus, and the requirements of the borough surveyor were fully detailed in the specification. When gauged neat it was required to set perfectly hard in water in seven

days, and a tensile strain of 600lb. on a cross section of 2½in. was expected. During the work the cement was regularly tested under the directions of the engineer, and a tabulated statement of the results kept; and all cement failing to comply with the conditions of the specification was rejected. Equal care was taken to insure good mortar; the lime from Halkin mountain, air fallen, was mixed in the proportion of two parts of lime to two of sand, and one part of hard smithy ashes or ground furnace-clinkers, and the whole to be ground in a steam mortar-mill. With regard to the composition of the concrete, the aggregates were required to be of clean gravel or broken clean grit or sandstone of the quality of the Parbold stone, the fragments being cubical, not flat or flakey; the sand added was to be of sufficient quantity with the cement and water to form a compact conglomerate, and the stone crushings and sand to form aggregates of six to one of cement. The concrete has been deposited in layers of 6in. thick, each being properly rammed.

The promenade thus embanked has a width of 60ft., and the upper plinth and steps are surmounted by cast-iron standards bedded in the concrete. The inner slope of the promenade embankment is two to one, and the reclaimed land is partly raised. The streets and roads are filled to the necessary height, and are 50ft. wide with slopes on each side, having batters of two to one. The approaches to the shore are covered with Haslingden sets 5in. deep, grouted solid with boiled tar. For the sake of durability and to resist the tidal action, the promenade along the north-east curve to Park-road is pitched with stone rough punched and grouted at the joints. The carriage road-way is formed with a foundation of hand-pitched stone to the proper contour 6in. deep, well beaten down, and wrecked with cinders covered with asphalt 4in. thick in two layers, each being well rolled. The asphalt is specified to be limestone from North Wales, broken to pass a 2in. ring and well mixed with distilled tar. The upper coating is of a finer quality, passing a ¾in. sieve.

We have no space to enter into further details of the work; the footpaths of promenade are paved with tiles 9in. by 9in., the open spaces are laid out for trees, and the improvement to this part of the town will be very great. Provision has been made for a storm outlet to be carried to a distance of 300 yards from the embankment, and great care has been taken to lay the sewer-pipes to prevent settlement on the newly-filled ground. The people of Southport will have every reason to be thankful for so useful a reclamation of their waste land, and there are other seaport towns which suffer periodically from the proximity of mud lands skirting tidal estuaries and bays which would do well to follow the example of Southport.

CHIPS

It is stated that a Warminster chemist has analysed the water from fifty wells in the town, and has found all to be polluted with sewage. It is supposed that over 500 persons use the water from these wells for domestic purposes.

A stained-glass window has been placed in Whinburgh parish-church, Norfolk, in memory of the late rector. Messrs. Barrauld, Lavers, Westlake and Co., of London, executed the work.

A new Cistercian church is to be dedicated at Mount St. Joseph, near Roscrea, by the R.C. Bishop of Killaloe, on the 18th inst.

A wooden pagoda is being added to the Cumberland Convalescent Institution at Silloth, to be used as a summerhouse and recreation-room by the male patients. Mr. C. Boyd is the honorary architect.

The Newport, Mon., School-board have adopted plans by Messrs. A. O. Watkins and Son, for the erection of the Alexandra Dock Schools, having 930 school-places, at an estimated cost of £3,000.

The greater part of the townhall at Sowerby-bridge is about to be reconstructed internally to fit it for use as an extension of the Joint Stock Bank. Messrs. Utley and Gray, of Halifax, are the architects.

The Wigton local board of health have decided to cover in their waterworks service reservoir at Red Dial, and to effect further improvements. The work will be carried out from plans and specifications prepared by Mr. J. S. Hodgson, C.E., of Hexham, under the superintendence of Mr. T. Tiffin, surveyor to the board.

CONTENTS.

Architectural Coherency	317
Town Dwellings and Warehouses, and their Dangers	317
New Furniture and Decoration	319
Rack-Railways on the Continent	320
The British Association	320
Some Oxford Churches	323
The Stained Glass in Great Malvern Priory Church	324
Garway and the Knights of St. John	325
Practical Notes on Plumbing—XII.	326
Adams' Automatic Trough Flushing Closet	327
The Promenade Extension at Southampton	327
Chips	327
Our Lithographic Illustrations	328
New Railway Works at Neasden	328
Cumberland and Westmoreland Antiquarian Society	329
The Inner Circle Railway	331
Japanese Porcelain Painting	331
New West End Theatres	331
Asphaltum	331
A New College of Practical Engineering	331
The Surveyors' Institution	332
The Late Mr. Charles Gray	332
The Secondary Strains in Iron Structures	332
Archaeological	333
Building Intelligence	333
Competitions	334
To Correspondents	334
Correspondence	334
Intercommunication	335
Stained Glass	337
Legal Intelligence	337
Our Office Table	338
Trade News	339
Tenders	340

ILLUSTRATIONS.

TOWER OF HANDSWORTH THEOLOGICAL COLLEGE.—NEW CHURCH AT LONGTON.—HOUSES AT FURLEY PARK, CROYDON.—MUSIC-ROOM AT FLEET ST.—TOMB OF THE COUNT DE BORGNIVAL.—DOLPHIN INN AT HIGHAM.—OLD HOUSE, IPSWICH.

OUR LITHOGRAPHIC ILLUSTRATIONS.

TOWER OF HANDSWORTH WESLEYAN THEOLOGICAL COLLEGE.

IN the BUILDING NEWS for July 25, 1879, we published general drawings and plans of these new buildings now in course of erection at Handsworth. The design of Messrs. Ball and Goldard, the architects, were selected in open competition, in connection with which Mr. Alfred Waterhouse, A.R.A., acted as referee. The college accommodates 70 students, and the buildings are built in red brick, with buff terracotta dressings and purple brick diapers. The carved pitch-pine fittings for the library and lecture-hall were supplied by Jones and Willis, architectural art workers, Birmingham. The tower-rooms are to be used for science-class purposes, the upper part being intended for an observatory. The drawing which we reproduce to-day was exhibited in this year's Royal Academy Exhibition.

LONGTON CHURCH, LANCASHIRE.

THIS church, designed by Mr. J. Edward K. Cutts, of Southampton-street, Strand, is to be built on an addition to the churchyard, and in place of the present modern brick structure, the materials of the old church and of several adjacent cottages being used in the new building. The walls externally are to be of red brick with stone dressings. Internally all wall-spaces will be plastered, with a view to their being decorated, together with the roofs and ceilings, at a future time. The church will seat 500 people.

HOUSES AT FURLEY PARK, CROYDON.

THE row of villa residences, of which we give a view and plans to-day, show another endeavour to improve the class of suburban buildings by varying the elevations, and adopting a style in harmony with the character of the work. Simple materials are used. Mr. James Williams, of Bond-street, W., is the architect.

MUSIC-ROOM, FLEET STREET, CLAPHAM.

THE interior view which we publish to-day illustrates the new music-room lately completed at Fleet-street, from the designs of Mr. Arthur Cayton, architect, of Clement's-lane. The general colours for the walls are blues and browns, the woodwork being entirely of walnut. The panels of the ceiling are in blue flock on a clear gold ground, the enrichments having a delicate finish as well as sharp outline. The effect of the room is chiefly due to its harmony of colour. The arrangement of the room is in character with the rest, and the front has been made with this intention.

TOMB OF THE COUNT DE BORGNIVAL.

MR. W. R. L. is the Paris Travelling Student for the present year, and to-day we

publish one of the drawings which gained for him the distinction. It represents, in measured detail, the tomb of the Count de Bournival, from east now in the South Kensington Museum. The work is Flemish Renaissance, and is dated 1533. As a characteristic example of "Free Classic" work, it shows a freedom of ornamentation peculiar to the style, which cannot fail to be interesting to our readers.

"DOLPHIN" INN AT HIGHAM.

THIS is a very good specimen of Domestic work just outside Norwich, built, according to the date on the right-hand bay, in 1615, apparently on the site of an earlier building, as the hall contains a crenopied Decorated piscina. The house, though now degraded to the service of Bachelus, was formerly the residence of Bishop Hall, to whom there is a monument in the church in the form of a gilt skeleton. The material of the walls is flint rubble interspersed with pieces of stone, the end gable being finely diapered with brick, and the roof tiled.

OLD HOUSES AT IPSWICH.

THESE are simply ordinary dwelling-houses of the last century; but, from their quietness and breadth of treatment, are well worthy of notice. The lower-story has a brick front, painted white, in front of which the upper one projects with a fine shadow. This pannelled face is worked in plaster and is also painted white. The roof has red tiling. The effect of the square cornice over the round-ended bays is very good.

NEW RAILWAY WORKS AT NEASEN.

THE raising of the last principal of the roofs of Metropolitan New Carriage Works, Neasden, was celebrated by a dinner given at the White Hart Hotel, Willesden, proprietor Mr. T. B. Jones, which was served up in excellent style, and thoroughly enjoyed by all present. The chair was taken by Mr. Jackson Gawith, doctor to the works, the vice-chair by Mr. Thomas, foreman; several representatives of the Metropolitan Railway Company and others employed by the contractor attended, and the evening was spent in a convivial manner. The expense was defrayed by a liberal donation from Mr. Garlick, the contractor, and from several tradesmen and others.

These works are on an extensive scale, comprising carriage repairing and painting shop, 194ft. by 163ft., by 36ft., up to gables; the roofs are of four spans; the walls are of brickwork, faced with paviers, supplied by Messrs. Nash, of Slough; roof-principals of iron, supported on girders and columns; the roofs are covered with slates and glass; the floors are of wood blocks and concrete. The buildings are heated with exhaust steam, conveyed through the sheds in 5in. and 7in. pipes. When completed, they will be fitted up with the most modern appliances; there are also stores 208ft. by 13ft., by 40ft. high, and sawmill 136ft. by 55ft., by 50ft. high. Already 50,000 cubic yards of excavation have been removed. The contract has taken 10,000 yards of concrete, 2,000,000 bricks, 350 tons of iron, 400 squares of roofing, and 1,400 tons of lime (supplied by Messrs. Graves, Bull, and Lakin, of Warwick).

The first brick was laid on Feb. 15, 1881, the last on the 15th ult.; the last principal was lifted on same date. The plans were prepared by the Company's engineer, Mr. J. Tomlinson. The contractor for the work is Mr. J. Garlick, Sitley Works, Birmingham; the quantities were supplied by Mr. Brede; the clerk of works is Mr. John Winstone, and manager of the works, Mr. Henry Charlton, the whole having been carried out under his personal supervision. The cashier was Mr. Clere. The contractor had to construct 3 miles of railway, and to keep a locomotive in constant work. The time for completion was Oct. 31st, 1881; total cost about £30,000. An addition to these works is contemplated, comprising loco., carpenters', signal, copper-smiths', and running sheds; also offices and gas-works, &c. When completed, they will rank among the largest works of the kind in or near London.

The Sittingbourne highway board last week elected Mr. F. W. Collard, a Borden farmer, and a member of the board, as district surveyor, at a salary of £150 a year, in succession to Mr. Kerman, resigned.

CUMBERLAND AND WESTMORELAND ANTIQUARIAN SOCIETY.

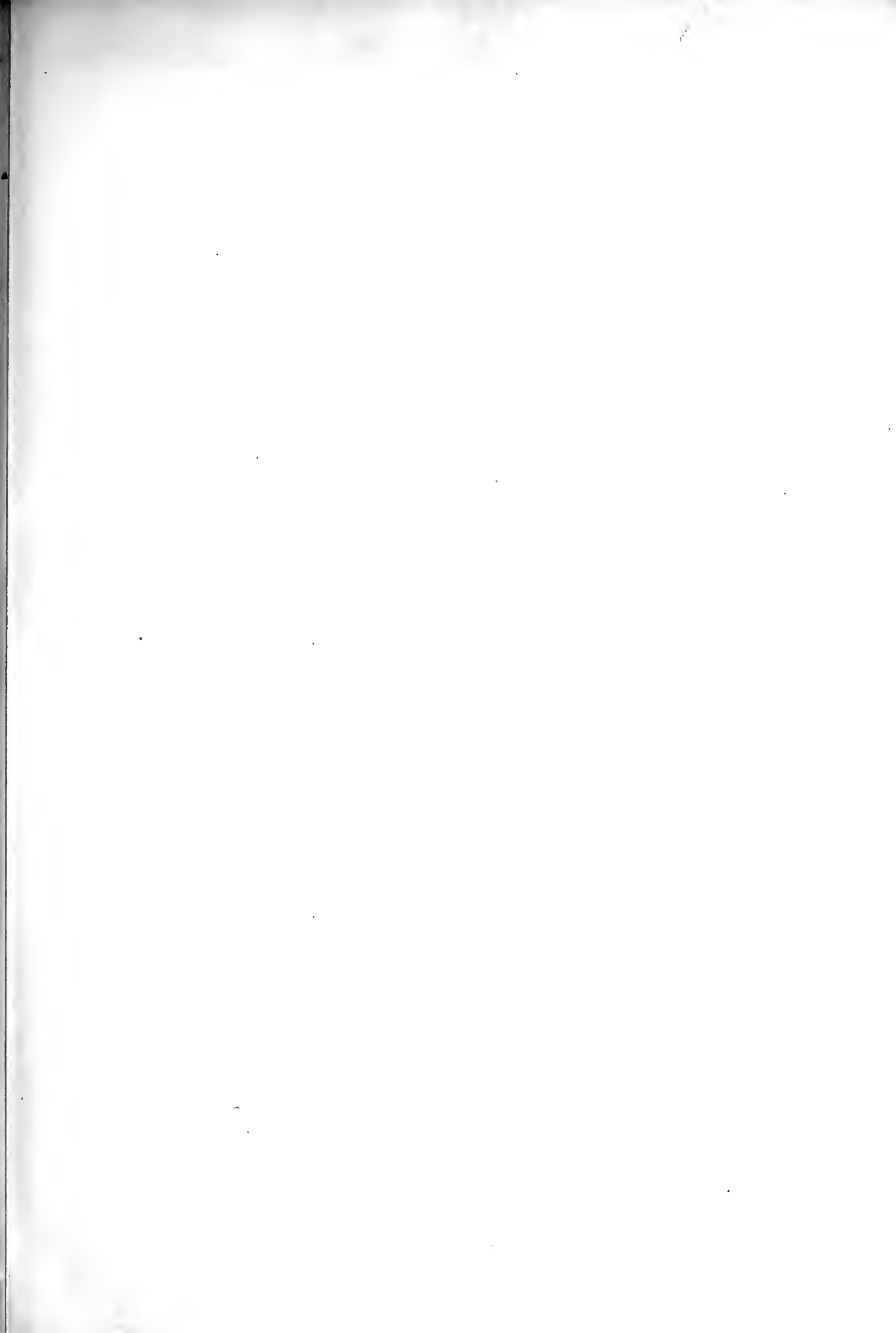
THE second meeting and two days' excursion for the present season of this society was held on Tuesday and Wednesday week in West Cumberland. On the Tuesday the members met at Egremont, and proceeded by carriages, the first stopping-place being the ruins of Calder Abbey. Canon Knowles said the earliest work here was the west door, and a few small fragments elsewhere, which were in the Transitional Norman Style, c. 1170. The tower-walls proved that a clerestory was actually built, while a lower roof-line showed with equal clearness that it was afterwards destroyed, and that this great church was covered over in its mutilated state. The church was nearly finished in the 13th century, not much later work being visible. Mr. R. S. Ferguson, F.S.A., showed a large cresset stone which had been found on the site, and mentioned that only the other day a similar one was discovered in St. Catherine's Chapel at Carlisle. At the modern church of Calder-bridge, the vicar said the super-altar was one removed from Calder Abbey; he identified it with one granted by Pope Nicholas V., and consecrated by the Archbishop of York c. 1448 to 1451. In Gosforth churchyard, a sculptured cross was seen, which Dr. Parker considered to show lingering traditions of the Lindisfarne School of Art, and to be of the Norman period. Mr. Jackson pointed out that the interlacing treatment was of a kind very common in the Isle of Man. Near Seascale Hall, a halt was made to view a site near a stream, which Mr. Robinson, of Maryport, has been excavating in the expectation of finding traces of a Roman camp—at present, no success has rewarded the explorer.

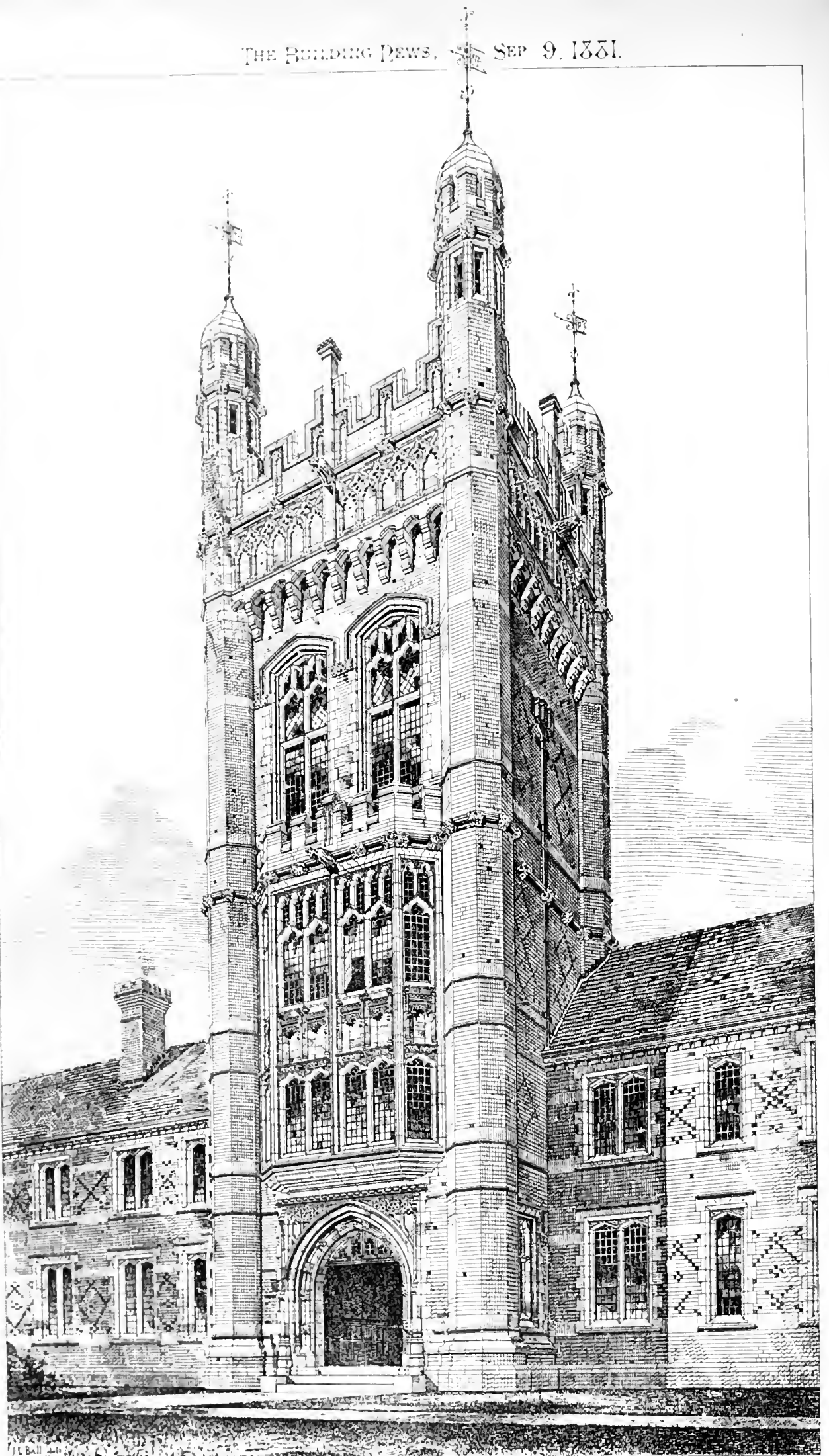
In the evening, a dinner and business meeting were held at Egremont. At the latter the Rev. W. S. Calverley read a paper on "Early Christian Monuments in Brigham and Dearham Parishes," these consisting of three crosses, a cross-socket, and a font. Three papers were read on "Old Church Plate in the Deaneries of Gosforth and Wigton, and in the Parish of Maryport," the only examples noted as older than the 17th century being an Elizabethan Communion cup and cover at Hale Church, dated 1571-2.

On the second day, Wednesday, several papers were read after breakfast, including one written by Mr. G. T. Clark, F.S.A., of Dowlais, on "The Mediæval Defences of the English Border;" another by Mr. T. L. Banks, architect of Whitehaven and London, on "Old Egremont Church," an edifice recently pulled down and rebuilt from the author's design. The ruins of Egremont Castle were afterwards visited, and described by Canon Knowles. The site was probably, he thought, that of a hill fortress, then fortified by the Romans for a watch-tower to their Egremont camp, then built on by the Norman lord, harried by Scotch invaders and rebuilt. After being neglected for a long time, it was ruined by a Parliamentary coup de grâce, and for two centuries was the prey of the builder and the sport of the builder, but the wreck was still a noble one. At Walls Castle a little to the south of Ravensglass Railway Station, the members visited the remains of a Roman villa, which are being excavated by Mr. Joseph Robinson, of Maryport, to whom, and to Mr. Jackson, are due the honour of discovering and clearing these remains. The ground is a hard clay, and is partly paved with tessellated work, and there is also a hypocaust still in position.

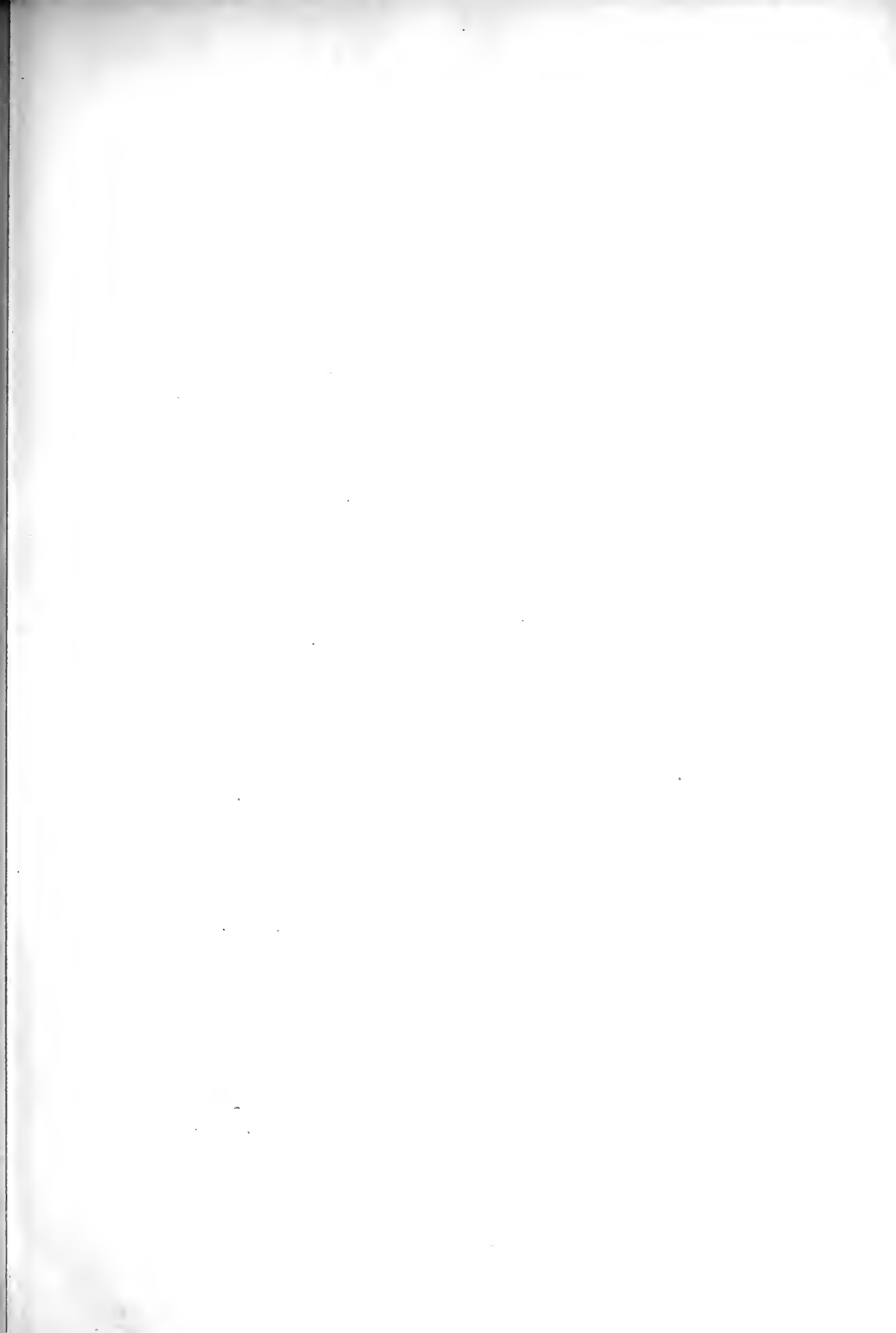
In the afternoon the members went to the Muncaster Castle, where, amongst other interesting objects, Lord Muncaster showed "The Luck of Muncaster," a small glass vessel, now carefully preserved in a wooden box lined with wool. The bowl is said to have been given to Sir John Pennington, by Henry VI., after the Battle of Hexham, with the wish that so long as the bowl remained in the family unbroken, so long might the luck of Muncaster flourish. Mr. R. S. Ferguson pronounced the bowl to be Old Venetian glass.

The corner-stone of a new Unitarian schoolroom was recently laid in Friars-street, Ipswich, adjoining a chapel. The building will be of red brick, with Portland stone dressings, and will measure internally 50ft. by 22ft. Mr. C. A. Wyatt, of Ipswich, is the builder.

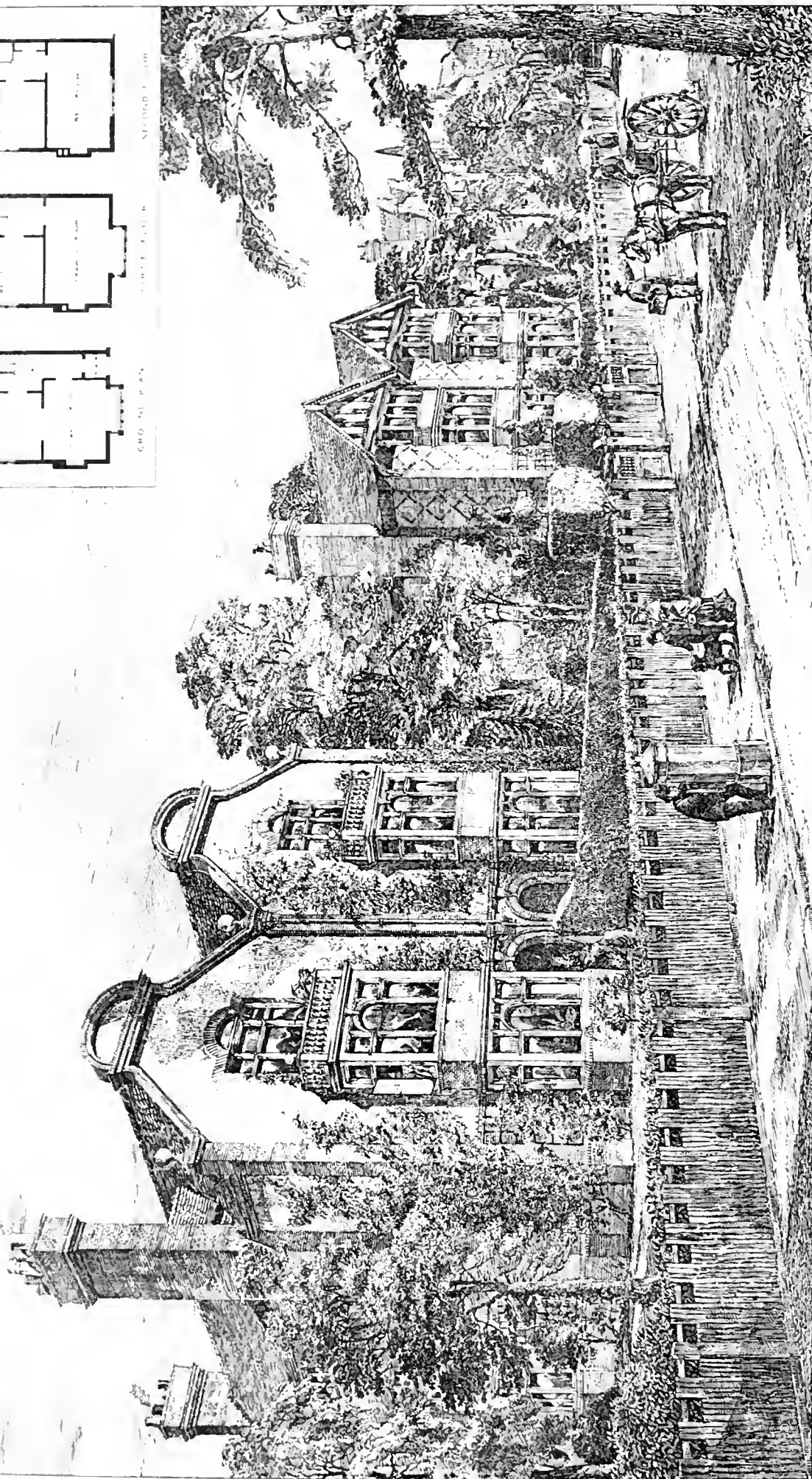
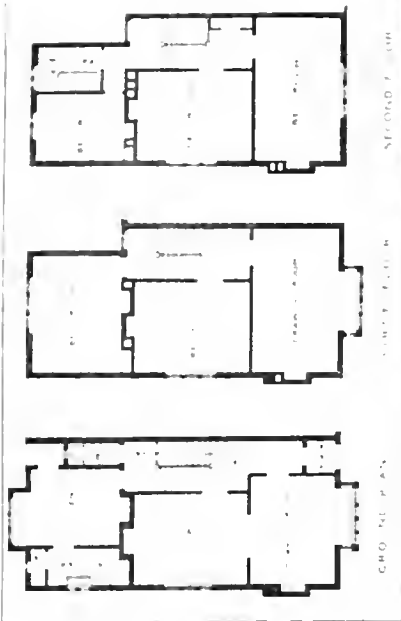


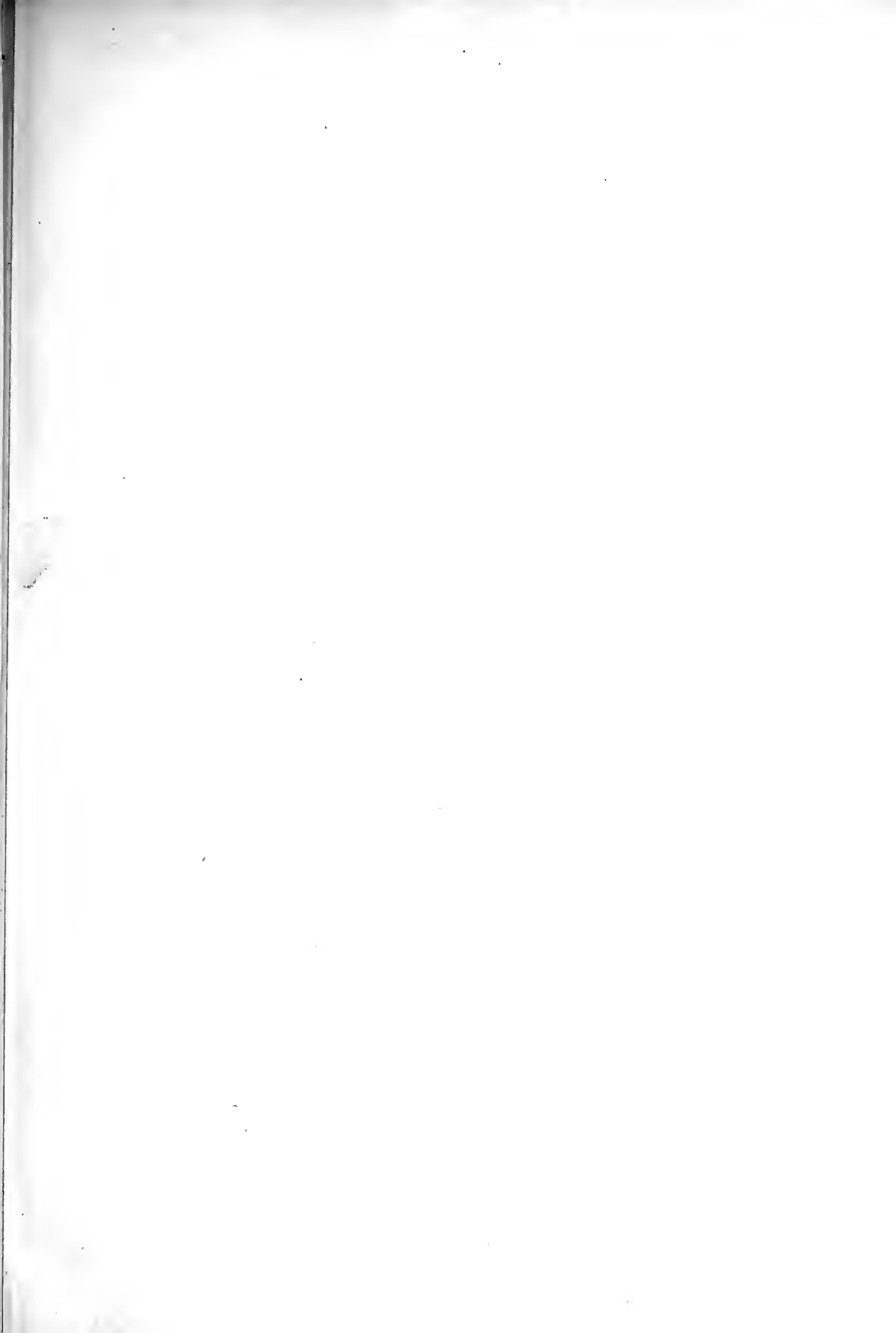


Tower of Handsworth Theological College

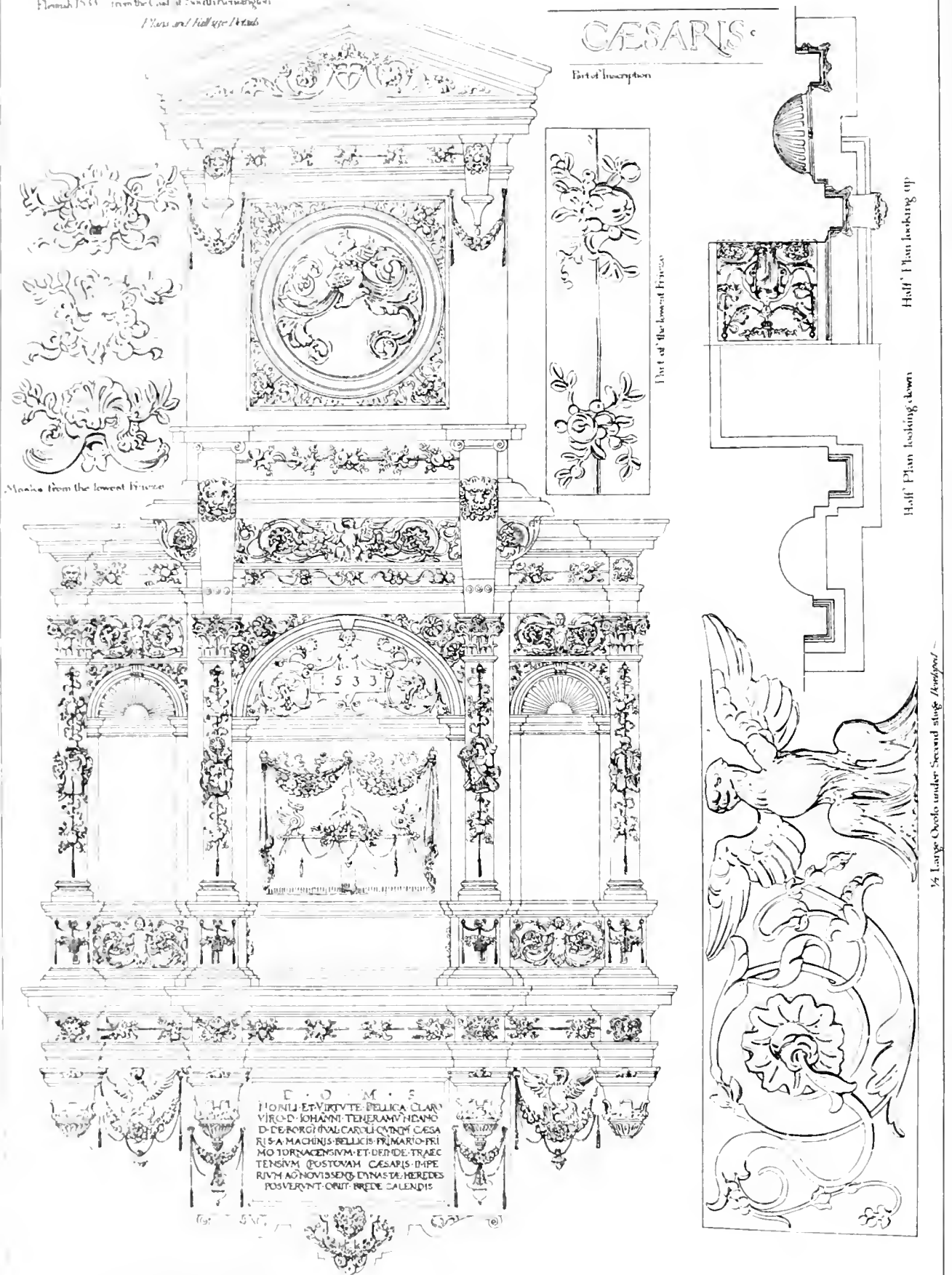


HOUSES AT PARK CROYDON
JAS WILLIAMS ARCHITECT





TOMB OF THE COUNT DE BOURGNEUIL.
 Flanking 1831 from the East at South Kensington.
Plans and half size details.



PUGN STUDENTSHIP 1881

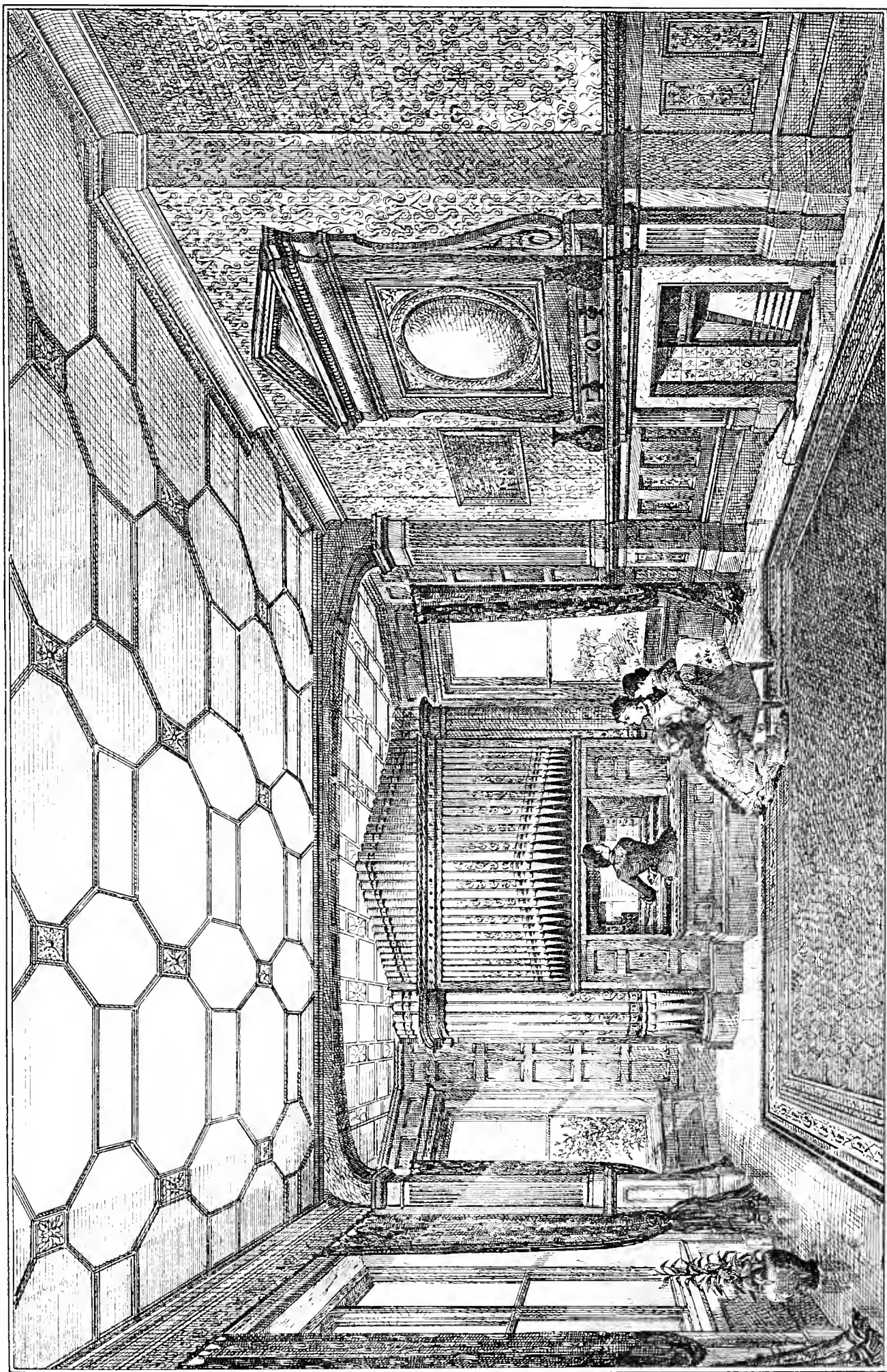
W. R. Lathbury



The Dolphin Inn at Hingham: Formerly the Bishop's House :

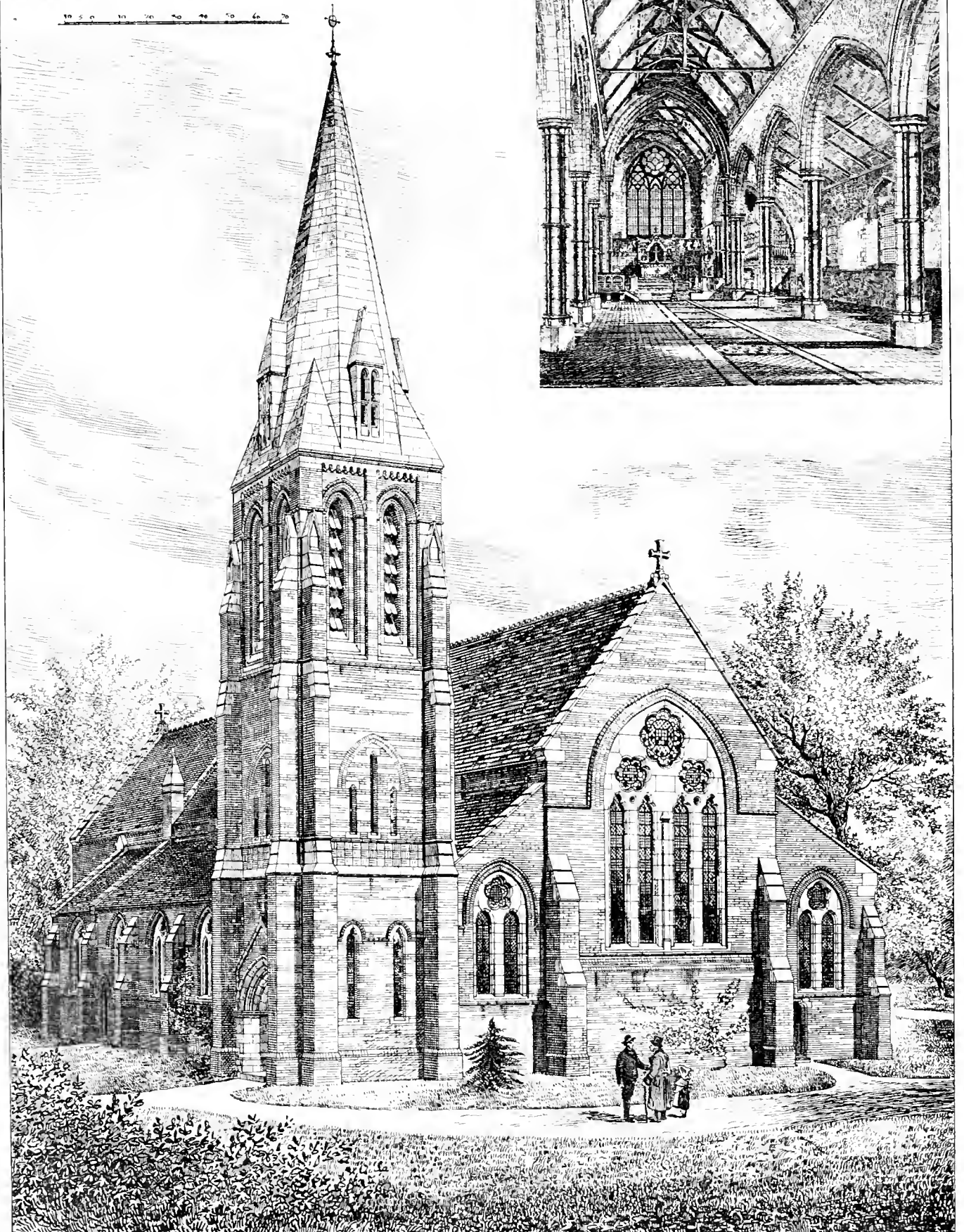
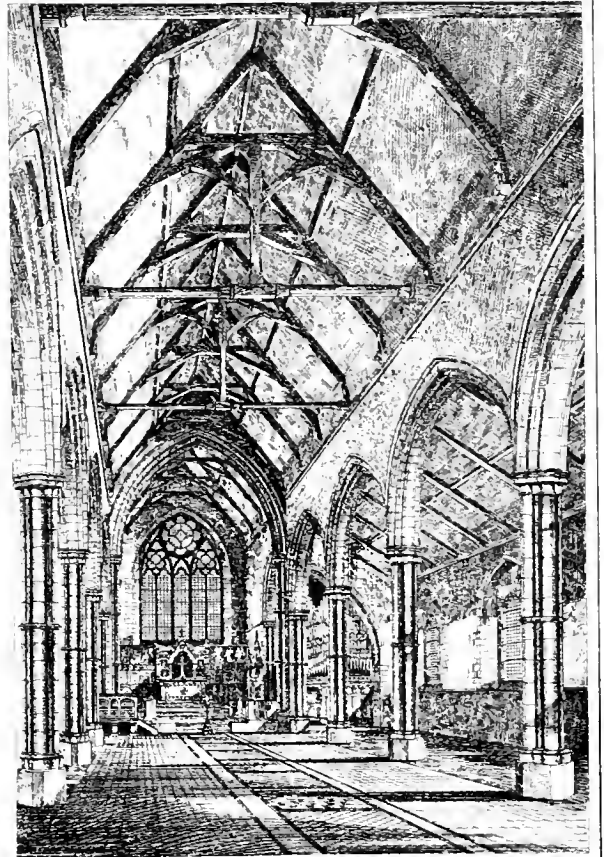
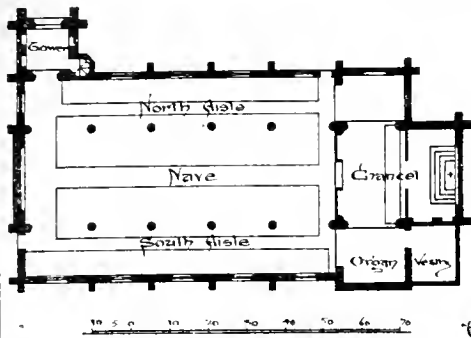






Interior of Music-Room • ELMHURST • CLAPHAM-PARK • for G. Mence-Smith Esq^r • Arthur Cawston Architect

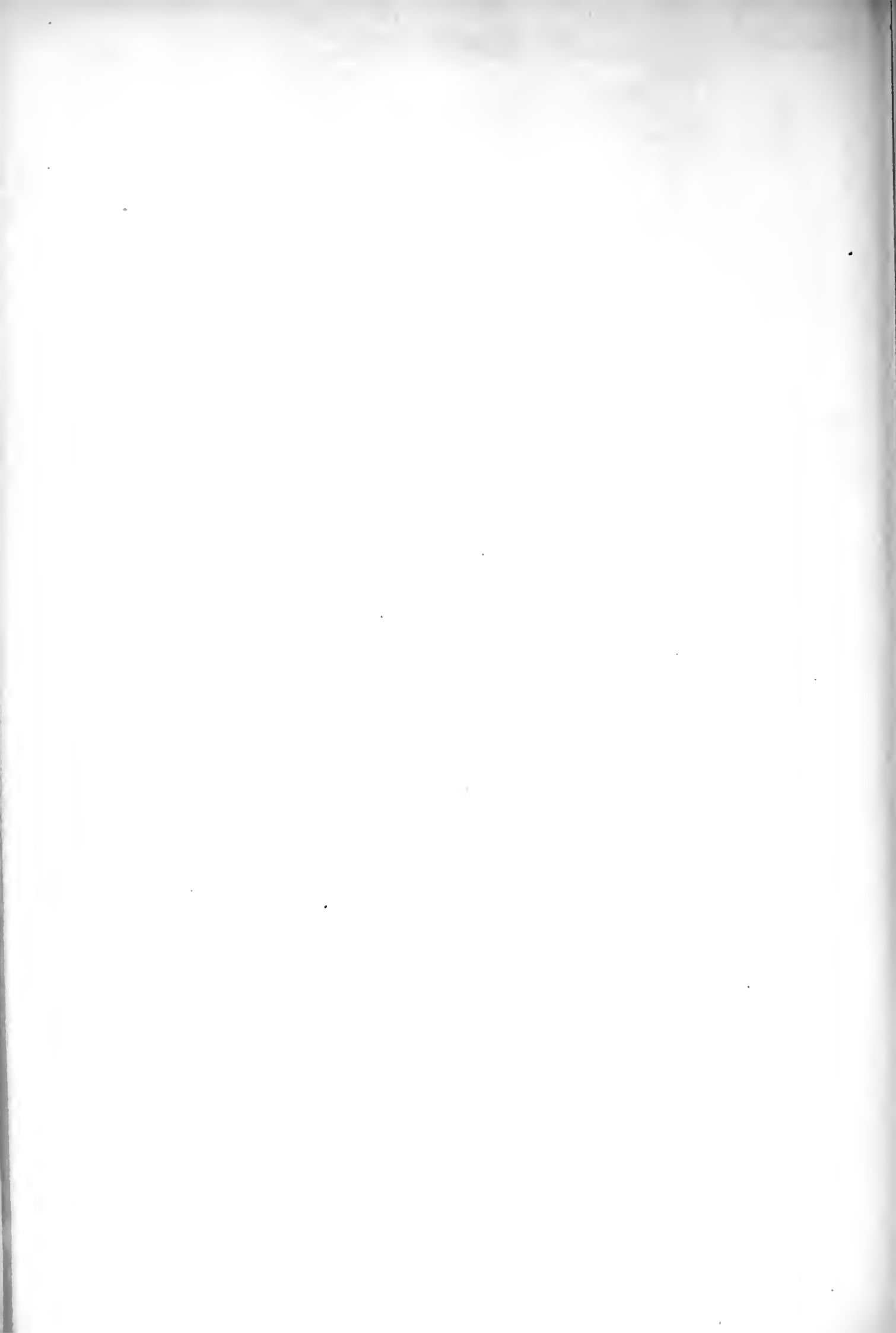




New Church at LONGTON.

J. EDWARD H. CUTTS ARCHT.

Photo-lithographed & Printed by James Alderman at Queen Square W.C.



THE INNER CIRCLE RAILWAY.

ON Monday another important step was taken towards the completion of the Inner Circle Railway in the formal commencement of the works of the underground line between High-street, Aldgate, and Trinity-square, near the Tower. The ceremony of turning the first sod was performed by the Lord Mayor, M.P., on the invitation of the chairman and directors of the Metropolitan Railway Company. At present, the Inner Circle scheme is only carried as far as the Mansion-house station of the District Railway on the one hand and the Aldgate station of the Metropolitan Railway on the other, but the work initiated on Monday will continue the railway system of the last-mentioned line as far as Tower-hill, leaving then only the gap between that spot and the Mansion-house to be cleared and tunnelled to entirely complete the much-required circuit of communication between all parts of the metropolis, and indirectly between London and the entire kingdom. The section of construction begun on Monday will be, it is hoped, entirely perfected within six months, and assuming a speedy and final settlement, between the joint committee of the Metropolitan and District Railway Companies and the City Commissioners of Sewers and the Metropolitan Board of Works, of the terms for the construction of a wide new street between the Monument and Tower-hill simultaneously with the underground railway, the whole scheme will be at length concluded in 18 months from this time. There is every prospect that this financial adjustment will be made within a few weeks, the formal consent of the Metropolitan Board of Works to the reopening of the negotiations and the renewal of their former offer to contribute half a million from the rates towards the great cost of the undertaking being alone needed, and there is no doubt that it will be cheerfully given. It would be useless, now that, at last, an amicable solution of the difficulty has been arrived at, to narrate the details of the many failures in the negotiations as to terms between the railway companies and the two public bodies representing the ratepayers. The rock upon which the various proposals came to grief was the reluctance of the Corporation and the Metropolitan Board of Works to undertake the provision of an indefinite sum towards the enormous expense of the works. The Metropolitan Board of Works made a final offer of £500,000, and the City Commissions of Sewers of £250,000, but this the companies declined; the matter has now been satisfactorily arranged by the increasing of the contribution of the citizens from £250,000 to £300,000 and there is no longer any difference between the public bodies and the companies, but, on the contrary, an earnest wish by them all that a work so important and so vastly needed should be carried to completion without the slightest possible delay. The instalment of work begun on Monday will commence at Aldgate station and go thence underground from High-street, Aldgate, into the Minories at Church-street, down the Minories to John-street, then, turning slightly to the right, under the viaduct of the Great Eastern Railway, through the centre of the Crescent in the Minories, and thence under Trinity-square to Seething-lane, where it will terminate. The final, and, if possible, more important, work will include an underground line under Tower-street, Eastcheap, King William-street, and Cannon-street to the Mansion-house, completing the circle. In order to carry out this latter scheme all the houses on the south side of Eastcheap will be removed, so as to gain a width of 60ft. for the new street or avenue from the Monument to the Tower. The houses on the north of Great and Little Tower streets will also be pulled down for the purposes of this important thoroughfare, which, when finished, will open a direct line of carriage traffic from Westminster-bridge to the Tower. Both the railway and the street improvements are to be undertaken by the railway companies, the public bodies contributing the fixed sums already mentioned in sectional payments from time to time as the works progress.

JAPANESE PORCELAIN PAINTING.

JAPANESE porcelain painting may be divided into two categories, decorative and graphic. The first, according to a paper in the *Society of Arts Journal*, is used to improve the vessel upon which it is placed, and this class includes all the

ware except that of the province of Kaga, which would come under the head of graphic, as it delineates all the trades, occupations, sports, customs, and costumes of the people, as well as the scenery, flora, and fauna of the country. "Owari ware" is made in the province of that name; it is not as translucent, but stronger and more tenacious, than some of the Hiizen manufacture. The principal potteries are at a village called Scto, twelve miles from the sea; in this village there are more than 200 kilns. The ware is mostly painted a cobalt blue, and is merely of a decorative kind, consisting of branches of trees, grass, flowers, birds, and insects, all these being copied by the artist from nature. All the Owari ware is true hard porcelain, and is strong and durable. In Hiizen, a number of wares are manufactured, the best known kind being the "Eurari," which is made at Arita, but painted at Eurari. The colours in use are red, blue, green, and gold; these are combined in various proportions, but, as a rule, the red predominates. Generally, the surface of the vessel is divided into medallions of figures, which alternately have red, blue, or white background, with figures in green or blue and gold. The eggshell porcelain sold at Nagasaki is made in this province from Arita clay, and this is made from clay with no admixture of fusible matter except that contained by the clay naturally. The province of Satsuma is noted for crackled ware. It is only within a very few years that large vases have been manufactured, and in earlier days the old ware was confined to small vessels. The glaze is a silicate of alumina and potash, and the best ware has a complete net-work of the finest crackles; the painting is of birds and flowers, and noted for its delicate lines of green, red, and gold. In Kioto the ware manufactured is very similar to that produced in Satsuma, but it is lighter and more porous; the decorations are also nearly the same, being of birds and flowers. There is a description of ware made in Kioto, called "Eraku," the whole body of which is covered with a red oxide of iron, and over this mythical figures of gold are traced. That produced in Kaga is *faience*, and in the style of painting is unlike any other in Japan, the predominating colour being a light red, used with green and gold. The designs with which it is profusely decorated are trees, grasses, flowers, birds, and figures of all classes of people, with their costumes, occupations, and pastimes. The "Banko" ware is made at the head of the Owari Bay; it is an unglazed stoneware, very light and durable, made on moulds in irregular shapes, and decorated with figures in relief. On the island of Awadji, a delicate, creamy, crackled, soft paste porcelain is made. The figures used in decoration are birds and flowers, but outlined by heavy, dark lines. Consul Van Buren is of opinion that, at no distant day, Japan will be one of the foremost competitors in the pottery markets of the world, on account of the great variety and excellence of the clays, their proximity to the sea, the cheapness of labour, and the beauty and originality of the decorations. Already this important industry has been greatly stimulated by the foreign demand, and by the success of Japanese exhibitors at the exhibitions of Vienna, Philadelphia, and Paris.

NEW WEST-END THEATRES.

TWO out of the three new theatres which have for some months past been in course of erection at the West-end, are rapidly approaching completion, and are intended to be opened within the next fortnight. The "Beaufort," in the Savoy, which has been erected for Mr. D'Oyley Carte, and which we have already illustrated, is to be opened on Friday, the 16th inst., and, preparatory to its opening, wood-paving is to be laid down in Beaufort-buildings, at the cost of the owner of the theatre. The theatre has two main frontages, one at the south side, facing the Thames Embankment, and the other in Beaufort-buildings. The height of the structure from the ground-level in Beaufort-buildings, and also the south frontage overlooking the Embankment, is limited; but these external features give no indication of the internal area, or altitude from the pit to the ceiling. From the Strand, or north boundary of the theatre, there is a considerable descent in the roadway along Beaufort-buildings, and, with the view of providing both stage and auditorium space, excavations have been made in the building over

the entire area of the interior, to the depth at the north end of almost the height of the external walls themselves from the street level, with proportionate excavation at the south end. This permits of a spacious stage and stage dock beneath it at the north end, together with a large and convenient auditorium, including pit, stalls, lower and upper circles, and gallery. The carriage and principal approach will be from the Embankment and along Savoy-hill, but there will likewise be approaches for pedestrians on the east side from the Strand. Mr. C. J. Phipps is the architect of the theatre. Mr. Alexander Henderson's new theatre at the corner of Panton-street and Oxendon-street, Haymarket, is likewise making rapid progress, and it is stated that the opening night will be on the 1st of October. Like the Beaufort, the external features of the building do not represent its internal capacity, the audience and stage portions being both, to a large extent, obtained by excavating several feet below the street-level. The building, a portion of which is said to occupy the site of the house in which Addison wrote his poem of "The Campaign," is designated the Alexandra Theatre. Mr. Verity is the architect. The construction of the Avenue Theatre, for Mr. Sefton Parry, at the bottom of Northumberland-avenue, is being actively pushed forward. The site of the theatre is at the angle of Northumberland-avenue and Craven-street. In accordance with what is understood to be the stipulation of the Metropolitan Board of Works—that all buildings in Northumberland-avenue are to be faced with stone—the theatre will have handsome elevations in Portland stone, with a considerable extent of ornamental carvings. In addition to the elevation immediately facing the avenue, there will be another frontage to the Embankment, circular in form. The building has already been carried to a height of several feet above the ground-line. Messrs. Fowler and Hill are the architects.

ASPHALTUM.

THE use of asphaltum was frequent in ancient works. We hear of its being employed to cement together bricks, as in the walls of Babylon, which were built of bricks set in hot bitumen. The Egyptians used it in embalming the dead, and it is known that a substance is obtained from Egyptian tombs for preparing a pigment called "mummy." It is recorded also that the old painters used a preparation of this substance for glazing their pictures. Mrs. Merrifield, in her "Treatise on Painting," notices the subject, and alludes to the pictures of Titian, which are said to have been glazed with asphaltum; the shadows were put on with it. Cima da Conegliano used it also in the shadows, and Tintoretto employed it largely. It is quite certain the art of using it as a pigment is now all but lost; the bitumen must be very pure. As a material to warm and glaze other colours asphaltum is a very useful addition to the painter's palette, and it may be employed with advantage in broad surfaces, backgrounds, and draperies. For the glazing of dark colours mere transparency is a valuable quality. There are few materials more desirable; but its liability to crack is well-known, and a particular manner of employing it in thin coats is necessary.

A NEW COLLEGE OF PRACTICAL ENGINEERING.

A NEW College of Practical Engineering has been opened at Muswell Hill, near London, under the auspices of a number of the most eminent practical engineers in the kingdom, among whom we may mention Sir John Anderson, late chief engineer at Woolwich; Sir Henry Bessemer, inventor of the Bessemer process; Sir R. M. Stephenson, founder of railways in the East; Sir John Whitworth, Bart., founder of the Whitworth Scholarships; Mr. Charles Manby, honorary secretary of the Institution of Civil Engineers; and a great many more—men recognised as among the most eminent living practitioners in the different departments of engineering art which they severally adorn. The principal of the college is Mr. John Bourne, C.E., well known by his works on the steam-engine and other kindred subjects. The instruction given will combine the best theory with the best practice, and the establishment of this Col-

lege will, it is expected, constitute an epoch in engineering history. One main distinction which its teaching will present is that there will be no *examinations*, and that everything taught will be permanently and practically useful. Another special feature will be that a number of treatises illustrative of engineering art will be produced at the College, forming together an engineers' library. In furtherance of this undertaking the valuable stores of practical information accumulated at the Institution of Civil Engineers will be made available, and selected students will be adopted as *collaborators* in this important work and their names published, whereby their attainments will be made so widely and so favourably known as to constitute a valuable credential during their whole subsequent careers. Mr. Bourne's engineering works have not only gone through numerous editions in this country, but have been translated into all the languages of Europe, and are used as textbooks in many technical colleges both at home and abroad. The hands of the students will be educated as well as their heads. They will be taught how to work accurately in wood and metal, and when their two years of instruction terminates they may be expected to be real acquisitions to any engineer's office or factory they may enter.

THE SURVEYORS' INSTITUTION.

THE following explanatory statement has been forwarded by the council to the members of the Institution.

The council have the pleasure of informing the members that the Institution of Surveyors has now been incorporated by Royal Charter, under the above title, by Letters Patent under the Great Seal.

The president and council in office at the date of the Charter are thereby appointed the first president and first council of the corporate body, and are to hold office until the promulgation of the new by-laws, which are to be agreed upon by the general body of members, and submitted for approval to the lords of the council, within a time specified in the Charter. The constitution of the council and their powers remain substantially unchanged. All rights of existing members are carefully guarded, and their previous status secured in the reclassification for which the Charter provides. Members of the institution will, in future, be denominated Fellows, with the right to use the designatory letters F.S.I. after their names. The class of Associates are to be subdivided into two classes, Professional Associates and Associates. Present Surveyor-Associates are to be placed in the former of these two classes and are accorded the right to use the distinctive letters P.A.S.I. after their names.

Provision is made for the gradual introduction of the system of examinations for all classes of members which has already been fore-shadowed in the Education Scheme for Students, in operation for some time past. Students will be called upon to undergo an examination at the commencement (and if they desire to become professional associates, another examination at the close of their student course. Persons will, as heretofore, be eligible for election to both classes of Associates, without examination, till a date specified in the Charter, and to the Class of Fellows (also without examination) till a further date. After the latter date there will be no admission to the class of Fellows or Professional Associates without examination, the dates being so fixed as to afford the fullest opportunity for all surveyors at present in practice, or at present qualifying themselves for practice, to join the Institution without the ordeal of examinations.

It follows from these provisions of the Charter that in course of time the class of Fellows will be almost wholly composed of persons who have passed by examination through the classes of students and professional Associates; but it will at all times be open to surveyors (though probably with less facility) to pass direct by examination into the class for which they are in other respects eligible. The Council are to renew each year the certificates of membership of each Fellow and professional Associate, on such conditions and on the payment of such subscription as by-laws prescribe.

All administrative details are left to by-laws, but all changes in the by-laws must be submitted for approval to the Lords of the Council,

and, if allowed, be published, with the form of allowance, in the Gazette.

The following (elected members of the council in May last, and who are representative of the profession throughout the country) are nominated in the charter as the first council of the new corporate body—viz., E. Ryde, Westminster (President for the year); T. Smith Woodley and F. Huskinson, Notts; W. J. Bendel, London and Essex; E. P. Squares, London and Wilts; T. Bunnie, Glasgow; V. Buckland, T. C. Clarke, H. J. Castle, E. N. Clifton, J. Clutton, R. C. Driver, E. L'Anson, C. J. Shoppee, C. Stephenson, F. Vigers, and D. Watney, of London; W. Fowler, of Birmingham; James Martin, of Boston; W. Searth, of Darlington; and W. Surge, of Bristol; with R. B. Grantham, C.E., and F. M. White, Q.C., as associates of council.

THE LATE MR. CHARLES GRAY.

THE death of this gentleman, on the 1st inst., at the age of 53, will remind many of our readers of the origination of the Architectural Association, in which, five-and-thirty years ago, he took a prominent part, being, we believe, its first honorary secretary. Mr. Gray started in practice some years afterwards with considerable promise and much activity. Several buildings which he erected at the corners of streets in the Covent Garden neighbourhood, to be occupied as chambers, attracted much attention at the time by their bold and original treatment in brickwork. It is to be regretted, however, that the architect's enterprise led him into financial speculations in connection with these and other buildings, which resulted in ruin, and he has now passed away, leaving a family unprovided for. The members of the Architectural Association, in particular, owe a great deal to the memory of Mr. Gray. At the time when a letter bearing his signature appeared in a professional journal, calling attention to the lack of means for acquiring architectural education, and leading eventually to the establishment of the Association, he was only 18 years of age; and the energy thus early manifested was long continued in the service of the society. In competition work, Mr. Gray is understood to have taken his part with considerable credit, and in the well-remembered contest for the Memorial Church at Constantinople, his design received honourable mention, proving that he had in him the making of a better man if fate had been less unkind.

THE SECONDARY STRAINS IN IRON STRUCTURES.*

THE calculation of strains in triangulated systems (girders) is generally performed as if the bars were joined at their ends by hinges offering no frictional resistance; so that, when the system deflects in consequence of the lengthening and shortening of the bars, the angles of each triangle change accordingly, the bars retain their condition of being straight. This is not the case in reality, especially in girders with riveted connections. The bars are compelled on the one hand to retain their angles towards each other at the junctions, and on the other to follow the altered positions of the corners of the triangles, the consequence being the bending of each bar with generally one point of contrary flexure, and the occurrence of transverse strains (secondary strains) in addition to the axial strains (primary strains).

If S be the axial or primary strain in a bar, F its sectional area, J its moment of inertia, r the distance of an extreme fibre from the neutral fibre, and M the bending moment, then X , the maximum strain, is—

$$X = \frac{S}{F} + \frac{M}{J} \quad \dots \dots \dots (1)$$

If further a be the length of one side of a triangle, σ_1 and σ_2 the projections upon it of the other two sides σ_3 , σ_4 , σ_5 , the rates of changes of length of the corresponding three sides, h the height of the triangle measured from a , then the change of the angle opposite a is:

$$\Delta a = \frac{1}{h} (\sigma_3 \sigma_4 - \sigma_1 \sigma_2) \quad \dots \dots \dots 2$$

If finally τ is the angle which the end of a

bar in the bent state forms with the straight line between the ends of the bar (deviation angle) so that τ_1 and τ_2 are the two deviation angles of a bar having a length = l , a moment of inertia = J , and a modulus of elasticity = E , then the moments at each end of the bar are:

$$M_1 = \frac{2EJ}{l} (\tau_1 + \tau_2) \quad \dots \dots \dots (3)$$

$$M_2 = \frac{2EJ}{l} (\tau_1 - \tau_2) \quad \dots \dots \dots$$

The process of calculating the strains is now as follows:—By means of equation (2) all the angles in the system after the deflection are ascertained, assuming that the bars remain straight; then, since the angles between the bars at their ends remain unchanged there would, in the expressions for the deviation angles of the bars of the same junction, be only one unknown quantity, viz., the deviation angle (τ) of one of the bars. By applying these equations (3) to each bar at one point of junction, and considering that the aggregate of the moments for that point must be = 0, and, by doing the same for each point of junction, so many equations are obtained as there are unknown deviation angles τ . By putting these values into equations (3) all the moments are ascertained, and consequently by means of equation (1) the strains are found. This solves the problem. For the calculation of examples, equation (1) can be brought to the following form:—

$$X = m \frac{r}{h} k \quad \dots \dots \dots (4)$$

where k is the primary strain, h the depth of the girder, r the distance of an extreme fibre from the neutral fibre, and m a coefficient dependent on the geometrical conditions of the structure. The formula establishes at once the rule that the bars in a girder should not be too broad. Calculating m for various examples, the author finds a number of results, some of which are as follows:

Warren girder—single system, broad flanges and narrow diagonals (i.e., measured in the vertical plane); m (for flange) = 2; m (for diagonals) = 6 to 12.

The same—narrow flanges and broad diagonals; m (flanges) = 1.0 to 1.4; m (diagonals) = 5 to 14.

Panel girder—single system, broad flanges; m (flanges) = 2; m (diagonals) = 8 to 14; m (verticals) = 17 to 20.

The same—narrow flanges; m (flanges) = 10 to 23; m (diagonals) = 1.7 to 3.4; m (verticals) = 3 to 5.

Putting m into equation (4), it is found, for example, that the secondary strains in the end vertices of panel girders may amount to 30 or 35 per cent. of the primary strains; and further, as a general result, the panel bridges contain greater secondary strains than Warren or lattice girders.

Lattice girder—parallel flanges, double system; diagonals free at crossings. This is generally under similar conditions as the girder with a single system, but at the ends the secondary strains amount to about 40 per cent. more.

The same—diagonals rigidly fixed. The secondary strains are in the centre about 13 per cent., and at the ends about 70 per cent. of the primary strains. This is very much increased if only one system is loaded—viz., in flanges to the 3.5 to 12 fold, and in the lattice-work to the 2.5 to 5 fold; but if additional narrow verticals are introduced, the strains are the same as if both systems were loaded.

Girders with polygonal flanges are advantageous on account of the diagonals and verticals being narrow. The secondary strains in parabolic girders with single system amount to only 8 to 12 per cent.

Systems with hinged connections. Here is:

$$X = \frac{1}{2} f \frac{d^2}{r^2} k,$$

d being the diameter of the pin, r the radius of gyration of a bar, and f the coefficient of friction. For rectangular sections and $f = 0.16$

$$X = 0.21 \frac{d^2}{r^2} k.$$

This, applied to some existing bridges, gives secondary strains not inferior to those with riveted connections; but the advantage of pin connections is that the vibrations from the moving load probably overcome the friction to some extent, and that consequently the

* By Dr. E. WISSER. From "Deutsche Bauzeitung" for Abstracts of Institution of Civil Engineers.

secondary strains due to the fixed load need not be taken into account. In bridges with riveted connection an artificial mode of erection would be required to produce a similar result.

ARCHÆOLOGICAL.

AMERICAN ARCHÆOLOGY.—The fourth biennial congress of the students of the above science will be held at Madrid from September 23 to 28, inclusive. The congress meets under the patronage of King Alfonso and of the municipality of Madrid, and strangers will have a rare opportunity of examining the various interesting museums and collections in the Spanish capital. The lineal descendants of Montezuma and Columbus will preside at some of the meetings.

CHESFIELD.—While digging the foundations for a house about to be erected at Chesfield, Lower Teddington-road, Hampton Wick, the workmen have brought to light some interesting remains, consisting of several earthen vessels or urns, rudely fashioned, and filled with animal charcoal and calcined bones, but whether of human beings or animals is at present uncertain. Most of the vessels crumbled to pieces on being exposed to the air, but two are preserved almost entire. They are about 12 in. in height, have evidently been formed by the hand—not by the lathe—and are ornamented with a border and rude handles. They were found at a depth of about 10 ft. from the surface, and as no implements, either of flint or metal, have been discovered, it is probable that these relics date from a very early period, even before the Roman occupation of this island. Urns of unbaked clay of a similar form and character have been discovered in the barrows on Salisbury Plain, but in their immediate neighbourhood were found beads of glass and amber, heads of spears, swords, and brass articles; in some of those barrows were also discovered the burnt bones of dogs, fowls, horses, and other animals. As no metal or even flint implements have been discovered at Hampton Wick, it seems probable that these remains belong to a period more remote than those which were found in the barrows on Salisbury Plain.

A RELIC OF THE CIVIL WARS.—A very curious and remarkable seal has recently been found on Washcommon, the scene of the first battle of Newbury, Sept. 20th, 1643, near the spot where the Falkland Memorial is erected. The seal is circular, and made of brass, measuring lin. and 8-10th in diameter. It bears the device of a skeleton, with the surgeon's knife in the dexter hand, and an hour-glass on the sinister side. The legend with which it is inscribed is as follows:—"THE SOCIETY AND LOYALTY OF CHYRURGEONS HALL LONDON." This seal is supposed to have been used by the surgeons belonging to the Chirurgeon's Company of London attached to the Royal army at Newbury, and it was probably lost in the encounter.

CHIPS.

An elaborate memorial has just been placed in the east wall of the nave of Luddenden Church, to the late Mr. and Mrs. Appleyard, of Clare Hall, Halifax. It consists of a semi-octagonal recess of Caen stone with pierced and projecting canopy; on either side is an angle buttress with crocketed pinnacles. Within is an angel carved in white marble and bearing an inscribed shield. The figure is the work of Mr. E. J. Boehm, A.R.A., the stonework of Mr. Terry, of North Brixton, and the execution of the memorial has been superintended by Mr. W. Swinfen Barber, of Halifax.

The parish-church of Langford, near Witham, Essex, was reopened on Wednesday week, after restoration carried out at a cost of £3,000. Mr. Browning, of Stamford, was the architect, and Mr. Thompson, of Peterborough, the contractor.

A new bridge, 30 ft. wide between parapets, is being thrown across the railway at Ovenden, near Halifax, in connection with the opening up of new roads in that district. Messrs. James Brier, Sons, and Wilson, of Dewsbury, are the contractors, and the work is being carried out under the superintendence of Mr. Kell, district engineer, of Leeds.

Two memorial windows have just been erected in the Lady-chapel of Chichester cathedral. That to the memory of Canon Ashwell represents Our Lord in the midst of the Doctors in the Temple; the other, to the Countess of March, shows Simeon bearing in his arms the Infant Christ. Messrs. Clayton and Bell, of Regent-street, London, carried out the work.

Building Intelligence.

BIRKENHEAD.—The Unitarian church at Charing-cross, Birkenhead, was reopened on Sunday last, the 4th inst., after various alterations and additions had been made. A new chancel, 17 ft. 6 in. x 12 ft., has been added, with organ-chamber and vestry attached. A window to chancel has been executed, filled in with stained glass, subject being "A Vision of St. Louis on the Shores of Palestine." New glass has been put in all the old windows, and the whole church has been refurnished and decorated. The lecture-hall below has been nearly doubled in size, with cloak-room and conveniences attached, and new approaches thereto. The whole, which has cost about £1,850, has been carried out under the direction and supervision of Mr. James N. Crofts, architect, 5, Harrington-street, Liverpool.

CARRICK-ON-SUIR.—A new church has been dedicated in honour of St. Nicholas in the town of Carrick-on-Suir, which stands on the borders of the two counties of Waterford and Tipperary. About seven years ago, Mr. J. J. MacCarthy rebuilt the front on a design which closely follows that of San Miniato at Florence. But subsequently the parish priest determined to rebuild the whole, and entrusted the preparation of plans to Mr. C. Ashlin, whose design harmonises with the front. The style is Romanesque, and consists of nave, aisles, apse, chancel, and side-chapels. Two tribunes have been added for the accommodation of the Presentation Nuns and the Sisters of Mercy, whose convents are contiguous to the church. The internal dimensions are:—Length, 151 ft.; width, 61 ft.; height of nave to ceiling, 52 ft.; height of aisles to ceiling, 31 ft. The nave arcade carrying the clerestory walls is supported on columns 20 feet in height, having shafts of polished red granite, with Kilkenny marble bases and elaborately carved Portland stone capitals. The chief light of the church is derived from the clerestory, the walls of which are pierced by twenty-four semicircular-headed windows, which are filled with stained glass. There is a lofty arch at the termination of the nave, supported on piers having shafts and pilasters of red and blue granite. The capitals of these piers have sculptured representations of the emblems of the Four Evangelists, and of adoring angels alternately. The aisles are terminated by similar arches resting on pilasters having blue granite shafts. The ceilings of the chancel and side-chapels are groined and enriched with carved bosses. The ceilings of the nave and aisles are flat, and divided into panels by deeply-moulded and enriched beams. The Communion railing is of white marble, having shafts of Siena marble and panels of Mexican onyx. The gates are of wrought iron and brass, and are enriched with coloured marbles. The floor of the sanctuary is laid with encaustic tiles. The high altar is of white marble.

CULLEYBACKEY.—A new Presbyterian Church at Culleybackey, near Ballymena, was opened on the 1st inst. The church is Early Decorated in style, and consists of nave and transepts. On one side of the principal front is a tower of four stages, having upon it a spire, the whole rising to a total height of 130 ft. from ground. The walling is of local basalt, with dressings of Dungannon sandstone. Above the platform and in each transept is a large circular traceried window. The roofs are half-ceiled. The internal joinery is of pitch-pine and walnut varnished, and seats are provided for 700 worshippers. Messrs. Young and Mackenzie, of Belfast, were the architects, and Messrs. H. M'Manus and Sons, of Randalstown, the contractors; Messrs. Ballantine and Co., of Edinburgh, supplied the stained-glass with which the principal end window and a side-light are filled. The cost of the church has been about £5,000.

DARTMOUTH.—The Royal Dart Yacht Club House, at Kingswear, Dartmouth, was formally opened on Friday week with a ball given by the flag officers of the club and Mr. Llewellyn. The new building contains on the ground-floor a smoking-room, writing-room, bar, cloak-room, &c. for gentlemen, and the kitchen offices. On the upper floor a reading-room, ladies' room, with cloak-room, &c. The building is of red brick, and finished throughout on the inside

with pitch-pine and white deal, varnished. Attached to the premises is a large lawn-tennis court. The work has been carried out by Mr. J. Fraden, builder, of Ashburton, from the designs and under the superintendence of Mr. Edward Appleton, architect, of Torquay.

HASTINGS.—The new Town Hall at Hastings was opened on Wednesday. The building, which in style is a free treatment of Early English Gothic, has its principal façade in the Queen's-road, near the centre of the modern part of the town. The public entrance to the court-room, in which the sessions, the county court, and police-court cases will be taken, is from a street on the opposite or western side of the building. In the arrangement of the interior of the court, provisions, not usually found in such buildings, have been made for the comfort of jurymen, and a system of ventilation has been adopted which it is hoped will give sufficient fresh air without causing dangerous draughts. On the north side, which overlooks a public recreation ground, locally known as the Cricket-field, the chief features of the exterior are the large recessed window of the Council Chamber and eight large stone panels in the pediments of the windows, carved in high relief, the work of Mr. Earp. These represent the arms of the Cinque Ports, the building of Hastings Castle, the battle of Hastings, the Cinque Ports barons bearing, by ancient privilege, the canopy at the coronation of some king, the defeat of a force of French invaders in 1360, Queen Elizabeth granting a charter to the corporation in 1558, the sailing of ships fitted out by the Cinque Ports to meet the Spanish Armada in the same year, and Hastings fishermen boarding French pirates. The building is of a local blue stone, said to be harder and more durable than Kentish rag; the dressings are of Bath stone. The cost of the building, including fitting and furnishing, will amount to about £20,000. Mr. Henry Ward is the architect, and Messrs. D. C. Jones and Co., of Gloucester, were the builders.

STAINES.—A new river-wall is being constructed at the back of the new Town-hall, Staines, in order to obtain a regular frontage line to the river, together with a suitable landing-stage and steps, leading to the New roadway at the side of the Town-hall. It is being built partly with bricks and partly with cement concrete rusticated blocks, and will form a retaining-wall to the vacant land at the side of the river. It will be raised in order to prevent the land from being swamped by the winter floods. The spare land will in all probability be sold for building purposes, in plots suitable for a class of house much needed in the town. The whole of the works are being carried out by Mr. Ralph Fitt, C.E., the surveyor to the Staines Local Board.

WEYBRIDGE, SURREY.—A new Roman Catholic church, erected near the railway station, was opened on Wednesday week. It is Early Decorated in style, and consists of nave, chancel, and Lady-chapel. The walls are of Bargate stone, with dressings, stringcourse, and quoins of Bath stone. The windows are in triplets, each light containing a stained-glass figure of a saint. The seats are open, of stained yellow pine, and provide accommodation for 200 persons. The altar is of Bath stone, the reredos of stone, gilded, and the baldacchino is supported by carved figures of angels playing musical instruments. The chancel-floor is paved with Minton's encaustic tiles. The pulpit is of Caen stone relieved with gilding. A new presbytery is in course of erection on the north side of church. The architect is Mr. Alfred S. Purdie, of Notting Hill, W., and the builder, Mr. S. Woods, of Weybridge. The cost has been about £3,000.

The Golden Valley Railway, in South-west Herefordshire, was opened for traffic on Thursday, the 1st inst. It extends from a junction with the Great Western system at Pontrilas to Abbeydore, Vowchurch, Peterchurch, and Dorstone, at present the terminus. With stations in each of those villages, the length is eleven miles, but it is intended eventually to extend the line north-west to Hay and south-east to Monmouth. Mr. G. F. Ellis was the engineer, and Mr. J. P. Edwards, the contractor.

The corner-stone of a new Reform Club was laid at Heywood, S.E. Lancashire, on Saturday last. The building will be erected on the site of the old market at a cost of about £5,000; Messrs. Maxwell and Tuke, of Bury, Lancashire, are the architects.

COMPETITIONS.

DARLINGTON BOARD-SCHOOL COMPETITION.—At a recent meeting of the Darlington School-board, called for the purpose of considering competitive drawings for the proposed additions and alterations to the Bank Top Schools, the design of Mr. G. G. Hoskins, F.R.I.B.A., of Darlington, was unanimously selected. The competition was confined to architects resident in Darlington.

FULHAM WORKHOUSE INFIRMARY.—For the proposed new infirmary at the Fulham-road workhouse, about 30 sets of designs were sent in on Thursday, the 1st inst. Their examination has been deferred by the guardians till Tuesday next.

THE GLASGOW MUNICIPAL BUILDINGS.—At the last meeting of the Glasgow Town Council, in answer to Mr. Filshill, who inquired if it would not be well for the city architect to begin and prepare a foundation for the new Municipal Buildings in George-square: the Lord Provost said he had made inquiries on this subject of architects who had been engaged in large operations, and he had been told that it would not facilitate operations for the city architect to begin and prepare the foundation just now. His Lordship added that there had been 135 sets of plans sent in for the competition, as compared with 96 on the previous occasion.

CHIPS.

A competition is to be held shortly of designs for the reconstruction and enlargement of the Sorbonne. The expense is estimated at more than 22,000,000fr.

The foundation-stone of the new parish-church of Duncausburgh, Fort William, was laid last week. The plans are by Messrs. Ross and Mackintosh, architects, Inverness and Oban, and the contract was taken by Messrs. Henderson and McInnes, Ballachulish. The building of the church involves an outlay of about £3,700.

A memorial-stone was laid at Mount Zion Primitive Methodist chapel, Norland, near Halifax, to celebrate the enlargement and addition of new classrooms. Mr. J. Pirih, of Elland, is the architect, and the work is being carried out by local contractors.

On Tuesday a new Baptist chapel was opened in Commercial-street, Hereford. It seats 700 persons, and has been erected by Mr. William Bowers, contractor, Hereford.

The parish-church of Goodleigh, Devon, is in course of rebuilding. Mr. Thomas Garland, of Barnstaple, is the contractor.

A Sanitary Protection Association, for Portsmouth, which is intended to undertake the supervision of the drainage arrangements of private houses, so as to insure their proper sanitary condition, was started at a meeting held on Monday night under the chairmanship of the ex-mayor, Mr. Alderman Cudlipp. The association proposes, as a supplementary object, to enable its members to procure practical advice on moderate terms, so as to obtain the best means of remedying defects in houses of the poorer classes.

A correspondent of the *Standard* enters a protest against the desecration of the Priory Chapel of St. Leonard, at Stamford, where, he says, it is actually proposed to turn the north aisle into a cart-hovel, and to shut out this fine Medieval building from the public view. The Priory is one of great interest to architects and antiquaries, to say nothing of the sacrilege of putting to most ignoble uses a consecrated building of the Christian Church.—It has twice been illustrated in the *Building News*—on Jan. 3, 1875, and on Jan. 26, 1877.

Forty of the passengers of the ill-fated *Tarent* comprised masons, joiners, and painters, with their wives and children, and other relatives. Eight are known in Glasgow, five being young men who were proceeding as painters to Port Elizabeth under an engagement from a Glasgow firm.

We are informed that Mr. Thomas Armstrong will succeed Mr. Poynter, R.A., as art-director at South Kensington, and Mr. Sparkes (now head master) as principal of the National Art Training School. Mr. Poynter has, however, consented to continue his connection with the department as visitor of the Training School.

An inquiry is to be held to-day (Friday) at Alfreton, before Mr. R. Morgan, inspector, into an application to the Local Government Board from the Alfreton urban sanitary authority for sanction to borrow a further sum of £1,000 for works of water supply.

"To a practical man with a taste for mechanics, and the bumps of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *Engineering*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion.—The *Engineering*. Price Two pence of all newsmen, or post free 2d.—31, Tavistock-street, Covent-garden, W.C."

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31 TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. THOMAS EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 3s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 3fr. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—D. Bros. and Co.—H. L. B.—J. F. E.—J. M.—D. F. Co.—G. S. and Co.—H. and Co.—E. C.

Correspondence.

ARCHITECTURAL EXHIBITIONS.

To the Editor of the BUILDING NEWS.

SIR,—Looking over a back volume of the *Building News* the other day, I came across some proposals that an exhibition as above should be held (but, I believe, only in consequence of the coming Architectural Conference, and for the members especially to inspect). Now what my object in writing is, is to suggest that such an exhibition should be held annually in London, and open to all members of the profession without limitation as to age; that also in addition there should be prizes awarded to the best designs sent by students under, say, 25 years of age, but to none older. The question would, I dare say, be asked: "But where would the funds come from?" Surely there are a great many members of the profession ready to subscribe towards it; and this, with a small fee for entrance, would certainly cover all expenses the exhibition would entail. This would, I am quite sure, confer upon all architectural students in this country a long-wished-for boon, not only enabling those in London, from seeing other styles of design, &c., but by giving all students something definite to employ their leisure time with.

I am very sure that once an idea of this kind took root, and aided by some influential members of the profession, it would in a very short space of time be an acknowledged benefit to the profession at large.

Hoping sincerely that some of your numerous readers and contributors will take this idea up and fully develop it, and apologising for trespassing on your valuable space,—I am, &c.,

C. L. MALLORY.

Bedford, Sept. 6.

THE DESTRUCTION OF THE LANTERN TOWER OF WIMBORNE MINSTER, DORSET.

SIR,—In reply to Mr. Mills Robbins' letter, I beg to state that when in Wimborne last year, I was informed that it had been the express wish of the late Mr. Wyatt that he should be succeeded in any restoration work at the Minster by Mr. Christian; and, subsequently, that a report had been received from Mr. Ewan Christian, and "adopted."

Can, therefore, Mr. Mills Robbins substantiate his statement that Mr. Christian has "nothing to do with the restoration of the tower," by giving the name of "the architect" vaguely alluded to as having unsuccessfully demanded an apology for the obnoxious word "vandalism"?

Surely the preservation of so valuable and unique a specimen of Medieval architecture is of sufficient importance to make it essential that the names of those responsible should be made public.—I am, &c.,

FRANCIS E. JONES.

20, Cockspur-street, London, S.W., September 5th.

SIR,—As it may injure the subscription list for the above if the charges of your correspondent, Mr. Mills Robbins, are allowed to go unchallenged, and as he seems unwilling to publish my letters, I feel it my duty to ask you to insert a few words to correct the statement he has made. The lantern-tower of this church is built of four different sorts of stone—Portland, Purbeck, Tisbury, and Heath-stone, in random courses, and without any regard to colour. In the repair now being executed, the greatest care has been taken to replace the decayed masonry with stone of similar character and colour. Your correspondent has behaved throughout in the most uncourteous manner. The fact of his inspecting the works without first giving me notice of his intention of doing so, is quite enough to show what he is and why he was so anxious to appear in print.—I am, &c.,

WALTER J. FLETCHER.

Wimborne, Sept. 3rd.

DESIGNS FOR STAINED GLASS.

SIR,—Some little time ago eight of the principal stained-glass firms were asked by Mr. Walter Hanstock, F.R.I.B.A., a well known Yorkshire architect, for designs for a proposed memorial window. Ultimately, the design of Mayer, of Munich, was chosen by the client, not on the score of cheapness, certainly, for his estimate was the highest one of the lot. In due course the other seven were written to and thanked, and the gentleman's choice notified to each one of them. Upon this, one firm of glass-stainers sent Mr. Hanstock a bill for £3 for design supplied for approval. This he resisted, as unreasonable, and contrary to the custom of the trade. The ultimate result was that Mr. Hanstock was served with a County-court summons last week by the artists in question to appear at Dewsbury at the next Court held there.

Are architects personally liable whenever they solicit designs or prices on behalf of their clients from makers of specialties? If so, it may be prudent on their part to abstain from placing themselves under such serious obligations in the future. For a gentleman, under such circumstances, to be dragged, as a defaulter, into the nearest County-court, seems, even at the best, an extraordinary proceeding.—I am, &c.,

QUERY.

COMPETITION: VICTOR EMMANUEL MEMORIAL.

SIR,—I fear there is something "uncanny" about this, judging from a rather prominent announcement in the *Daily News* of 6th. The time for receipt of designs is not till the 23rd inst., and yet from the information the *Daily News* is authorised to give, it would appear the matter is already settled. Particulars of what the design is to be given, also the terms arranged with the "Artist," &c.; also the locality of the memorial—Piazza del Indipendenza, in Florence—although the instructions of the competition distinctly stipulate it is to be in Rome. It is just possible the editor or informant are under some mistake, but a brief time will show this.

Meanwhile, I, as a competitor, have telegraphed to stop the delivery of my drawings *in transitu*, having only sent them off four days since.—I am, &c.,
September 7th. COMPETITOR.

EXPANSION OF CEMENT AND CONCRETE.

SIR,—Cracks in the New Victoria Dock walls are, no doubt, due to contraction, and Messrs. Dyckerhoff's experiments indicate the expansive character of the cement they used. It will be dangerous for the engineer or architect to ignore the teachings thus placed before them. All experienced cement and concrete-makers are well acquainted with both of these developments, and carefully guard against their dangers. Until recent years, all the vagaries surrounding the use of imperfect cement was looked upon as "swelling," "flying," or "cracking." The cause of these faulty results was not examined with any degree of accuracy in past times; but it is now well-known that defective crystallisation is the source from which all these evils spring. There is no "see-saw" process, as suggested, further than that due to fluctuating temperature, and to which all building materials are in different degrees liable.

Setting of cement is a chemical process, and is best performed where the required reactions are in accordance with natural laws; any departure or divergence above or below the datum of safety (as true Portland cement), produces expansion or contraction. The cement user is helpless unless he can command a reliable supply of good Portland cement, the acceptance or rejection of which should depend upon his own carefulness.

I am afraid that Mr. Faija's panacea for the control of cracks will not afford much comfort to the afflicted. It is impossible, by means of laths or "thin wooden battens" to concentrate the eccentric cracking of a faulty cement, and, even if Mr. Faija were to supplement his wood fixings by the strongest of iron cramps, the contractive or expansive action would travel in all directions, regardless of any ingenious mechanical dictation.

A somewhat amusing example of this kind of attempted controlment took place at Liverpool about ten years ago. At St. George's Pier-head, when the new approaches were made, the engineer determined that the monolithic concrete foot pavement should be first-class in character. To insure the desired results, the best London cement was used, and the divisions made, as now suggested by Mr. Faija, in the most careful manner. In a very short time, however, the cracks of contraction became developed, and proceeded in myriads of diagonal lines all over the pavement.

I would still, as I have invariably done, advise cement users to test the cement for themselves, and endeavour, by investigation, to acquire a common-sense knowledge of so important a material. Authorities do differ, and too much heed is given to theorists, who often mislead the practical man.

No one at all acquainted with the latest experience of cement or concrete would think of laying floors or plastering in a series of coats. There are many good reasons against such practice, and I would not recommend builders to trust too much to doors, windows, &c., for relief against either expansion or contraction of Portland cement concrete. Cement capable of disturbing the aggregate with which it is associated, will eventually disintegrate, and it is only a question of time when its influence will become developed into danger and loss.—I am, &c.,
HENRY REID.

London, September 2nd.

SIR,—A few summers ago my attention was drawn to the expansion of cement in a most decided manner by a gentleman calling at my office. He stated that the flags in a certain street had risen up, and were dangerous to the public. I immediately went to the place, and saw such to be the case. The footway of the street had been down several years, and laid partly with continuous cement-concrete, and partly with flags. A sudden rise in the temperature had expanded the cement, thereby causing the flags to rise at the first joint after leaving the cement.

A man was sent to cut a piece off the cement,

and the flags were again laid in their places, where they still remain.

In this town there is a footbridge across the railway near the station. It is reached by stone steps; these, being considerably worn by constant traffic, were repaired in the following manner: The portion worn was cut out about 2in. below the original height of the steps to about 6in. or 8in. from the end, the portion cut out being carefully filled up with cement-concrete. In several cases the expansion of the cement has been so great as to break several of the steps across, the small piece being held still in place by the iron handrail.

In preparing a specification for laying cement footpaths, I had a special clause inserted to have the footway laid in alternate blocks, in order to obviate the effect of expansion as much as possible.

I laid a very considerable length of footpath last year, the average width being 6ft. within the kerb. The concrete-slabs are from 5ft. to 6ft. in length, except where the services are laid for gas, these being about 18in. wide. The edges of the squares were preserved by two laths, each 1½in. thick, and 3in. wide. These were allowed to remain overnight for the cement to set. The laths were then removed, and the intermediate squares filled in.

By this means I did not expect to find any trace of expansion; but at every corner where the cement was laid round a curve, the cement is now forced from the wall (in some cases nearly ¾in.) for a considerable length. This can only arise from the expansion of the Portland cement, which was used in the proportion of two parts of crushed granite to one part of cement.

I have also observed that if a shower of rain fall on cement that has been laid for several hours, the surface becomes covered with very fine cracks, only observable when filled with rain.

This is the case in almost every instance. Yet cement briquettes intended for testing are invariably immersed in water for seven days previous to being tested.—I am, &c.,

JNO. PETRIE.

Borough Surveyor's Office, Jarrow-on-Tyne, Sept. 3.

MR. DAVIES AND HIS U-TRAP.

SIR,—On reading Mr. Davies' letter, on page 313, in reply to mine on page 281, I had a model U-trap made of precisely the same shape and size as the one used by him at the discussion, and, from the trials I have already put it to, I can see no reason to alter the opinion I have expressed with reference to the experiments Mr. Davies made with his model. I intend, however, to test it more fully, and with it, for the sake of comparison, Beard and Dent's 2in. U and S-siphon, and will, as soon as possible, forward to you the results.—I am, &c.,
DANIEL EMPTAGE, S.E.

Dane-hill Sanitary Works, Margate, Sept. 7.

SIR,—I certainly fail to see how Mr. Davies' experiments with his model of the U-trap can be accepted as conclusive. It is without doubt a great improvement, and I for one should be glad to see it the only kind of U-trap in actual use, as we must have them. Now, a few years ago I experimented with the U-trap, and with no less than three improved models, and found that for easy clearance with the smallest amount of water, the S-trap, when properly constructed, had the advantage, and held less water than the other four models, besides containing less space to foul the water forming the seal, and when fixed under certain circumstances, was not near so liable to siphon, or wave out as Mr. Hellyer's U-trap. I since have adopted (when possible, for sometimes the plumber has no choice, having to work to the ideas of others) and advocated the use of the S-trap.

With regard to Mr. Davies' graphical method of striking out the side of the U-trap, there is but a trifling difference between his method and the proper method in general practice—namely, 12in. across the top of the cheek, and the slight extra space is quite compensated for by the easier sweep of the band thus gained by the older method, which anyone can understand by drawing his method and marking off an extra inch across the top, and drawing a line from the mark until it intersects the circle. This way is

well known to trap-makers, and I believe Mr. Pullen has used this method for some time.

I shall accept Mr. Davies' kind invitation early, as I again intend to test the U-trap.—I am, &c.,
H. B., M. S. P.

Lambeth, Sept. 3rd.

WASTE-PIPE VENTILATION.

SIR,—In reply to Mr. Emptage (page 313) respecting the open ends of waste-pipes, I beg to say why I prefer them closed, for last year's frost taught many a serious lesson by way of being frozen in.

Open ends are very well in a sanitary point of view; but let them be fixed accordingly, for I will not admit it being sanitary to fix the end of a waste-pipe so that you cannot use the sink for weeks together.

No one can deny that the open-ended pipe, when put into its proper place (that is to say, two or three feet away from the mouth of the gully-trap, and the channel kept properly cleaned), is far better than being placed direct over the top of a gully, so far as gases are concerned.

But how many even so-called sanitary engineers will do this? Not one in fifty. Further, how many ever think about fixing a flap over the end of the waste-pipe to keep back the frosty air? And more than this, how many are there that take the trouble to see such flaps properly protected against frost? My experience with these gentlemen tells me that I never saw or heard of one—no one.

I now ask Mr. Emptage to examine the much-talked about disconnected system as practiced about London (not that I am in favour of waste-pipe being connected with the drain). Examine the gully-trap inside and out after it has been in use, say, two or three years, especially when used for four or five-roomed houses. My experience has been, that the sides of the trap, also about and above the grid, become coated with filthy matter. Here gases generate, and when the open end of the waste-pipes are fixed even within 6in. or 12in. of these stinking holes, what may we expect, considering that this waste-pipe is not trapped? It is all very well to say, as Mr. Hellyer has said, that the trap should be used inside the house; but our sanitary inspectors do not enforce them, and even if such traps were to be enforced, they are very liable to become choked up, to say nothing of being frozen in the winter. I maintain that under such circumstances this cannot be called sanitary plumbing, unless the open end is properly protected against frost and a full-sized grating used.

Now if you take the end of your waste-pipe to, say, within 2in. of the bottom of the gully-trap, or, say, 2in. below the throat of the trap, I ask, How can this pipe "become a means by which sewer-gas can escape without interruption into the house"? And how is it that the further the end of the pipe enters the trap that the more objectionable it is? I am thoroughly aware that the water in the trap is not pure (but, to a certain extent, I have a cure for this—namely, the trapping of the end of the pipe before it enters the water contained in the gully-trap, which may be done by causing the end to dip into a very small bowl one size larger than the waste-pipe, or by turning the end of the pipe above the water line in gully-trap, so as to form a trap within and below the gully-trap grid, which will be thoroughly out of the reach of frosty air) and am also aware that 36 square inches of sewage water (to say nothing about the surrounding sides of the trap, grid, &c.) will send off 36 times as much gas as can come off a lin. surface contained within a pipe when dipping into a trap. Therefore, I say that if the open end of this waste-pipe is over or within a few inches of the gully-trap, it has every chance to convey the generated stink into the house. I know that this pipe, when open at the end, is large enough to carry a 100 times as much gas as can ever be generated from this gully; then is it not best to stop the end in some way or other? Of course if you cannot depend upon the gully-trap being always trapped, do not attempt to put the pipe into the trap; but even here, if the pipe is taken to the bottom of the trap, it will be far better than terminating it above the water-line or just over the grid. I should like to have Mr. Buchan's answer to this.—I am, &c.,

P. J. DAVIES, Hon. Mem. A.S.P., &c.

SIPHONAGE OF TRAPS.

Sir.—Mr. Michael Drury, in his first letter, on page 87, says:—"It is only reasonable to expect that the same orifice which, as is well known, so effectually destroys the action of a simple water siphon-pipe would be equally effective in restricting the siphonic action of a sewer siphon or C-trap."

Mr. Drury starts with this text, and, notwithstanding his own perfectly true, and several times repeated, assertion that, "The force which sends the water rushing through a w.c. siphon, is not a siphonic or gently-drawing force, but an impulsive driving-action, caused by the weight and fall of the water," he still continues to treat it as though it were like what he also truly describes as, "the gently-drawing force of simple water-siphon."

Mr. D., also on page 314, says: "A vacuum is impossible if the siphon is punctured." Here he is quite right with regard to the one kind, but equally wrong with respect to the other. With a soil-pipe, the extent of the vacuum will depend upon the bulk and force of the flush, which drives the air before it down the pipe, more especially where there is a foot vent, and, consequently, no resistance. The air being thus driven out, creates a vacuum behind it, which has to be instantly supplied, either by the air-pipe or through the trap; hence the necessity for an efficient orifice.

It will help to make matters more clear to Mr. Drury, and also to some of his readers, if they will try the following experiment, which I have myself tried.

Bend a piece of lin. lead pipe to the form of a siphon, making the long leg about 2ft., and the short one about 8in. long. Place the short one through the side of a tank, then fill the tank by means of a pail to about 1½ in. above the bend, and the siphon will start and empty the tank. Now, make a ½ in. hole in apex of siphon, and again fill up your tank; you will now find that the water will only run out to just below the bottom of bend, simply because air is admitted through the small hole which has destroyed the siphonic action. Now, add to the long leg another 6ft. of pipe, and again fill your tank; you will now find the siphon will start and empty it as freely as at first; the drag and weight of water in the long leg is now strong enough to overcome the influence of the air at apex. Now, increase the air-hole to 3-16 in., and the siphon will again fail, and so you may go on.

This experiment shows the difference in the action of the two kinds of siphons. If you depended for starting this siphon upon a "gently drawing force," you might draw away until Doomsday, and would get nothing but air through the apex.

Mr. D. also says: "As the trap is always fixed closely adjacent to the basin, it is difficult to conceive the possibility of a flush of such an impelling nature that it should run itself out at the trap hollow."

Now, really, this shows the extent of Mr. Drury's knowledge of this matter. If he had watched the action of w.c. traps, and more especially those in connection with direct-action basins, he would have found that his "difficulty" would have been how to retain the seal in the trap. The fact is, the seal will very readily go out, both by waving and siphonage, unless properly protected by ventilation. I would advise Mr. Drury at once to try some half-dozen direct-action w.c.'s by throwing in a pail of water in a rather careless manner, as is often done by our servants, and I am sure he will require no further proof upon this point.

I am very glad to see that Mr. D. has very greatly qualified his assertion that no harm would be done by the unsealing of a w.c. trap when provided with his ½ in. pipe at apex, and that he now says that a trap, if only unsealed momentarily, would be fraught with direful danger.

Hoping this letter will satisfy Mr. Drury, and thus save the need of further correspondence.—I am, &c., DANIEL EMPAGE, S.E.

Dane Hall Sanitary Works, Murgate,
September 6th.

The Town Council of Wisbech upon the 1st inst. last week for the reconstruction of the south main sewer. The lowest offer received was £910, whereas the surveyor, Mr. Bailey had estimated the cost at £863. On a division, it was resolved that the work be carried out by the surveyor.

Entercommunication.

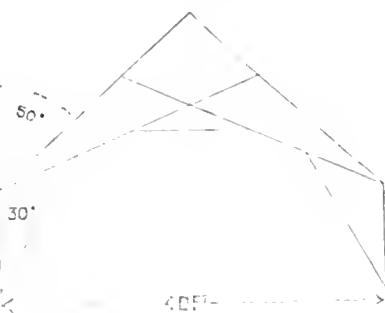
QUESTIONS.

[6643].—**Skew-Bridge Construction.**—Will any one favour me with the name of a work on the above subject, one that a workman can comprehend?—D. M.H.

[6647].—**Removing Whitewash.**—Will one of the experienced correspondents of the BUILDING NEWS kindly describe any efficient process by which I can remove whitewash from the rough outside walls of a 16th century dwelling-house?—LANGLORD.

[6648].—**Restaurants.**—I shall be glad of a list of London restaurants and coffee taverns worth visiting, with any special points of design or planning which should be noted by a—PROVINCIAL ARCHITECT.

[6649].—**Roof.**—What outside thrust would a principal of the accompanying description, loaded uniformly with



3½ tons, exercise on the walls! What improvement, if any, is necessary? How much will a semi-circular, laminated arch, 40ft. in diameter, 4in. deep by 1in. thick, constructed with eight ½ in. boards of red deal, and ½ in. iron pins 1ft. apart, expand when loaded about the crown with 3½ tons? Early answers will greatly oblige.—DEXNIS, Glasgow.

[6651].—**Ventilation of Soil Pipe.**—A short time ago I attached a 2in. ventilating pipe to the bend of my soil-pipe, and carried same well above the roof. I did not put a cow on top, thinking it better to leave the end open to the sky. Whether down draughts prevent the effectual working of the ventilating pipe I cannot say, but the w.c. seems continually charged with sewer gas. I may mention that the apparatus is the usual pan-closet apparatus, with container attached. What should I do to protect my family from illness? Would one of Ewart and Co.'s 2in. "Empress" ventilating cowls fixed to top of ventilating pipe cure the nuisance, as these ventilators appear to be very excellent!—T. P. F.

[6651].—**Wood Block Flooring.**—I should be glad of the experience of any of your readers as to the advantages or otherwise of this kind of flooring for schools and buildings of a similar description. Also the most approved method of laying the same. I have used them in exposed situations such as summer-houses, and in other out door work, and with satisfaction. In these cases the blocks were 12in. by 4in. by 2½ in., laid on concrete, and bedded in sawdust. Three pieces were nailed together and laid at a time, but without dowselling. I am thinking now to use them in two or three schools on account of their noiselessness, and would be glad to know, in cases where they have been adopted, if they are approved.—PROVINCIAL.

REPLIES.

[6644].—**Measuring.**—In my answer on p. 283, 4th line from bottom of the first column, read "shortening or its appearance," instead of "shortening of its appearance." "Appearance of shortening" would be better still.—HUGH MACLACHLAN.

[6624].—**Traps.**—OMISSION.—Line 12 from bottom of this answer on p. 283, read after "sharper edges" "and divisions." The P-trap should have a deeper bend than shown.—HUGH MACLACHLAN.

[6625].—**Drying-House.**—Build a good and sound hot-air stove into a brick chamber with fresh air conduits from the exterior into same, and an opening for the escape of heated air into the room at top. This stove, if furnished with gills, will be more effective. If the drying room is small, the brick chamber may be dispensed with.—HUGH MACLACHLAN.

[6627].—**Photos.—Pencil-Sketches.**—The former are best mounted by steeping them in a large flat dish of clean cold water for a few hours, when they become so loose as often to float off by themselves. Hot water injures the tone, and undue haste causes damage and holes. Pencil-sketches may be fixed either by covering them with milk, plentifully diluted with water, or by blowing a preparation over them in a light spray. This preparation may be obtained from Robertson's, artist & draughtsman, Long-acre, London. I have been informed that this preparation is a thin solution of shellac with turpentine, but I do not know the proportion.—HUGH MACLACHLAN.

[6628].—**Styles of Architecture.**—The best work on this subject is Ferguson's "History of Architecture," in three volumes. Otherwise, read in Gwilt's "Encyclopedia of Architecture," the later editions, or a small new handbook by Mr. F. Roger Smith, and published by Messrs. MacMillan and Co. in their Art Series.—HUGH MACLACHLAN.

[6628].—**Styles of Architecture.**—I am sorry not to be able to agree with Mr. F. J. Freeman in the works he recommends. Mr. Drury's work is too small and insufficiently illustrated, though it is the best recommended

by him, considering its size. Nicholson's is far too antiquated. Rickman's is a decidedly good work on Gothic architecture, but little is to be learnt from it on other styles, the part on Classic work being merely introductory.—HUGH MACLACHLAN.

[6629].—**Farmsteads.**—The following have been illustrated in the BUILDING NEWS with plans, dates given as below:—Coombe Farmhouse, Wadhurst-park, Surrey, Jan. 31, 1873. Farm-buildings at Chase Woods, Hales, Oxon., Jan. 16, 1874. Do. do., Peterhall, Beds., June 19, 1874. Do. do., Earlswood Idiot Asylum, near Redhill, Surrey, Feb. 5, 1875. The Home Buildings, Grange-park, Alresford, Hants, July 9, 1880. British Dairy Farmers' Association Prize Design for Homestead for 50 cows, Dec. 17, 1880. Homestead, Akenham, near Ipswich, May 20, 1881.—HUGH MACLACHLAN.

[6632].—**Contracts Signing.**—Yes, after the employer has had a document legally drawn up, signed, and witnessed, authorising the architect or any other person to act on his behalf.—HUGH MACLACHLAN.

[6634].—**Priced Quantities.**—The drawings, specifications, and quantities should be attached together, when only one stamp is necessary for the lot. It is usual for the contractor to sign every drawing, and the first pages of the specification and quantities, and to initial each of the other pages.—HUGH MACLACHLAN.

[6640].—**Wood-Carving.**—"Z. D." thinks he will learn wood-carving. Don't let him buy a fret saw, and after cutting out geometrically-designed panels and brackets, fancy that he has been carving wood, because it is nothing of the sort. He must try to get a few practical lessons before he starts. If he does not he will never be able to sharpen a tool properly, much less carve decently. Addis' tools are the best. He will require three dozen or so of these; chisels and gouges, more of the latter than former, a mallet, a holdfast, a carver's screw, and a small bench. All this means an expenditure of about three pounds. After that a life-time of application is necessary if the student makes up his mind to master the art. Further, all the application in the world is of no avail, if a natural taste does not exist also. Many carvers who work the hardest are really the poorest "tools."—HARRY HEMS.

[6641].—**R.I.B.A. Preliminary Exam.**—Send for the particulars and course of study to the secretary of the R.I.B.A., Conduit-street, Regent-street. This question will be found answered in a recent number.—G. H. G.

[6641].—**R.I.B.A. Preliminary Exam.**—I believe what will be the last Volunteer Architectural Examination was held at the rooms of the Institute in June last. It is now to be replaced by the Compulsory Examination for intending Associates. Write to Mr. W. H. White, secretary, 9, Conduit-street, Regent-street, London, W.—HUGH MACLACHLAN.

STAINED GLASS.

HALIFAX ST. JOHN'S (WESLEYAN).—A two-light stained-glass window, dedicated "to the memory of Anne, wife of Henry Edmunds, junior, ob. 2 April, 1881," has just been erected in this chapel. An allegorical female figure of "Faith," partly supported by a staff, cross-crowned (emblematic of the Gospel Word), occupies one light. Another of "Hope," with right-hand resting on the emblem-anchor that entereth within the Veil, the respondent light. Each figure stands in front of a shoulder-high, chastely white and gold diapered screen, and beneath a richly-carved canopy. A nimbus of glory, upon a rich ruby background visible above the screen, surrounds each head. Celestial crowns, with palm-branches crossing, constitute the special feature of the tracery lights above. The figures are tenderly coloured, the robes of the one in green and yellow tints, of the other, dark blue and russet brown. The ornamental tracery, canopies, borders, &c., are in 15th-century style; whilst, generally toning the whole, a subdued golden glow seems to light up the more salient details. The style and tone especially harmonise with the cathedral-like architecture of this beautiful structure. The window, from the studio of Messrs. Powell Brothers, Leeds, was erected under the superintendence of the architect, Mr. W. Swinfen Barber, of Halifax.

The Sickley mortuary chapel at Lowick Church, Northamptonshire, has just been restored and re-roofed; the work has been carried out by Mr. Ireson, of Tansor and Oundle. At the same time a new organ, built by Messrs. Wordsworth and Maskell, of Leeds, has been placed in an organ-chamber built on north side of the church. The opening services took place last week.

The mean old buildings which encumbered and endangered the east end of St. Peter Mancroft Church, Norwich, an edifice now being restored from Mr. G. E. Street's designs, have just been purchased, and will be cleared away, thus opening out the view of this large and handsome church from the Haymarket.

St. Peter's Church, Thanet, has just been relighted by means of standards and brackets, executed by the firm of Jones and Willis, of London and Birmingham. The same firm have also supplied a handsome and massive eagle lectern.

At a meeting of the congregation of All Saints' parish church, Sudbury, Suffolk, held on Friday, it was decided to restore the church, and to provide new floors, open out windows, and repair the battlements and roof.

LEGAL INTELLIGENCE.

HEAVY CLAIM FOR COMPENSATION.—At the Institution of Surveyors on the 30th ult., the case of Sir W. Hart Dyke v. the Darent Valley Main Sewerage Board came before the umpire Mr. F. Vigers, the arbitrators being Mr. W. Hodson (Farningham) for the claimant, and Mr. J. Tootell (Maldstone) for the board. This was a claim in respect to an easement of the right of the defendant board to run certain 2ft. drainage-pipes through the residential estate and appendages of the claimant's property, Lullingstone Castle, near Dartford, Kent. Mr. Pollard, instructed by Messrs. Meynell and Pemberton, was counsel for the claimant, and Mr. Douglas Kingsford, instructed by Messrs. Carnell and Son, Sevenoaks, appeared for the board. In opening the case, Mr. Pollard explained that a board having the powers of a sanitary authority, in laying down drainage, were not compelled to purchase any individual's land for the purpose of carrying out their scheme; but according to the same Act of Parliament which gave them these powers the owner could estimate the damage he suffered and claim compensation. There was no general rule that could be laid down as to the amount an owner of land could make for compensation. In this case it could not be estimated at per foot or per acre; it was not a mere matter of calculation in £ s. d., as the damages his client had and would sustain were of a peculiar nature. These cases entirely differed from cases where railway companies were connected. A railway company could be compelled to purchase the land if they required it for such purposes as a tunnel, and in running through private property they had always to pay pretty smartly for it. He should ask the umpire to pay attention to the Public Health Act, and that clause which entitles his client to come before that court and make a claim for compensation. The words in this Act were much larger in their scope than what would be found in any clause in any other Compensation Act. This Act provided that while land could be taken without purchasing, there was power to claim compensation for any damage sustained. The nature of damage might be various; if any view was interfered with, any annoyance caused by smoke, or any detriment was made to the property in any way, they were entitled to claim compensation. Sir Wm. Hart Dyke would, he (Mr. Pollard) was afraid, suffer materially if he failed in succeeding to convince the umpire that the line he took was proper. The estate possessed to some people a peculiar, exceptional, and, indeed, extraordinary value. If he could satisfy the umpire that from the peculiar elements of this estate it was of special value, and that one person would give more for that property before the action of the board than at present, then he claimed that compensation was due to his client. Lullingstone Castle could be traced back as far as the 13th century, and at the present day, having habitable accommodation, would, in the view of many now, in the 19th century, be of exceptional value. Since the 13th century there were associations antiquary about it, and it was rather peculiar to the Hart Dyke family. The damage to the character of the property, while lessening its saleable value, affected the peculiar fancy and sentimental regard which was held for it. If property was interfered with as to materially affect its sentimental value—which was really its marketable value—the amount of compensation would have to be estimated thereby. In this case the board in exercising their powers had chosen to go through the most valuable and antiquary portion of the estate. There were three or four manholes so situated as to entirely rob the property of any ideas of fancy. It seemed so inconsistent to lay this sewer where it had been laid, thus destroying those elements which made it very valuable to a certain class of buyers. The mere question for the umpire to consider was whether what had been done was likely to impair the sentimental value of the property. There were 30 manholes in a length of 9,124ft., and so close did they seem that it suggested the board had had an object to do the most damage to the property they could. The very best part of the Darent for fishing had been destroyed by these manholes; but while he was not imputing any nuisance had been caused—for his client would have his remedy if necessary—he contended that the mere presence of these manholes on that embankment was sufficient to impair its sentimental value. On this particular part of the embankment Sir William Hart Dyke and his friends could angle, and there entertain friends, but owing to the presence of these manholes, which were in such close proximity, that would not now be possible. In the meadow farm, where the sewer ran under a greenhouse, the value of that property was somewhat destroyed, for if it were required for building purposes, it could not be adapted without extra expense, and the necessary licence for building on a sewer. On the estate there was land used as a tilting-ground by Queen Elizabeth and Henry VIII. Whether it was antiquated or antiquarian, there was special value attached to it by that fact. This had been

destroyed by the presence of the sewer. It might be contended that Sir William could only claim compensation for actual damage, no regard being paid to sentimental damage. He would call attention to the 308th section of the Public Health Act on that point. Where there was a property in private ownership of a peculiar character, even if by any interference by any one, that property was even improved in metemetary value, and its existing sentimental value impaired, that supposed increased value would have to be rejected. In support of his argument Mr. Pollard cited the claim made by the Duke of Buccleuch in respect to Montague House. In that case £5,000 was awarded by Mr. Baron Pollock as umpire in respect to sentimental value, as shown in the evidence of the Umpire on p. 422 of the Law Reports of English and Irish Appeals. Though the circumstances in this case were different, the point in question was the same. The claim made by the Duke was founded on sentimental depreciation, notwithstanding that that property would have produced more money let as offices, &c., or building ground. The residential qualities were, however, here destroyed by the frontage to the Thames being taken away, and, after considerable difficulties in law had been overcome, the award of Mr. Baron Pollock in favour of the claimant was supported. In this case not only was the value of the frontage to the river destroyed by the presence of these manholes, but the privacy was taken away. After dwelling on matters which were contended to interfere with claimant's privacy, the learned counsel concluded by drawing the attention of the umpire to the damage done during the construction and repairs. Evidence was then taken. For the claimant, Mr. W. J. Beadel, of the firm of Beadel and Co., Gresham-street, estimated the total value of the estate at £125,000, and the depreciation consequent upon the sewerage works, at £20,000. In cross-examination he said: The park is 700 acres in extent. I do not know how much land is in the occupation of Sir William Hart Dyke. 2,000 acres is my estimate of the quantity that should go with the Castle. If purchasing this land I should expect to get it for £20,000 less now that the sewer is down. I am certain it would fetch £10,000 less. This depreciation in value is not only on the ground, but on its privacy and sentimental value. If it were sold for building purposes its value probably would be increased, but I doubt it in that part of the country. I do not say that at the present moment it would fetch a fancy price. I think there is a temporary depression, and therefore take five years. I put before the umpire £10,000 certain, and £20,000 in my judgment; and £1,000 as compensation for inconvenience during construction and repair. Mr. R. L. Cobb, of Higham, estimated the depreciation in value at £16,000. Mr. W. Hodson, Farningham, placed his valuation at 15 per cent. and five years' purchase, or £19,540. He added: I think the number of buyers if the estate were for sale would be decreased to the extent of an equivalent to five years' purchase less. I think the very site of this sewer would deter any one from taking it. As to the amount of compensation due to Sir William Hart Dyke, we have agreed to set the figure at £1,000, but in my opinion that is insufficient. If the Castle had been let during the summer, it would have produced a larger sum than that. For the board, Mr. E. Tewson, of the firm of Debenham, Tewson, Farmer, and Bridgewater, said: I have divided the course of the sewer, and find that there are 60 chains through the park. Then there are 60 chains outside the park to the village, and 17½ chains through Mrs. Mandey's field. 60 chains equal three acres, which I put at £150 per acre = £450. There are 14 manholes, 10 of which have gratings, and 4 stone covers. In dealing with these manholes—so far as my experience has gone—£10 per manhole has usually been allowed, but these being through this park, I put them at £20, making for them a compensation of £280. Then the 60 chains through the village, with a half-chain wide, equal 3 acres, which I put at £75 an acre, equalling £225. There are 11 manholes, which I have taken at £10, equalling £113, and 17½ through Mrs. Mandey's field, equal 3r. 20p. I put that at £100 per acre, £37 10s.; with 5 manholes at £10, or £50. In consideration of the possible depreciation in the estate through the right of privacy being interfered with, I have given £1,500. I believe the land itself would let for exactly the same; the only depreciation being compensated for at £1,500. I could, I think, deal for less money. In consideration of any inconvenience which Sir William Hart Dyke may have been put to, before I had heard the evidence of witnesses on the other side, I had put the figure at £500. I confine myself to estimated damages actually sustained, and have paid no regard to sentimental damage; my total estimation of compensation is £3,202 10s. I do not think that the estate would be materially affected in its saleable value. If the estate was brought into the market an extra buyer might be found for it. I remember several cases where large properties have been sold, and I am not aware that in any case they have been more valuable on account of their historical associations

unless the estates possessed some social attraction—more, at any rate, than this does. As to the fishing, I don't think there is any great depreciation in value. If it possessed things that you could carry away—such as pictures and engravings—and place in a museum, it might have some appreciable value, but I don't think that you could get money for those at Lullingstone. If you sell them you must sell them damaged. You would not get much money for them. In my opinion, the amount I give as estimated damage is, I think, full compensation. In cross-examination, the following questions were put to the witness: Have you never heard of property making more on account of the nature of its historical associations?—I have tried over and over again, but I have never succeeded in getting an exceptional price on account of that. You have then tried to obtain a fancy price on account of historical associations?—It is my duty to describe property as it is, and this I endeavour to do. If I get a mansion with modern convenience and comfort upon an old site, that is the place I find will sell. Mr. Virgoe Buckland, land agent and surveyor, 65, Cannon-street, E.C., put his estimate at £3,302, and Mr. George Langridge, of Tunbridge Wells, gave his as £3,192 10s. The latter was asked: Do you think that the property is deteriorated by the sewer? His answer was: I think so far as its antiquarian associations are interfered with it is not. I think £1,500 represents the damage for interference with privacy and sentimental dread of the presence of these sewers. The damage is to the privacy, but it is well compensated for by my total amount. Mr. Joseph Tootell, land agent and surveyor, Maldstone, estimated the damage at £3,005. Cross-examined: Do you think that £500 is sufficient compensation for the injury done to the residential rights? I think if Sir William had been put to such inconvenience as to prevent him being able to stay there, he would have gone away and charged the board with the expense. I think £500 is fair compensation for injury to residential enjoyment. I have known places with antiquarian associations, but have not known a precisely similar case to this. Mr. Thomas Hennell, C.E., 8, Delahay-street, Westminster, was called and gave evidence as to the (1 in 500) level, depth, and position of the sewer where it affected claimant's property. All the manholes near the Castle, he said, were covered with stone slabs, and there would not be any necessity to uncover them. There would be a quantity of spring water pass into the sewer with the sewerage of Shoreham and other places that was conveyed through it. The course of the sewer was selected in regard to the levels and the character of the property. As to the embankment mentioned by counsel and witnesses for claimant, it was simply an old stopped up road, grass having grown upon it. By the insertion of this sewer in Sir William Hart Dyke's land, Lullingstone Castle would be benefited. At present the provision for the conveyance of sewage from the Castle was inadequate. This was the whole of the evidence, and counsel having addressed the Court, the adjournment was made, the Umpire taking time to consider his award.

CHIPS.

The Epsom highway board have received 121 applications for the vacant office of surveyor, and have referred the mass of letters and testimonials to a committee to sift out the less eligible candidates.

Waterworks extensions are being carried out at Bury St. Edmund's, by Messrs. Pontifex and Wood, of London.

The Okehampton local board, at their last meeting, adopted plans for main sewerage prepared by Mr. Martin, with an outfall at Brays Hams. The estimated cost is £1,000.

The Episcopal parish-church of Lurgan, in the diocese of Kilmore, was reopened on the 1st inst., after restoration carried out at the cost of the Marquis of Headfort. The old pews have been replaced by open ones of pitch-pine, with choir-stalls in the chancel, and new heating apparatus, pulpit, reading-desk, and a stained-glass window illustrative of the 23rd Psalm, have been supplied. Mr. J. H. Fullerton, of Armagh, was the architect, and Messrs. Irwin Brothers, of Ballibay, were the builders.

By order of the Metropolitan Board of Works, Oxford-street has recently been renumbered. It has been calculated by a correspondent of the *Times* that this will cost the inhabitants at least £10,000 for alterations to shop fronts, stationery, &c.

At a meeting of the Eastbourne local board on Monday the salary of Mr. Tomes, the surveyor, was raised from £275 to £375.

The contract of Mr. J. Herd has been accepted by the Corporation of Manchester to erect the new swimming-bath for women at Leef-street for a sum of £4,677.

Our Office Table.

PREPARATIONS are being made for widening Fleet-street from Chancery-lane to the corner of Bell-yard, and in the demolition of the block of houses two places of interest will be "improved" from this thoroughfare. One of these is the old Cock Tavern, long associated with the names of Johnson, Boswell, Goldsmith, Steele, and Addison. The other is the house of Isaac Walton. The house where Walton lived stands as it stood in 1721, when he entered upon its occupation. Its identity is clearly established by the parish-books of St. Dunstan's, as well as by deeds. The "Compliment Angler" was first published in the parish where it was probably written, and where he had lived—St. Dunstan's—the first edition bearing this imprint:—"London, printed by T. Maxes, for Rich. Marriott, in St. Dunstan's Churchyard, Fleet-street, 1653." The setting back of this block of houses and the widening of Fleet-street at this part have become the more necessary since the obstruction caused by the "Griffin."

AN International Geographical Congress and Exhibition was opened at Venice last week, and remains open till the 22nd. England is poorly represented by a few maps and charts from the Ordnance Survey and the Admiralty and a few books. The Survey of India has sent a very large and splendid collection. The great theodolite of the Indian Survey has been erected, and an Isin, and a thin theodolite have also been set up. In addition to ten surveying instruments of good size, a very large self-registering tide-gauge will be seen at work, registering the tide at Venice, and driven by its own clock. Similar exhibits of a self-registering aneroid and a self-registering anemometer will also be made. India has also sent many maps and charts and publications from the Marine Society of India. The English Commissioners are Lord Aberdeen, president of the Royal Geographical Society, Sir H. Layard, and Mr. H. Bell. The Government of India Commissioners are General Sir H. L. Thuijler, C.S.I., late Surveyor-General of India; Colonel C. T. Haig, R.E., and Captain A. W. Baird, R.E., of the Indian Survey.

ONE of the sculptors who competed for the supply of the statuary for Blackfriars Bridge writes to the *City Press*, complaining of the "scant courtesy" shown to the competitors. Among other things, he points out that over five months have been allowed to pass since the models were placed for inspection at the Guildhall, and he fears "the older competitors may go to their graves in happy ignorance of the decision arrived at by the committee after their lengthened deliberations." We have heard that the award has been made, but that some inexplicable unwillingness to make it public seems to exist on the part of the City authorities.

THE fifth annual fine-art exhibition at Dundee will be opened by the Earl of Dalhousie on October 1st. In addition to paintings and sculpture, etchings and drawings in black and white are to be included and made a special feature. A large number of works have been contributed by artists, and Messrs. Agnew and Sons are to lend Mr. Holman Hunt's "Shadow of the Cross." Former Dundee exhibitions have been attended with considerable success, the sales from last year's amounting to £5,000, a larger amount relatively to the population than has been realised at any other provincial exhibition.

THING is a report, according to the *Athenaeum*, that Mr. Shields has given up his share in the series of decorative pictures in the great Chamber of the Town-hall, Manchester, where Mr. F. Madox Brown has been painting for some time past. Mr. Shields's large commissions from the Duke of Westminster for stained glass to be placed at Eaton Hall, which we described some time ago, have compelled him to concentrate his attention on that work. The *Athenaeum*, while regretting extremely to hear that the report in question is correct, thinks still it might supply the problem of how the very different works of two painters would agree in one room were Mr. Brown allowed to execute the entire series of twelve pictures.

THE seventh of the annual exhibitions of pictures promoted by the Corporation of Liverpool was opened to the public on Monday. The

galleries contain 1,435 as compared with 1,081 last year, when the size of the pictures, generally speaking, was greater than on the present occasion, the number being consequently less. Compared with previous exhibitions, this is pronounced the best hitherto held, there being a full complement of pictures from the Royal Academy, including specimens by the leading Academicians themselves, while the tone of the works, as a whole, shows an advance both in strength of treatment and in variety of subject. The most noteworthy painting in the collection is Mr. D. G. Rossetti's "Dante's Dream." This work is of very large size, and has never been exhibited in public before, having left the artist's studio to come direct to Liverpool. The exhibition is unusually strong in water-colours, in which branch of art the Liverpool school is well to the front. Of sculpture there are fewer examples than usual.

LORD BRADFORD, on Monday, opened an exhibition of fine-art treasures in Balton New Infirmary. The building adjoins the public park, and has cost £20,000, exclusive of fittings. It has accommodation for 75 beds. Donations promised towards the building and endowment amount to £35,000, of which £2,000 was contributed by the working classes. The exhibition was originated by the late Mr. Selim Rothwell, artist, Manchester, and the collection consists of 1,600 paintings, etchings, engravings, and pieces of sculpture and bronzes hung and arranged in 31 rooms and five corridors. There are loans of pottery, coins, and ancient armour. The exhibition will remain open two months.

WE regret to have to announce the death of William Edgecombe Rendle, of Westminster (formerly of Plymouth), who expired on the 3rd instant at Eastbourne, after a long and severe illness, and was interred yesterday (Thursday) at the Brompton Cemetery. He was born at Compton Giffard, near Plymouth, on February 10th, 1820. He was engaged in several large mercantile pursuits, and was patentee and inventor of what is now known as Rendle's Patent Glazing, which is adopted by H.M. Government and all the leading railways, his latest and largest work being the great Citadel Station at Carlisle. He was also successful in theatrical matters, and was partner with Mr. Augustus Harris at Drury Lane Theatre, when the great piece "The World" was produced. He was also lessee of the Imperial Theatre, Westminster, and proprietor of the Clarendon Hotel, Brighton.

LONDON is already rich in parks, but the need of additions in this respect is ever-growing, like its immense population. Hence the prospect of a new park being provided for Paddington is hailed with general satisfaction amongst all who are interested in the development of these lungs of the great city. The fund for this object has been raised to £32,100 by the offer of a gentleman well known for his wealth and liberality to contribute the munificent sum of £10,000. It is expected that ere long the sum required will have been obtained.

THE exhibition at the Berlin Royal Academy was opened on Monday. The galleries contain 1,100 objects, but, with few exceptions, the great masters are unrepresented. Andrea Achenbach, Vaelao Brozik, Böcklin, Defregger, Knaus, Gabriel Max, Makart, Mankacz, Vautier, and many others of like merit, are conspicuous by their absence. Alma Tadema and Gustav Richter (whose hourly-expected death was prematurely announced a few days ago), Anton von Werner, Gussow, and some other names of note remind one of the time when the exhibition of the Berlin Royal Academy was an event interesting to all lovers of German art. Part of the blame for the mediocrity of the present exhibition is ascribed to the jury, which accepts, without the slightest discrimination, all the objects sent.

MEDIAEVAL wills often mention the bed and bedstead as a bequest of value, but the windows of a dwelling-house are not frequently included among the legacies. The late General Patterson, of Philadelphia, however, has provided in his will, just admitted to probate, for the retention of the "Washington glasses" in his family. The concluding paragraph is in these words: "That the Washington glasses, now in my residence, at Thirteenth and Locust Streets, Philadelphia, being the same which were set in the walls of

General Washington's house, upon Market Street, and which I purchased and had reframed and set up in my house on Arch Street more than fifty years ago, and thence removed them in the year 1836 to my present residence, shall remain where they now are so long as any of my descendants shall continue to occupy the residence." Upon the sale of the house, the glasses are to go to his son Robert, afterward to his grandson Frank, and then, it is declared, "it is my wish and hope that my said grandson will provide for the transmission of the said glasses to his own children, if he shall have any, or to some other of my descendants, so that the same shall forever hereafter remain as heirlooms in the possession of some one of my descendants."

THE PARKES MUSEUM is closed until the end of September. In October it will again be opened free to the public on Tuesdays, Thursdays, and Saturdays, and during the winter lectures on sanitary science will be given in the museum. The lectures will be illustrated with the sanitary appliances deposited in the museum, which now include many new contributions sent from the recent Medical and Sanitary Exhibition at South Kensington. We believe it is intended to distribute the awards to the exhibitors at the exhibition at the second public annual meeting of the subscribers to the museum in October or November.

MR. A. WATEHOUSE, A.R.A., says the *Guardian*, whose masterpiece at South Kensington, the Natural History Museum, is so great an addition to our public buildings, has recently realised a much smaller design, but one of considerable comfort to those who are looking for the growth of a new style of architecture. This is a corner shop, or house and shop, No. 1, New Bond-street. A walk down Bond-street, indeed, ought to convince any one whose antiquarian bias is not too great to be compatible with impartial criticism, that the modern urban architecture of London is by no means to be despised in places where money is "no object."

WITH reference to the New Law Courts, the London correspondent of the *Leeds Mercury* says: "It is interesting, but not satisfactory, to learn that the constant conflicts between the architect and the Office of Works have resulted in the double result of producing a building with which neither is satisfied. Mr. Street was forced to abandon, for motives of economy, and at the bidding of Mr. Layard, then Chief Commissioner of Works, the central tower, which was the chief ornament and culminating point of his design; whilst Mr. Street, forgetful of the wants of public officials, has constructed a large number of his rooms in such a way that gas will be required to be permanently used in them."

MR. WINTER JONES, F.S.A., late Principal Librarian of the British Museum, died suddenly on Wednesday morning at his residence at Henley-on-Thames. His last literary effort, recently privately printed, was a sketch of the Assyrian and Babylonian excavations undertaken for the British Museum, which formed the substance of a lecture delivered by him at Penzance a few months ago. The results of Mr. Rassam's latest researches were so attractive to him that they became the subject of a lively conversation which he led on the eve of his death. It should be added that Mr. Winter Jones prided himself among his literary friends on being the descendant of the author of "Goody Two-shoes."

MESSRS. MORRIS and TASKER have completed a lighthouse for Sesapeake Bay, off Cape Henry. The new lighthouse measures 155ft. from base to top, with a diameter at the base of 30ft., and at the top of 16ft. There are six stories, above which are a service-room, watch-room, lantern-room, and finally the roof. The total weight of the lighthouse is 1,700,000lb., 7,000lb. of bolts alone being required to put it together. The exterior, which is octagonal in shape, is constructed of cast iron, while the cylindrical interior is of sheet-iron. The castings of the base and first story are 2in. in thickness, and the sheet-iron lining is 3in. The staircase, which has 180 steps, goes around the cylinder instead of up a shaft, as in the lighthouses now in existence. The light-room is a circular steel frame, 12ft. in diameter and 9ft. high. The glass to be used is now being manufactured in France, and a light of great power will be adopted. Every story is solidly bolted together by heavy cast-iron floor-plates, 11in. thick, while the points and facings are finely planed.

THE BUILDING NEWS.

LONDON, FRIDAY, SEPTEMBER 16, 1881.

THE DESTRUCTION OF THE PARK THEATRE, AND ITS LESSONS.

LAST week we made some observations touching two recent fires which destroyed a large warehouse and a dwelling; we have now to chronicle the destruction by fire of a theatre at Camden Town, which occurred early last Sunday morning. The Park Theatre was originally known as the "Alexandra," and was a building of comparatively recent construction, the design having been furnished by the late Mr. H. C. Robinson, architect to the Lord Chamberlain's department. The Park Theatre stood in the centre of a block of dwelling-houses and shops, bounded by the High-street, Camden Town, on the east side, and by Park-street, Arlington-road, and Wellington-street on the three other sides. The houses backed to the theatre, and its main entrance was in Park-street, the gallery entrance being in Arlington-road. An area intervened between the main theatre and the backs of the houses on these sides, and but for this provision the property adjoining in some parts would have been placed in imminent danger. It is needless to dwell on the particulars of the fire already published; suffice to remark that soon after the termination of the performance, the building was discovered to be on fire at the stage end, and in less than one hour, in spite of all the water thrown into the building from every point of vantage and the untiring exertions of the fire-brigade, the flames obtained complete possession of the building, and enveloped it on every side. So thoroughly was the work of destruction wrought, that by the time the fire was got under the theatre was gutted, and nothing was left standing of the structure in the early morning of Sunday but the outer brick shell of the building. Of the interior, the only remaining objects are the iron pillars which supported the balcony and dress-circle, and these have been twisted and bent into every conceivable shape. The official report of Capt. Shaw gives the size of the theatre as about 160ft. by 80ft. Where and how the fire originated is not yet known, though it is supposed it must have commenced in one of the dressing-rooms in the upper part of the stage.

The burning of the Park Theatre is an event that will once more draw attention to a few points of consideration which are worth dwelling upon. Of these the situation and surroundings of the building, its total destruction, and the means of egress, are important. The theatre, as we have said, was built in an area surrounded by dwelling-houses and shops, a mode of construction open to serious risks. That the surrounding houses were not damaged to a greater extent than they were was attributable mainly to the means adopted by the brigade to confine the flames within the four walls of the building. A strong wind blowing in any direction would have entailed an amount of damage to property and life it would have been serious to contemplate. Theatres are generally built in crowded localities of this sort; the auditorium, and often the stage, as in the present instance, are hidden from view by the houses which cluster round them, while they are connected by the entrances with the streets. Some time ago we called attention to the code of rules framed by the Metropolitan Board of Works, in which it was laid down that all plans of public

buildings of this class should be examined. It is well to remember, as Mr. Hollingshead, the lessee of the Gaiety, informed the Select Committee on this question, that the theatres and music-halls of London were amenable to no less than six different jurisdictions. One of the regulations of the Board has reference to the position of such places in relation to adjacent premises. Plans for this purpose have to be drawn to a scale of 1in. to 20ft. The numbers to be accommodated in the different parts of the house are required, and the area to be assigned to each person is not to be less than 1ft. 6in. by 1ft. 6in. in the galleries, nor less than 2ft. 4in. by 1ft. 6in. in the other parts of the house. With regard to exits, there is a clause prescribing that provision is to be made for a separate means of exit to each floor communicating directly with the street, and of a certain width, and each tier of boxes is counted a floor for this purpose. If these regulations had been in operation the Park Theatre would never have been situated or built as it is, where full houses are nightly penned in by dwellings on all sides with only two narrow means of exit.

The complete burning out of the building within two hours is a more significant fact, and one which suggests several inquiries regarding the construction of a building capable of being so wholly destroyed as the Park Theatre has been. Hardly a vestige of the interior remains. Captain Shaw, in his useful hints on theatres, so often noticed in these pages, requires that every department of a theatre should be inclosed within fireproof walls, and be capable of being shut off entirely from the stage or auditorium in case of a panic or fire. Each passage and stairs would then be rendered tolerably secure, even if the auditorium or stage were in flames, and escape rendered easy. The proscenium-wall would be carried up above the roof and have a metal curtain at the opening, while the smaller openings would be closed by iron doors. We may ask here, whether these or similar precautions were made at the Park Theatre, and if not, why not?

The theatre was only built about ten years ago, and the designs were prepared by the architect of the Lord Chamberlain's department. It is rather remarkable, at least, that there seems to have been no means of shutting off the stage or the portion found on fire from the other parts of the theatre. If there were iron doors, why were they not closed after the performance?—why was the entire area of the auditorium left to the flames? It is fearful to think of the consequences that would have followed if the audience had been still within the walls, or even making their way out. The same rapidity of the devouring element would have been present, with less facilities for effective working, for, in all probability, a panic of a frightful kind would have ensued on the first appearance of danger. A horrible sight of burned and suffocated beings would have told the tale in the early morning, only paralleled by the dreadful sacrifice of life at the Brooklyn Theatre still within remembrance. It is almost ironical now to ask whether the rules required by the Lord Chamberlain's licence had been observed: such, for example, that all doors and barriers opened outwards; that all gangways, passages, and stairs were kept entirely free for the unimpeded rush of the audience; that at least two means of exit were provided; that ample water supply and hose were in readiness; that wire-guards protected all gas-burners and foot-lights; and whether the other regulations to insure safety of life and property had been complied with. These are points which, since the damage has been done, have little direct bearing upon the case; but if life had been sacrificed, they would have acquired a hundredfold more importance. It is signifi-

cant, however, that before the engines could be got to work, the fire had actually spread to the upper boxes and gallery, and was fast overspreading the pit and stage, and this only a few minutes after the alarm was given. We indeed await with interest an explanation of the possibility of a theatre being so completely gutted in so short a space of time, if only the barest precautions were exercised in closing off the stage from the auditorium. The flames appear, from the first, to have been unimpeded in their course, leaping forward from tier to tier till the whole of the auditorium was in one blaze. The falling in of the roof, of course, finished the work of destruction.

Had a panic of the audience occurred, as it might have done, with its fearful tale of sacrifice, the question of the entrances would have been one of considerable moment. There were only two entrances, the main one in Park-street being as wide as such entrances generally are, though insufficient, and these led by low-covered buildings to the main structure. There were no apparent means of making an escape from the upper tiers and balcony without descending stairs in the building; and, in spite of the directness of the corridors, we do not see what check to the flames was within reach of those in charge, if the fire had taken place under the circumstances we have supposed. The store-rooms, in one of which the fire is thought to have commenced, ought to have been entirely shut off from the stage; but nothing of the kind seems to have been thought of. With regard to the ordinary regulations in force, we do not hear much. It, no doubt, ought to be required that, immediately after the performances are ended, the theatre should be carefully inspected, and all lights extinguished; the supply-valves of the water-mains and all hydrants and hose should be tested. Then all the parts of the theatre, or the several "risks," as Captain Shaw has pointed out, should be properly separated by iron doors, or other means, and especially that the stage opening should be closed by a curtain of iron.

The question of a local staff of competent firemen is one we have before pointed out, and Captain Shaw's ideas on this point are pretty well known to our readers. No manager ought to be allowed to open his doors without a staff of able attendants, and as Captain Shaw suggests, a sufficient attendance of real firemen should be one of the conditions of the licence, these firemen being obtained from the fire-brigade station of the place. On the Continent a fire-watch is thus secured for every theatre, and till our theatres are protected by a "watch" of trained firemen under the manager's direction, who know every nook and corner of the building, and are made responsible for its safety, we shall always be in a perpetual state of alarm and uneasiness about the safety even of an empty theatre left, without due charge, to the tender mercies of some tired official, or even to the carelessness of the last worn-out player who leaves the building. The burning of the Park Theatre is sufficient warning of the imminent danger to which people are subject living in crowded neighbourhoods near these places of public resort, and we hope the attention of managers will be called to the subject once more.

NEW BUILDINGS AT THE WEST END.

TO judge from a few instances of recent taste in the construction of buildings of a commercial character, the stately stone front, with its colourless Classic details, has been set aside for the rival claims of a less dignified but more picturesque modification of a vernacular brick style. It is no longer a question whether Classic or Gothic is the

more national style for building in, or which of them has the stronger claim on our regard, for Gothicism, as we have long predicted, from its utter inability to meet the requirements of modern commercial, and, to a certain extent, of domestic wants, has been relegated to the one sphere with which its sympathies have been so long associated. It is hardly, indeed, a question of style at all, but rather of the most pliable form of using material. The battle-ground has changed somewhat, for we hear no more wrangling about which style is the most national, but which is the most appropriate. The propriety of this or that form of roof and window turns now upon more practical considerations than it did when compliance with certain historical precedents was demanded; and, in a word, the more exalted question of an architectural creed or policy is left to theorists and amateurs to quibble over. Sentiment, as usual, has had much to do with bringing about the feeling for a domestic style of building which employs the materials ready to our hand, and this reliance upon our own resources, rather than upon Classical precedent, has a healthy look about it.

Pall Mall has changed but little since the Regency, and the art traditions of classic Italy still seem to cling to it. We can barely conjecture what it was like in the days of Pepys, when it had a "sweet shady side" of stately elms, with a few brick mansions on the south side. Many of the old brick 17th-century houses have been transformed. Nell Gwynne lived here, and in Mr. Craze's collection there is a view of her residence, and also of Schomberg House, as they appeared in 1820. Another example of the old brick buildings may be seen in a drawing of Christie and Manson's auction-rooms, also in Mr. Craze's possession. The style of building was at this time a rather unbending kind of Classic of red brick and stone, such as we see in the representations of old Marlborough House as it appeared in 1710; we call it "Queen Anne," and perhaps no better example of the style exists, as that house was built by Wren. After nearly two hundred years we are reproducing the very lineaments of this style, though occasionally the stone dressings are replaced by terra-cotta. Let us take a rapid review of new work in the locality. We first refer to a large building at the eastern end of Pall Mall, now in progress for the West-end branch of the Life Association of Scotland. It is entirely fronted with stone, and will comprise two shops on the ground-floor and offices above. Mr. Alex. Peables is the architect. Compared with the older brick Classic of this part, it affords some points of contrast. The façade has been treated in the academic fashion; there is one large order, Corinthian, in the front, supporting an entablature and attic above. Two three-quarter columns in the centre and end pilasters, with pedimented windows between, are the leading features of the design, a view of which was exhibited in the Royal Academy of this year.

Regent-street has not shown many signs of progress in architectural improvement since the days of its designer, John Nash. We recently spoke in praise of Messrs. Howell and James's new front to their premises, in which red brick and terra-cotta of a light salmon colour have been very tastefully combined, and this is the only recent building which has broken away from the Classical trammels. Since it has been completed, we can speak of its treatment more confidently. As a design in a modern Renaissance spirit it is a success; the parts are well connected; but it is chiefly as an experiment in colour we now refer to it. The vertical piers between the windows in red brick make a pleasant harmony with the

warm salmon tint of the terra-cotta which has been used in the horizontal members, the window-heads, balconette, pediments and cornices, and dormer-gables. The light mullions, with their green painted frames, afford a very agreeable relief to the eye, and supply the corrective to the bright red tints. How long a London atmosphere will spare the freshness of the brickwork is a matter of doubt.

In Piccadilly another effort to introduce colour and to depart from the beaten track has been made by Mr. Waterhouse in some corner shops and offices at the end of Old Bond-street. A Domestic Renaissance character has been given to the building, which we have before referred to. The windows have mullions and jambs of a warm terra-cotta, and the same material has been used entirely in the angular projecting bay which is carried up, and partially in the walls and horizontal features. The stamped or cast ornamentation which Mr. Waterhouse employed in the Prudential Offices, Holborn, and to a larger scale in the Natural History Museum at South Kensington, is employed here also in the bay and the stringcourses. The dark brown or purplish bricks, and the lighter warm stone-colour of the terra-cotta work produce a harmonious result; though somewhat marred by the heavy shop-front treatment below.

In New Bond-street the plain brick and stucco fronts are gradually giving way to the introduction of the new style, and in many of these façades the thoroughly Domestic features in vogue when Queen Anne and Dutch William reigned have been called into requisition. We have already described the principal buildings in this street, and our back volumes contain views of some of them. An extensive area of ground is now vacant in Piccadilly, near St. James's Church, intended as the site for new galleries for the Institute of Painters in Water-Colours, and also for a concert-hall and shops. In a notice of the last exhibition we gave a description of what the promoters intend; and, with regard to the architectural character of the new façade, we believe we are right in saying it will be in a free Italian or Renaissance style. At the corner of Gilbert-street and Oxford-street we see a block of new shops and chambers, designed in the "Queen Anne," but essentially unpoetic in its spirit. The red brickwork is tuck-pointed, with white joints, the proportions of the upper stories and dormers certainly look out of scale and crushing, and there appears to have been a desire to make the most of every feature. The dormer-gables are very narrow, and crowded at the side, the carved brick stringcourse is quite as heavy and deep as the main cornice, which has festoons in the frieze, and it would have been infinitely better if either the stringcourse or the cornice had been omitted. Swags of foliage are carved over the first-floor windows. The front towards Oxford-street has a stilted-looking gable, with an arched recess and a corbelled flat-curved oriel window; but the manner the shop-front and the angle are treated is unsatisfactory. The windows of the shops have flat arches, cut out of a deep frieze of polished granite of a dark warm colour, and above this a black marble polished cornice cuts off the red work over. The first floor is rather crushed in appearance, which is due to a want of gradation.

The old-fashioned aristocratic squares are here and there invaded by the modern builder. We see in Berkeley-square, for instance, an important block of new mansions just finishing from the designs of Mr. Wimperis. The style we may rather designate Anglo or Neo-Classic than Queen Anne, though the design is evidently conceived in that spirit. There is an octagon turret at the corner finished with a lead

eupola of ogee shape. The lower story of this turret forms an angular entrance, the projecting roof or porch of which we hardly think improves the design. Two brick gables face the square; these are varied, one having carved brick ornament. The terra-cotta balconies have a somewhat disconnected appearance, and we find fault with the circular oriel balcony on its single corbel, but the whole design may be taken as a fair example of a modern version of the brick architecture of the 17th century, shorn of its quaintness and simplicity, and of much of the detail which gives the old work its picturesque character.

In the neighbourhood of the square we note a small church, now building, in red brick, by Mr. A. W. Blomfield. It has a short nave and well proportioned chancel with side aisles (the northern being a passage aisle), pierced with windows of simple Geometric character. There is a large triplet under an outer arch at the east-end, and the west front is relieved by a stone mullioned window, and with bands of stone. At the corner is a tower of brickwork relieved by stone, and intended to be finished with a low roof, the grouping of which will be simple and pleasing. We illustrated the interior of this church Dec. 24, 1880.

DECORATIVE ART.

THERE are two distinct schools of decoration which have been followed by our modern artists and art-manufacturers. One of these schools takes Nature as its standard and tries to keep very close to the natural forms; it is strong in individuality of expression, though its work is oftentimes no better than a feeble kind of "high art" which it affects to rejoice in. The other school, that of the Idealist, while also acknowledging the methods of Nature, denies that he is bound to accept her as his only guide, and seeks to make his art conformable to other laws, which he believes are of equal force in interpreting the object of his design. This school often falls into lifeless platitudes and a spiritless academicism. The two kinds of artists differ practically only as to the limits of nature and the imagination, and we shall find that both the "realist" and "idealist" agree to study Nature. The whole subject of art is, in some measure, involved in the question; but it has a more practical bearing for the artist and manufacturer. It is proper for artists to understand at the outset the fundamental principles upon which they work, partly by habit, but perhaps more from temperament; for it will be a long time before art, as the embodiment of sensuous pleasure, is thoroughly understood to be the result of particular vibrations conveyed to the nerves of the eye and ear, seeing that the most devoted masters and enthusiasts are not yet willing to admit a physical basis for their preferences, even in spite of what Helmholtz has demonstrated with regard to musical notes, and M. Veron and Spencer have shown in their essays on art.

It is at least important to understand, for instance, why the cover of a book is more artistic, when the ornament is of a conventional or non-naturalistic kind, than when it is stamped or impressed with unmeaning wreaths of flowers or leaves; or why our wall-papers and carpets are more in keeping with the dictates of correct taste when their surfaces are relieved by flat patterns dictated by the fabric and by colours which harmonise with the surroundings of the apartment. The geometrical distribution of foliage, especially of that kind which the Japanese artist has taught us in the varied disposition of his diapers and medallion ornamentation, and the harmonious blending of colours such as he has shown in his charming faience and lacquer work,

appear to offer the nearest approach to decoration in which both the principles mentioned have been exemplified. Few of the admirers of naturalism in art can object to a treatment which gives ample play for the imitation of natural forms, and we do not think the conventionalist will be disposed to undervalue the exquisite sense of creative fancy displayed in some of these productions. The Oriental textiles furnish the most beautiful examples of the law of adaptation of natural objects to works of art, and we find one of our leading art-manufacturers of the West-end following this *motif* of design in the production of wall-hangings, carpets, and chintzes, in which flowers, fruit, and foliage of English growth are treated with a naturalness and individuality of type, yet preserving an artificial arrangement of a purely conventional or geometrical character. The chrysanthemum and tulip, the apple and mistletoe, are types we have seen treated in this manner. Since all surface ornament has to be repeated, as in the case of a wall paper, the proper degree of naturalness compatible with this kind of distribution is a matter of the first consideration. It may be taken as a principle of general application that the greater the repetition the less natural ought to be the treatment. A natural type always loses by repetition. Many other reasons may be given for assuming that a conventional or ideal treatment of ornament is one which most strictly follows the method of Nature; and the real issue between the disputants of the two schools of decorative art appears to be that while one copies Nature as he sees it, the other studies her methods and true spirit.

The true characteristics of decorative art can only be understood by distinguishing clearly the limits of these principles—in fact, by defining those modes of arrangement which separate decorative from “expressive” art. Decorative art has been well defined by Veron in his admirable work on æsthetics as being “achieved mainly by arrangement of line, form, colour, sound, rhythm, movement, light and shade, without any necessity for the intervention of idea or sentiment.” “The arts of design are, therefore, not the only ones which may have a decorative character. It is to be found in the dance, in music, poetry, and in rhetoric. Our ballet measures are nothing but decorative dancing, with the one object to please the eye.” The same author, however, seems to place decorative art in a lower category than has been assigned to it, and it is probably the endeavour of late to revive what is called “high art,” that has made decorative artists impatient of the limits and necessary trammels imposed on decorative design. They like to introduce images, ideas, and sentiments into their work and to this extent they fail to give us purely decorative character. Greek art was purely decorative in its feelings, we mean that which has ever remained subordinate to architecture. It was perfection and grace of outline and form which were the aims of the Greek artist; even Greek sculpture was decorative, and the same spirit was rekindled by the artists of the Renaissance. The statues and Greek reliefs in which mythology and heroic scenes were introduced are thoroughly decorative. The attitudes of the figures, the movements and rhythm of the groups and the draperies were all designed with the same feeling. The most perfect physical types of beauty were chosen, and these were idealised, though M. Vernon asserts that such was not the case, that the sculptor copied the figure which he had before his eyes, the human form as he had pictured it. The beauty of a statue depends, says the same author, upon the refined interpretation of a beautiful form; but what is this but Nature idealised? The sculptural assessories of Greek architecture

afford abundant evidence of the theory of such a conception of physical beauty. No doubt the Greek sculptor, in his more expressive works, endeavoured to develop the personal and human form, but we are here speaking of decorative or symbolised sculpture. We are not saying that these works are to be copied implicitly by our artists. This indeed would be to ignore the very principles upon which the Greek artist worked; we should then indeed become the slaves of a despotic academism, which never has produced anything real or spirited. We only contend that the most perfect of natural forms, the central types of the human figure, were taken, and by a consummate mastery of contour, movement, rhythm, light and shade, these forms were made subordinate to the architectural composition. No doubt decorative sculpture has been always more or less symbolic: the Assyrian and Egyptian ornaments are so conceived, and in the Greek figures of Zeus, Athena, Hermes, or of Pan, the attributes of these gods are made prominent and distinctive. The bas-reliefs on the Temple of Theseus, and the pedimental sculpture of the temple of Ægina, are examples of decorative sculpture of the highest and most expressive character. We might instance the decorative art of the Renaissance as having been founded on principles derived from Greek art; but our main object is now to show that architectural decoration, including sculpture, has been long suffering from a confused view of the principles upon which the best examples have been designed, and that our ideals of decorative beauty in design have been solely derived from the antique, without a corresponding ability to use the methods the artists of the antique followed. Without this knowledge, all our copies and academic studies, and all the teaching given in our art schools, will be of little avail. We must train our art-students, especially those who will direct our manufactures, to become decorative artists, not imitationists or dabbles in “high art;” and to do this we must show them how to convert natural types into ornament which shall subserve the objects which it is intended to decorate. But a knowledge of natural types is useless if it leads to no other result than copying or reproducing them; it must be accompanied by an ability to idealise—the power of abstraction, or of seeing things in a sense removed from the visible and concrete manifestations in which they are presented to the eye. The greatest artists have been those who have been gifted with the power of “conventionalising,” as we term it; in other words, of abstracting the elements of natural types, and applying them in a decorative manner. Is it not this quality which has imbued the decorative works of Phidias with such inimitable beauty, which give the creations of Raphael, of Correggio, and Da Vinci their charm—which make us admire the decorative painting of Watteau and Boucher, and all the art of the 18th century? Except perhaps Stevens, we have had few modern decorative sculptors who are possessors of this gift.

THE WATER QUESTION.—XVI.

CONCRETE FOR EMBANKMENTS AND DAMS.

WHERE reservoirs are desired to be made in situations which afford no clay for puddle, and nothing but loose earth and stone for the embankment, the use of concrete may be extended, in forming the bulk of an embankment or dam. Where the range of stone is extensive and massive, and is bedded, it may be more advantageously cut into blocks for setting as proper masonry. The materials of the immediate site, whatever they are, are those only which can be used with economy for the

main portion of a reservoir embankment. Where these consist of stone, in any form, they may be used either by way of setting, in such blocks as can be procured, or they may be broken up for concrete and used for the bulk of the embankment. The material is heavier than earth, and less liable to slip, and for both these reasons it may be used in bulk of less magnitude, with the same degree of resistance.

Concrete may fairly be taken to weigh 120lb. per cubic foot at the least, and much more with some kinds of stone, while 96lb. per cubic foot is a heavy average for earth. The weights of stone of various kinds are approximately as follows, per cubic foot in the solid state, viz.: basalt, 180lb.; granite, 166lb.; mountain limestone, 170lb.; clay slate, 180lb.; trap, 170lb.; sandstone, 141lb. as an average, but some kinds are only 130lb.; chalk, 160lb. When broken up for concrete into pieces of about 4 cubic inches, the space occupied by a cubic foot of solid stone extends to about 1½ cubic feet, more or less as the pieces are moved about amongst each other so that the angles interlock, and the quantity of sand, or fine gravel and sand, with which the interstices may be filled, varies accordingly. The cementing substance required to combine the mass must be such as will set under water. The beds of blue-lias limestone furnish a hydrate of lime which has this property in a degree sufficient for the purpose; and so, indeed, have some parts of the Wenlock limestone and the gray chalk; but in other situations, where the cementing substance must be brought from a distance, Portland cement will be the most proper material, for the reason that the less the weight to be carried to the spot the better, and that Portland cement will bear a larger proportion of sand. River-sand, if clean, is better than pit-sand, but it is by no means safe to assume, as is sometimes done, that all river-sand is better than pit-sand, inasmuch as it often contains vegetable and animal fibre in injurious quantity, which cannot be separated from it by any ordinary or economical means. The only means of separating objectionable matter from sand to be used for mortar or concrete is washing it, and river-sand has already had, before it is procured, more washing than can be artificially given to it, and if the objectionable woody fibre, rags, wool, hair, &c., remain in it where it is procurable, they may be considered as being inseparable; and sand containing these, or any of them, in considerable quantity, is unfit for this purpose. The only way to get rid of the organic matter in river-sand would be to burn it out, but that would be a process too costly to be carried out. Pit-sand, on the contrary, is free from these, but contains too much earthy matter, which requires washing out of it. It is not always possible to do this entirely, with any degree of economy, for in many cases the quantity of clean sand left after the operation of thorough washing would be so small as not to be worth having at the price it would cost; and when neither clean river-sand nor good pit-sand is procurable, crushed sandstone may be used; but it is not a good material for the purpose, inasmuch as that any stone which can be crushed into sand contains much earthy matter. Sand procured in this way is, of course, costly, but even then it is not of good quality, and either of the other kinds is to be preferred to it, when cleansed. There is another source from which the necessary fine material for concrete may be procured. Clay may be burnt as it is dug out of the ground, at an almost small expense, and if well burnt may be crushed into a fine material resembling sand, which, although not so good a material as clean sand, is preferable to some others, inasmuch as it is absolutely clean; its fault is that it is absorbent, and, if not well burnt, too much so for use. Crushed

engine-cinders form another material of similar character, and equally good if procured clean, and consisting of engine-cinders only; house-ashes are, of course, inadmissible under any circumstances.

The immediate purpose for which concrete is intended to be used seems not to be always kept in view in specifying the proportions of its several components. Where it is used as a foundation to carry weight, or more properly to distribute weight over a larger area of foundation, much sand is to be avoided, inasmuch as it weakens the coherence of the materials as a whole. It is better in this case to use the cementing substance for the purpose of the adherence of the parts of the larger material to each other, and instead of driving them asunder by interposing sand, to bring them as close together as possible, and let each piece of the larger material be coated with its due proportion of cementing substance. If, after the larger material had been brought as nearly into contact as is practicable, the space of the remaining interstices could be known, they might with advantage be filled; but, as they could not be known, the probability is that, if filled at all, they would be over-filled, and the larger parts of the material driven asunder, so that it is probably better to avoid sand altogether. It is understood, and is to be insisted upon as a point of the very greatest importance, that the materials with which concrete is to be made must be clean; no good concrete, of any sort whatever, can be made without attention to this point.

But where concrete is intended to be used as a wall to prevent the passage of water, the interstices of the material require filling up, and it is important to know what relation of space they bear to the solid material, or to the whole mass, in order that they may be completely filled. Small angular stones lie closer together than rounded gravel-stones, if means are taken to press them together; but not so without such means. When loosely tipped in a heap, the interstices are larger with angular stones than with gravel, which, without ramming, settles itself to as great a degree of compactness as it is capable of; whereas the other material can be much compacted by ramming. Ramming clean gravel is detrimental rather than useful, inasmuch as it merely displaces the parts of the material without bringing them closer together as a whole. If the material be neither angular nor much rounded, as beach-shingle, it is of intermediate character in this respect, and may be rammed with some advantage.

If the material were perfect spheres the spaces amongst them could be calculated exactly, thus:

The distance, A B, Fig. 1, is the diameter of a ball; A C being half the diameter, and B C the transverse distance apart of the rows of balls, = $\sqrt{A B^2 - A C^2}$, the longitudinal distance being the diameter of a ball. In the vertical arrangement, Fig. 2, the height B C = $\sqrt{A B^2 - A C^2}$ as before, and the cubic space occupied by each ball is $A B \times B C$.

If the balls are 1 in. diameter, the distance B C = $\sqrt{1^2 - \frac{1}{4}} = \frac{\sqrt{3}}{2}$ in. The vertical height is the same, and the space occupied by one ball is $1 \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2}$ cub. in. The 11 sphere, 1 in. diameter, is 523.6 cub. in., leaving a space around each ball of $\frac{\sqrt{3}}{2} = 0.866$ cub. in., and the ratio of the hollow space to the whole space occupied is 2264 to 523, or 30 per cent.

If the balls are 2 in. diameter, the distance apart of the rows of balls is $\sqrt{2^2 - 1^2} = 1.732$ in., both horizontally and vertically, and the space occupied by each ball is $2 \times (1.732)^2 = 6$ cub. in. The solid sphere is proportional to the cube of its diameter, or

to $2^3 = 8$, and is $5236 \times 8 = 4188$ cubic inches, and the ratio of the hollow space to the whole space occupied is 1812 to 6, or 30 per cent., as before. If the balls are 3 in. diameter, the percentage is the same. The distance apart of the rows is $\sqrt{3^2 - 1.5^2} = 2.598$ in., and



the space occupied by each ball is $3 \times 2.598^2 = 20.25$ cubic in. The solid sphere is $5236 \times 3^3 = 14137$ cubic inches, leaving a space around each ball of $20.25 - 14137 = 6.113$ cubic inches, and the ratio of the hollow space to the whole space is 6.113 to 20.25, or 30 per cent.

These may be compared with some recent trials of the proportions of sand and shingle at the Portsmouth Dockyard Extension works, given by Mr. C. Colson in a paper read at the Institution of Civil Engineers in February, 1881, where 15 samples of shingle of 1 cubic foot each, from various localities—viz., from Langston Harbour, Browdown, and Portsmouth Harbour, were tried, and which showed that it required, on the average of the 15 samples from the above-named localities, 38.4 per cent. of sand to fill the interstices, or 2.630 parts of shingle to 1 of sand. There was 53.3 per cent. of sand in the material as procured and used in the dock-walls and other parts of the work, or 1.875 of shingle to 1 of sand; but in the trials the quantity of sand was reduced to that which was sufficient only to fill the interstices of the shingle, with the above results. At the same time 26 trials were made of the quantity of cement required to fill the interstices of the sand for mortar, which showed a proportion of 36.4 parts of cement to 100 of sand, or 2.715 of sand, to 1 of cement.

Mr. G. F. Deacon, of Liverpool, made some trials of concrete used in the foundations of roadways, given in a paper read by him at the Institution in April, 1879. The concrete consisted of 8 parts of broken stone, 6 parts of gravel, and 1 of cement, making a mass, when mixed and beaten together, of 11 parts of stone and gravel to 1 of set cement; from which it would seem, the cement being included in the 11 parts, that it required 3 parts of gravel (containing half a part of cement) to fill the interstices of the broken stone, there being in the produced mass 3 parts of gravel more than was sufficient to fill the interstices. The percentage of space of the interstices of the broken stone to the whole mass was thus 3 to 11, or 27.27 per cent.

When the quantity of sand and cement is considerably in excess of that required to fill the interstices of the larger material, as in this latter case and in the walls of the Portsmouth dockyard extension, it takes the form of a matrix in which are embedded the larger pieces of material, and thus becomes or resembles rubble masonry, such as is found in the old castle-walls and Roman buildings, in which pieces of rough stone are embedded in a coarse mortar. This is the form which concrete walls should take which are intended to retain water in a reservoir. Concrete has not hitherto been used to form a reservoir embankment entirely, but during the last few years it has been used to protect the puddle walls of earthen embankments.

In the Appendix, No. 7, of the third Report of the Rivers Commission, in 1867,

Mr. Rawlinson recommended the use of concrete to protect the puddle in these words: "The cheapest material which can be safely used will be concrete, made of the best hydraulic lime, and laid thickly over the entire surface of the puddle trench. Concrete, or a thick bed of mortar, should in fact, protect puddle from contact with rock, gravel, clay, or earth at every point."

THE SANITARY IMPROVEMENT OF OUR PAVEMENTS AND FOOTWAYS.

NOTWITHSTANDING the improvements which have been made in our system of drainage, and in the construction of our streets and roadways by the use of asphalt and wood as a metalling, there still remains the unsanitary house area to deal with. In the metropolis, the open-grated area in our pavements is a source of mischief which it would be difficult to over-rate, and it is upon this subject we wish to say a few words. Nearly every street has its open areas for lighting the basements of the houses on each side; in many instances, as in the private thoroughfares, these are inclosed more by iron railings, but where shops exist the necessity of bringing the frontage to the pavement is obvious. In these cases the basement is often lighted by an area covered over by an open grating. It is almost superfluous to say the areas thus made constantly become the receptacles of road dust and dirt, and in course of a few weeks they are filled with refuse and decaying animal and vegetable matter, as every observer must have noticed. To clean the areas out it is necessary either to take off the outer grating and remove the refuse, or to open the basement-window and carry it through the house, the objection to either of which operations is plain enough. We have often wondered why the Metropolitan Board have not compelled the builders of houses in our streets to adopt some better mode of lighting than the open grating affords. Those who have closely observed the condition of some of the basements will have noticed that in a crowded thoroughfare like Fleet-street and the Strand the windows in the basements of the houses are incrustated with dust or mud all the year round, while the areas are receptacles for all kinds of refuse and decaying matter. What the health of those can be who live and work in these miserable basements, whose windows are beclouded with passing crowds, and bespattered with the mud of traffic, it is hard to say; but we think the public have also a right to complain of these foot-traps in our pavements. On public sanitary grounds, we think the subject of basement areas ought to be dealt with, and it is a pity the Metropolitan Board have no power to require, in the reconstruction of premises, some improved form of lighting and ventilation. There is a clause in the Metropolitan Management Act with regard to underground rooms as dwellings, requiring that any room more than 3ft. below the footway of the street, which has already been used as a dwelling, shall have "an area in front of the window to the extent of at least 5ft. long and 2ft. 6in. wide, and be open or covered only with open iron gratings," but this provision does not secure the object we are hinting at. We might, indeed, make out a stronger case of indictment than we have done. Sometimes these areas are 8 to 10ft. deep, and only 2ft. wide, but the basements are not necessarily used for habitation. In some of the streets leading from Covent-garden—Burleigh-street, for instance—the areas are choked up with vegetable and other rubbish, and the light is obscured, while in other instances the open grating becomes a dangerous foot-trap and a cess-pool. As the Board have power to compel

owners of property which projects beyond the general line of the street, to set back in case of pulling down, or of destruction by fire, &c., it is only reasonable to expect these areas will, in course of time, be made to conform to a general rule. But there is a remedy. The excellent prismatic lights manufactured by Messrs. Hayward, which admit light and afford ventilation to these areas, can be readily applied to all existing cases. The glass prisms not only augment the lighting power, but keep the area free from dust and rubbish. For dwellings in basements, the Board should require a structural alteration. The basement-wall of the front might be set back, or the area built as a recess within, instead of being made an external projection beneath the footway. In this case, if height allowed, the open grating might be placed within the frontage line; if not, light and air could be obtained by trimming back the ground-floor joists and introducing a vertical grating or light in the front below the ground-floor window. We have seen basements used as warehouses well lighted by prismatic pavement lights, but the advantage of vertical lights is obvious. It may be urged that the alteration of old areas would be difficult, and entail much expense. A lintel or arch would be required to be introduced at the proper level, after which an opening would be made between the arch and the pavement, and an iron grating or frame of lights inserted. The old window opening could be then stopped up, and instead of light being obtained through the grating, level with the pavement, a direct light might be got in the vertical opening cut out above the pavement, and the ceiling finished as a sloped bulkhead. If an area be required, it is very easy to support the front wall of house and set back the area into the room, though in this case space would be sacrificed. We have only indicated two easy methods of obviating the present basement-area and its numerous sanitary evils. Besides providing a very imperfect light, it becomes a kind of ash-pit, into which all kinds of refuse is swept; in time of heavy rains it is flooded, and there is seldom any drain to carry away water. The grating is dangerous, for the foot is apt to be caught in the openings; and as a sanitary imperfection, which has survived many important alterations, the subject demands attention.

PARKS AND SQUARES IN AND ROUND LONDON.

IF it be curious to note the difference in so infinite a number of ways between the London of 1593, as depicted for us by Pieter Van den Keere, and the London of the "Roman" era, it is certainly not the less so to compare the Metropolis of, say, but fifty years back, with that of to-day, as mapped out by the Post Office authorities. We are indeed in quite different towns, and but for the Tower of London on the banks of the Thames, and some few other well-known and not-to-be-forgotten landmarks, we should not know the very town we live in. And this is not in size alone, in length and breadth, but in *plan* and method of laying-out building-ground, and in the very designing of a new city. In the plan before us of 1593, by J. Norden, there is no indication whatever of any squares or open spaces, grass covered, and with trees, with the exception, here and there, of the open spaces between the blocks of houses and at the backs of them, till you get beyond the city walls and through one of the many "gates." Round the town and outside of its wall, we soon find ourselves in the green fields, with but here and there a house, or short length of houses, but, as we have said, in the town itself there are no green spots. This is curious to note, for the "squares" of London are of

quite modern growth, though we can hardly imagine this huge town nowadays without its "squares."

It is of the squares of London town, and of the parks and open spaces round and about it, that we would now say a few words, for the progress of house-building, all round and about London, north, south, east, and west, is so great, and is proceeding with such rapidity, that but for some little thought and attention in this direction, the open ways and "lungs" of mighty London will be, it is to be feared, altogether forgotten. We are here, too, it will be borne in mind, thinking not alone of the squares of London, but of the parks, now so fast getting to be but large squares in themselves, so to phrase it, for they are as house-surrounded as the smaller squares themselves. In Norden's plan, East Smithfield, and the space to the north of it, was indeed a *park*, as was also Spittle Feildes, with many other now entirely built-over spaces. In looking at this map of old London town, of some three centuries back, before this modern world of ours can be said in any sense to have existed, so different are all things, and bounded so definitely and closely by its wall, it would seem a pity that the plan adopted at Vienna was not thought of, where the "glacis" round the fortified walls of the inner and older city, wherein are the cathedral and older buildings, is not built over, but converted into a garden or grass-covered space, thus forming a park in the very midst of the Imperial city itself!

It is of course impossible to do anything of this sort nowadays, in our modern and huge city, for the very direction of the old city wall and city boundaries are not to be distinguished, except on a map, and only then with some painstaking and trouble. But there is one thing which, as we think, might yet be done, and which would, to a great extent, make up for the loss; and it is to take advantage of the size and number and position of our *present parks*, and to, if possible, *add* to their number, and thus to form a ring more or less complete, of green-covered and tree-covered ground, round huge London—day by day growing bigger and bigger. A somewhat close and careful looking at maps is needful here, and had this been done in the past we feel quite sure that much that is now to be regretted might and would have been avoided and very much would have been done that has been missed, and which is now impossible.

Leaving, then, Norden's plan of three centuries back, we may glance for a brief moment at the map of fifty years back, and before the railways were even thought of. In this map, by Edward Hogg, of Charing Cross, of 1836, the Regent's Park and Hyde Park are fairly out of town. They are surrounded by green fields and wide open spaces—Paddington, and Brompton, and Camden Town, and Pentonville, and Finsbury, to the north, were open fields. And the wide space from Hackney to Stepney on the east of London City were as vacant of buildings and all sign of house and city building as they well could be, and here it was that advantage might have been taken of the vacant spaces, to the north and east of London, and parks as large and healthy as Hyde Park and the Regent's Park, might well have been formed, and thus a circle or girdle of green and grass-covered spaces would have surrounded the north of London. And, in addition to these, if another and as much needed had been thought of for Stepney, between the Mile End-road and the river, London, on at least three sides of it, would have been bordered by those health-giving spaces of open grass-covered ground. A glance at the Post-office map of to-day will show, at a glance, how this fair chance of a good thing has been missed, and what it is that occupies these spaces.

We may then (and it was necessary, for the sake of some clearness, to note what has been) pass on to what is *now* possible; and the very first thing which must strike all who will glance at it is that the once "Sub-urban" Parks are now in the very midst of the huge city itself. The parks are house-surrounded. The Green Park is like a huge London square, and even Hyde Park, and with it Kensington Gardens, are as house-surrounded, and as much in London as any one of the large London squares. And it is right fortunate that this is so, accidental as it has been—for designing and contrivance have done, after all, but little here. And this it is that brings us, after missing much, to the main purport of this slight notice, and it is, to call some attention to the possibility of forming, by degrees, a yet larger circle round huge London of *open spaces*, and to, in some way or other, connect these together by wide and *tree-planted roads*. A glance at the post-office map will indicate what might well, at least, be hoped for, and certainly *begun*. The London of 1593 might, as we have said, been tree-begirt, like the old Vienna, and the London of half a century back have been park-surrounded, of which Hyde Park and the Regent's Park were the key-notes; but these chances being missed, we would suggest that the London of to-day might well be beautified, and the health of its ever-growing thousands added to, by a little timely thought and careful working-out. Without going into details, we would but venture to urge the retaining as open tree-covered and park ground the present market-gardens at Fulham—indeed, the whole of the space formed, or outlined, by the bend of the river here. Much of Hammersmith is yet unbuilt upon, while Wormwood Scrubs, due west of the town, and looking, like Hyde Park, as it did on the old maps, might well be spared, and the bricks and mortar kept out and away from it. Kilburn "Park," as it is named on the map, and the open space about it to the north might, at least in part, be reserved as open and grass and tree-covered spaces; parks, indeed, with wide and connecting tree-bordered roads connecting them. This, with Highgate and Hampstead to the north, takes us to Holloway, a town in itself, but in reality a part of London, and not to be distinguished from it or separated from it. A good park might yet be formed at Highbury, and thus a series or circle of open-spaces might be secured as "parks" north of huge London, so as to partly encircle it, and to form what we may fairly call the lungs of it. It is curious to note here that the Victoria-park, a thing of to-day, is now all but house and street surrounded, and will, in another year or two, be quite so. We must leave the south of London for another opportunity, simply urging on those who have influence and authority to take the whole subject of the London parks and squares into consideration. We might surely urge it on the attention of the House itself, while there yet exists so fair a chance, accidental though it be, of doing a something so useful and right serviceable to the London public—ever on the increase, and needing more and more, year by year, some new artificial and "contrived" compensation for that which their very "progress" must needs, in some way or other, deprive them of.

C. B. A.

THE FURNITURE TRADE CATALOGUE.*

WE have on our table a bulky volume, issued by the publishers of our contemporary, the *Furniture Gazette*, containing designs for every description of modern

* The Furniture Trade Catalogue, containing Designs, with Price-list. London: Wyman and Sons, Furniture Gazette Office.

furniture in the various styles in vogue, with a copious index and price-list. The object the publishers have in view is to provide a general illustrated catalogue of furniture for the use of the trade throughout the country, the designs illustrated being such as can be purchased at any wholesale house. The descriptive index and price-list which is prefixed will enable the retail dealer to fill up his own prices for articles, based upon the information furnished in a "wholesale trade price-list," which has been compiled by a practical and experienced man. These prices state the minimum and average figures, and will be, no doubt, found of great use by many in the trade. The last-named list is published in a separate form for convenience. Turning over the illustrations, which number 165, we meet with a selection of designs for every conceivable article of domestic furniture, beginning with simple matters like hat-rails, and other hall requisites, to drawing-room and bed-room articles. It is scarcely necessary for us to say every taste and style has been brought together, and that the designs aim more at supplying the trade with the prices of ordinary stock patterns of the various styles, than in setting the highest taste in these matters. As a catalogue of designs, the book, therefore, has a distinct value to the trade. With regard to some of the designs, we would rather not express an opinion, and we are sorry they should have been introduced; there are others of infinitely better taste, which suffer from their association. Thus we pass over the first three or four plates to meet with a hall-chair and tables of a superior kind. Many of the hall-chairs and umbrella-stands, as Nos. 16, 17, 31, are spoilt by a weak Gothicsque finish, not in keeping with present taste, though flashy. The chairs on plate 15 are better.

In looking at some of the designs for book-cases, we discover much of the Gothic spirit which prevailed some 20 years ago; while a few of more recent taste show a rather feeble knowledge of detail. We instance the way the pediments spring in designs Nos. 75 and 76. The best examples of sideboards are given in Nos. 95 and 101; the latter is quiet and broadly treated, and other moderate designs are given on plates 44, 45, and 47, which are as superior to those numbered 97, 99, 102, as the real is to the counterfeit. With respect to drawing-room furniture, a similar diversity of style and taste is to be met with. There are many intensely Gothic, others Louis Seize, some Japanese, and Queen Anne. Some of the Anglo-Japanese coffee-tables and the Chippendale shaped tables are neat, and the "occasional" tables and cabinets are numerous and varied enough to select from. The cabinets, Nos. 359, 354, and 360, are the best illustrated. The chimney-piece designs fall short, and are costly in finish, and the chimney-glasses and cornices are tawdry in some instances. The section devoted to bedroom furniture contains a few sensibly treated articles, and the catalogue in this, as in other departments, will be found comprehensive enough for the requirements of all.

PRACTICAL NOTES ON PLUMBING.— XIII.

By P. J. DAVIES, H.M.A.S.P., &c.

TRAPS (continued).

Ω-TRAPS MADE IN THREE PIECES.

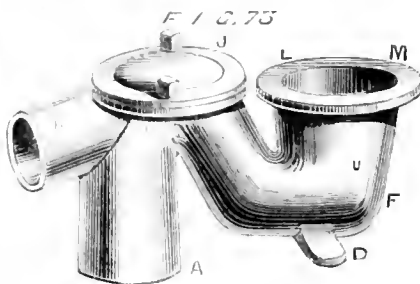
THIS is a very old method of making Ω-traps: the bottom Q D F is cast, the dip M L soldered or burnt on, as also the outgo A Q J. A drawing of a trap weighing over 2cwt., lately taken out of an old house in Knightsbridge, illustrating this method, was published (Fig. 72) last week.

* All rights reserved

Ω-TRAP WITH LUGS FOR FIXING ABOVE FLOORS (Fig. 73).

Fig. 73 is a diagram of an Ω or half Ω-trap for fixing above floors, suitable for short or low balloon basins.

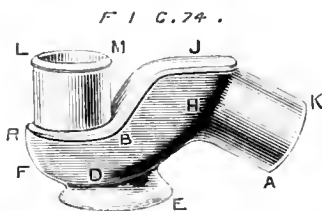
This trap may be made with cleansing cap and screw, and can be wiped down to the soil-



pipe at A, or on a straight outgo. This style of trap has been made in earthenware, but the difficulty has been to make the connection with the lead and outgo sound. This difficulty has been overcome by making the trap of lead instead of earthenware.

THE SEMI Ω-TRAP (Fig. 74.)

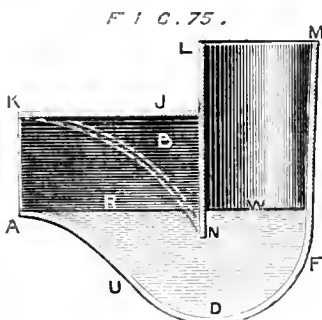
This is another trap for fixing above the floor line, and excellently well it answers its purpose. The bottom part, D H R, of this trap may be



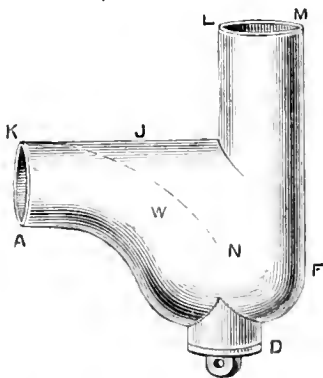
bossed up on a block or otherwise, and the top or inlet soldered on, so that the lower part R B, forms the water lock. The foot E is also soldered on. Of course this trap can be fixed below the floor-line with the outgo soldered on in the usual way.

THE ECLIPSE TRAP (Figs. 75, 76).

This trap is a good and useful one, having a



F I C. 76.

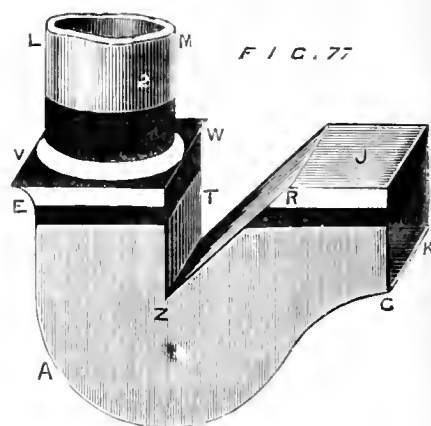


dip N, with rounded bottom and top; an air-chamber B, which prevents wearing out (the great fault in the Ω-trap).

The Eclipse is cast in one piece of lead. Fig. 76 is the elevation of it, showing that the whole is rounded, which, in the estimation of many sanitary engineers, is a great advantage.

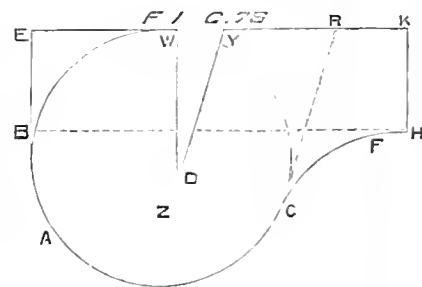
V-TRAPS (Fig. 77.)

This excellent trap is, in principle, part Ω and part Ω-siphon. Z is the cheek; T the



throat; J the top, which also goes down to form the throat, and up, then over to the top to V; the top or inlet-pipe is soldered on last.

The method of cutting out this cheek Z is as follows:—First strike the circle A, W, C, Fig. 78, draw the right line E K, cutting the top of



the circle; next draw the line E, square to the top line, and cutting the circle at B; then measure off the outgo R, with the distance from E, to the extreme periphery of the circle at C; now, with a straight-edge, draw the outgo line R, to cut the edge of the circle, as at C, then draw W D square to the top and the slanted line Y D, taking care to go low enough at the throat in order to have a good dip. Prepare this cheek and solder on the band, as at K G A E, Fig. 77, then the top, and dip in another piece, after which, solder on the inlet-pipe L M. Of course the throat part and up T W Z to R is soldered from the inside, and the part R E after. Messrs. Beard, Dent, and Hellyer make a cast trap somewhat similar to this last described.

Ω-TRAP.

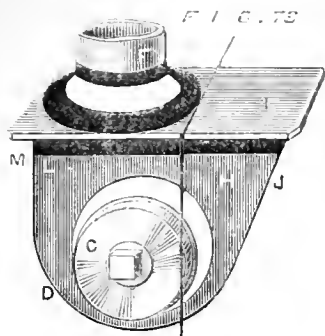
This trap has stood its ground for at least 200 years, and there can be no doubt it had its origin from the dip pipe and bowl trap, then to the shape of the Ω-trap (to be explained shortly), then altered again to its present shape of a Ω.

But, in whatever way this trap first originated, there cannot be a doubt that it has lately got into sad disgrace with many who do not know its merits.

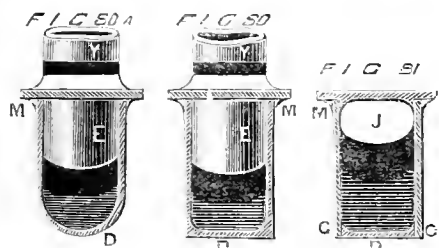
The Ω-trap has been made by many plumbers, who never thought it was wanted for anything more than the keeping back of stinks; they have made it to almost any size and shape, not troubling or caring whether it cleared itself or not.

I shall now show the best method of making it, so that it shall be what is generally known as self-cleansing; at the same time I shall keep within the bounds of that principle, which, I suppose, is universally known to be the beauty of the Ω-trap—viz., the clearing the soil from the inlet to the body of the trap, and its retaining the water-seal or lock; especially against the waving out caused by strong currents of air blowing down air-pipes or up soil-pipes.

Fig. 79 is an elevation of the \square -trap, having a cleansing cap and screw C soldered into the side or cheek; this latter being fixed here, is



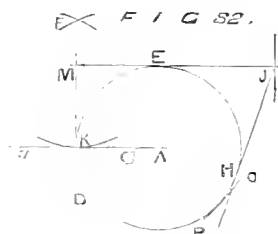
more for sink work than for closets—in fact, the proper place for this cap and screw for closet-work is at I. In order to get at it, I have made \square -traps with the dip to screw in and out, but for sink-work it is best at the side or under the bottom, as at D, Fig. 80. This allows you to



take such things as tooth-brushes, &c., out of the dip, which cannot pass into the body of the trap.

Fig. 81 shows the outgo from the inside of the trap.

Fig. 82 shows my geometrical plan for striking out the cheek of a self-cleansing \square -trap.



The novelty of this is obtaining the point J, so that it will make the same angle in any sized trap—viz., the angle of 76° .

To strike this, take a piece of lead, having one straight edge, as from M to J, open the compasses to, say, $4\frac{1}{2}$ in., and scribe the circle D E H, cutting the line at E, then with the square M to K, also cutting the circle at K. Next and most important, place the point of your compasses at the intersecting point M, and with the other obtain the distance to the outside point of the circle, as at H, and as shown at O P arc; then, having obtained this exact distance, set it off along the line M E, as at J. This is the length of the top. Next from the point J draw the outgo line J H, and this will be the proper angle to allow the water to rush and sweep everything from the dip, along the bottom of the band, and out into the soil-pipe.

The next thing to be considered is the depth of this trap for self-cleansing purposes; this is governed by the size of the dip-pipe E (Fig. 80.) Suppose the dip-pipe to be 4 in., and the outgo-pipe the same, then the 4 in. outgo will take up 4 in. of the cheek, that is from the top down to the soil-pipe or outgo, as at K J, Fig. 83, so that this must be 4 in. Then you must have the dip longer than this to get the seal—which should never in any case be less than $1\frac{1}{2}$ in. to 1 in.—here in this case the bottom of the dip is $5\frac{1}{2}$ in. down the trap; then you should have 4 in., or the size of the dip-pipe, between the bottom of the band and the lower edge of the trap. This would be a 9 in. trap, but this is not

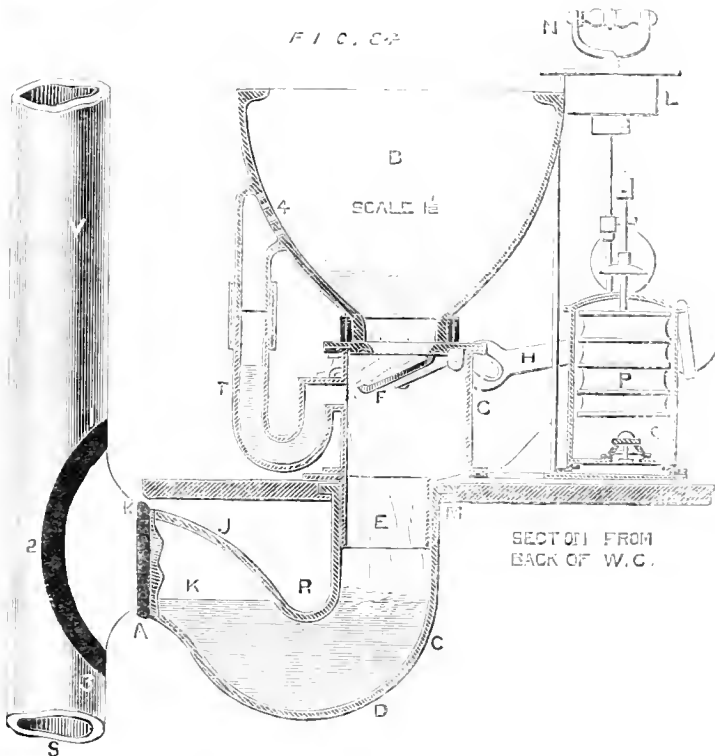
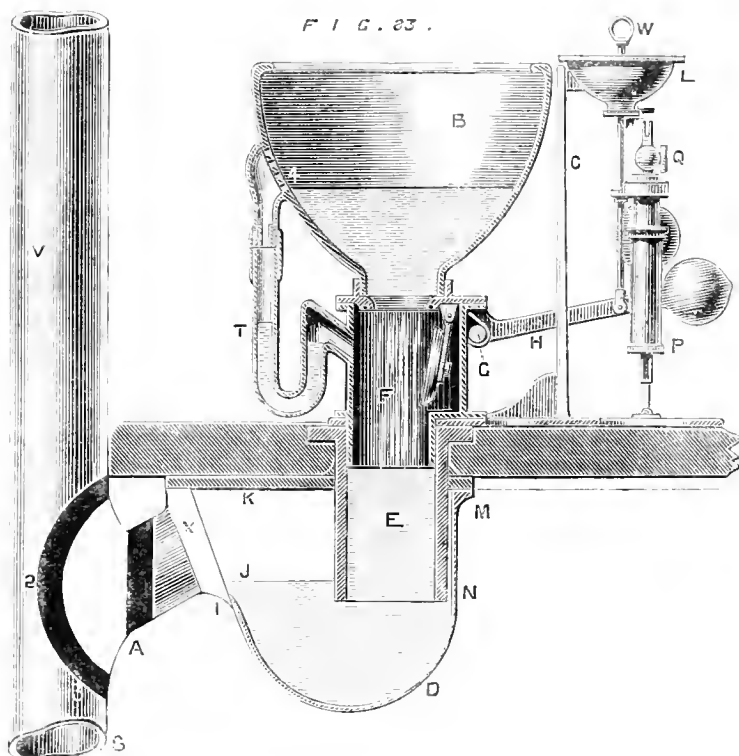
wanted, for $3\frac{1}{2}$ in. will be plenty for the space between the bottom of the dip and band, which, on account of being, so to speak, here contracted, the water will have a better scouring action on the bottom of the band, and the band being square or flat, will allow the soil, paper, &c., to go freely away; in fact, although you have only $3\frac{1}{2}$ in. between the band and dip, there is more water-way than through a 4 in. pipe. The next part to be considered is the width: this should

Rules.—Firstly: The depth should be twice the diameter of the dip-pipe, in addition to the necessary depth of the seal, which, in a former paragraph I have said should not be less than $1\frac{1}{2}$ in. to 1 in.

Secondly: The band or width of the trap must be just wide enough to admit the dip.

Thirdly: The outgo soil or waste-pipe must never be less in diameter than the dip-pipe.

Fourthly: That when soldering on the outgo



be, for a self-cleansing trap, only just wide enough to admit the dip, whether 1 in. or 6 in.; therefore, if you use a 4 in. dip-pipe, make the trap only wide enough to admit this pipe.

I have proved, beyond the shadow of a doubt, that if the \square -trap is made according to the following rules, it will never fail in doing its duty as a self-cleansing trap, and supersede all others at present invented.

or waste-pipe, the top of this pipe should be brought up to the top of the trap, as at K, Fig. 83, and be as smooth as possible, and without sharp edges.

Fifthly: Keep the dip-pipe close up to the heel of the trap, as shown at N, Fig. 83.

THE ACTION OF THE \square -TRAP.

Junior plumbers will do well to notice the details of the action of the \square -trap.

On lifting the handle W, Fig. 83, it brings up the lever H, with it the tumbler pin G, and the crank which works an axle having the loose valve F attached; the water then runs the full bore of the dip-pipe into the trap, striking against the band at D; it then flies off at a tangent to the point J, where it again strikes into the soil-pipe X, and down the pipe S; the air-pipe V, allows it to travel onward without dragging air through the trap; but should there be a strong wind blowing down this ventilating-pipe, or upwards from the sewer, &c., the air presses flatly, so to speak, on the surface of the water, and so keeps it steady. Having, I think and hope, made the working of the \square -trap clear to my readers, I must now refer them to Fig. 81, in which I shall endeavour to show the working of the ∞ -trap.

THE WORKING OF THE ∞ -TRAP.

So far as the closet apparatus is concerned, you have the same work as you had in the \square -trap. But the difference in the action of this and the \square -trap is that owing to the shape of the ∞ -trap; the wind, on blowing up the soil or down the ventilating-pipe, plays on the water at K, causing it to rock rapidly owing to the shape of the trap. This possibly goes on for ten or twelve hours, but, perhaps, only a few seconds. This rocking motion of the water causes it to ebb out through the outgo of the trap; thus, the so-called ∞ -trap ceases to be a trap, and becomes only a snare.

This, I venture to suggest, is a sufficient reason for all sanitary engineers to condemn the ∞ -trap, and, until they can find something to supersede it, use the \square , which I must repeat and have already proved publicly, is the best trap yet invented.

(To be continued.)

HOLLOWAY COLLEGE AND SANATORIUM, VIRGINIA WATER.

THE group of curative and educational institutions, between Egham and Virginia Water, now approaching completion, built and endowed at the sole cost of Mr. Thomas Holloway, furnished the subject for a "special" in *Tuesday's Daily News*, from which we make some extracts.

The Holloway Sanatorium is intended for the treatment of middle-class persons afflicted with mental disease, and no patient will be allowed to remain in it more than twelve months. It has been erected from the designs of Mr. W. H. Crossland, of red brick with stone dressings, in an Early phase of the English Renaissance style. A marked feature is a tall tower. The interior decorations have been designed and executed by various hands, under the direction of Mr. George Martin. With the exception of the grey marble top of the balustrade, the whole of the entrance-hall and staircase is painted and gilt over the stone. This was an after-thought. Cold grey columns and walls, even if enlivened by sculpture, would, it was considered, sit heavily on a mind diseased, and it was resolved to make the principal apartments one blaze of gold and colour. The hall is accordingly lavishly decorated with figures and designs arabesque and grotesque. If it be sound doctrine that surfaces of wood or stone should be gilt or painted, as the late Mr. William Burges, A.R.A., and some other authorities have maintained, the rich decorations of the Holloway Sanatorium are correct enough. The great lecture or recreation-hall is remarkable for a splendid gilded roof, and for a profusion of gilding and other decorative work on the walls and behind the platform. Portraits of distinguished persons, by Mr. Grandet and other artists, form part of the decoration scheme, and add interest to it. In the refectory also the apartments consist of a series of paintings in the style of Watteau, forming a frieze, above which are smaller groups in lunettes. In the smaller but still noble parlours and living-rooms the same idea of cherubines and long-strewnness is carried out. There is a model laundry in an entirely separate building, and red brick houses have been built for such of the staff of the establishment as are not obliged to sleep in the main buildings. In the original plan it was intended to use the main building as a place of assembly, but Mr. Holloway has now decided on building a distinct chapel, the designs for which have been prepared by Mr. Crossland.

Thousands of shrubs and young trees already fill the pleasure-grounds. The Sanatorium is planned to accommodate 400 people, and has cost about £300,000.

At a little distance from the Sanatorium, in the direction of Egham, is a still greater institution founded and endowed by Mr. Holloway, a college* for the higher education of women. Mount Lee has a frontage to the high road of about three-quarters of a mile, and contains 95 acres of freehold land. The college buildings, already far advanced, are set back from the road upon an elevated plateau, and surrounded by pleasure-grounds. The designs for the construction of this building were also made by Mr. Crossland, who is now superintending their execution. The style is that of the French Renaissance, in which sculpture entered largely into the design. Mr. Crossland has employed all the resources of his favourite style in so breaking up the masses of red brick and stone with pavilions, tourelles, and pediments as to obviate the monotony of a huge structure. In the pediments and whereon sculptured stone is required M. Façigna has designed and executed spirited groups. The college forms a double quadrangle 500ft. from east to west, and 350ft. from north to south. The main portions, which run from east to west on each side, consist of five floors, each 10ft. 6in. high, all of which (with the exception of the western portion of the lower floor, arranged as storerooms) are devoted to rooms for students, professors, and classrooms, connected by four spacious stone staircases placed equidistant, two in each wing. The building provides accommodation for 350 students, and each student will have two rooms, arranged as bed and sitting-rooms, each 13ft. 6in. by 10ft. 6in., and divided by corridors 10ft. wide and 500ft. long on each floor. The professors and heads of departments will have rooms in the central and corner pavilions, which are slightly larger in area. There are three classrooms also in the corner pavilions, each 28ft. by 16ft., on the ground-floor, together with a lecture theatre 42ft. square by 18ft. high. The three cross buildings running from north to south have been arranged as follows:—That on the west front comprises the chapel, 130ft. long by 30ft. wide and 30ft. high, and a recreation-hall 100ft. long by 30ft. wide and 30ft. high. These two rooms have an entrance-gateway between them, carried up through two floors, and leading into the upper or western quadrangle. This gateway is surmounted and surrounded by suites of rooms for chiefs of departments, arranged five on each floor, with porters' rooms, &c., all approached by stone staircases, the whole being crowned with a clock-tower rising to a height of 130ft. from the ground. The cross building between the quadrangles will contain on one side the dining-hall, 10ft. by 30ft. by 25ft. high, and on the other side the kitchen, 80ft. by 30ft. by 25ft. high, together with cooks' rooms, stores, and surgery, &c. The centre between dining-hall and kitchen is occupied by an octagonal tower, 100ft. high, containing, on the ground floor, a central hall 35ft. in diameter, approached from each quadrangle by flights of steps. The octagonal roof above the roof-line contains two series of low-service cisterns for supply to main buildings and hydrants. The floor under dining-hall is laid out as servants' rooms, and that under kitchen as stores, with large entrance-hall between. The cross building on the east front contains, on the lower floor, the tradesmen's driving gateway in centre, 48ft. by 17ft., on the left of which is a gymnasium and racket-court, each 50ft. by 30ft. by 16ft. high, the lavatories, &c., adjoining, with library on the floor over 100ft. by 30ft. by 30ft. high. On the right of the gateway will be two large music practice-rooms and twelve small piano-rooms, with museum and picture-gallery on floor over, 100ft. by 30ft. by 30ft. high. The driving gateway in centre of this block will have suites of five rooms on each floor over for heads of departments, reached by a spacious stone staircase and the whole surmounted by a bell tower 140ft. high. The three cross buildings are approached from the main buildings at each end as well as from the quadrangles, cloisters, and terraces in centre. The contract with Mr. John Thompson, of Peterborough, was signed on the 30th July, 1879, and the building has now been in course of erection for twelve months, and rapid pro-

* The College was illustrated in the *Building News* for Dec. 21, 1877, by double plate, giving plan and elevation.

gress is being made—the contractor having agreed to have the whole finished and delivered up in four years from that date for the sum of £257,000. This amount is exclusive of fittings, furniture, &c. Extensive plant and machinery are employed on and about the works, and about 800 men are constantly at work. The contractor brings all his materials on the ground by traction engines, two of which he has constantly at work between the railway station at Egham and the site, which are about a mile apart. The mouldings are all cut by machinery.

Mr. Holloway has, during the past season, made quite inadvertently a sensation in the picture market. A mysterious American was said to be buying up some of the best things offered by Christie, Manson, and Woods, and by private dealers. The "mysterious American" seems to have been no other than Mr. Holloway, whose idea is to make a "gallery of gems" for the "girl graduates" of the future. His purchases up to the present moment, all now to be seen at their temporary resting-place at the Sanatorium, are according to the following list with prices attached, from which it will be gathered that Landseer's famous "white bear picture" with the animals rending the Union Jack of a hapless Arctic Expedition, still rules high above even John Everett Millais:—

1. Trentside (Creswick)	£2,100	0	0
2. "Man proposes, God disposes" (Landseer)	6,615	0	0
3. Battle of Reveredo (Clarkson Stanfield)	3,465	0	0
4. Pic du Midi (Clarkson Stanfield)	2,677	10	0
5. Two Princes in the Tower (Millais)	3,900	0	0
6. Princess Elizabeth, daughter of Charles I., in prison at St. James's (Millais)	3,150	0	0
7. Landscape and Cows (Cooper) ..	273	0	0
8. Landscape and Sheep (Cooper) ..	546	0	0
9. Haweswater (Pyne)	273	0	0
10. Travellers in Storm (Copley Fielding)	3,150	0	0
11. Borrowdale (Collins)	2,625	0	0
12. Tomb in the Water (Matter)	2,362	10	0
13. Verona (Holland)	913	10	0
14. Old Cronies	550	0	0
	£32,690	10	0

THE NEW BUILDINGS OF THE BIRMINGHAM AND MIDLAND INSTITUTE.

THE new buildings of the Midland Institute, by the side of the town-hall at Birmingham, are to be opened on the 20th October, having been erected at a cost of between £25,000 and £30,000. The new lecture-theatre is about 65ft. wide, 100ft. long, and rises to a clear height of about 40ft. The entrance is in Paradise-street, and forms a hall 55ft. in length and 22ft. in width. It will be connected with wide staircases and cloakrooms, and with the rooms on the first floor, devoted to the uses of the general department. The theatre is roofed-in with wrought-iron girders, carried on a series of rectangular piers on the two sides and one end of the building. The girders are of great depth, having to carry a span of about seventy feet, and the ceiling constructed between them is deeply coffered, and is now being painted and decorated. The interior walls of the theatre are of brick and stone, there being no plaster. The spaces between the piers that are not filled with windows are panelled to the same design as the windows, and the panels are filled with arrangements of encaustic tiles, specially designed with regard to the colour of the whole of the interior. The windows are filled with stained glass. The floor of the theatre will have a slight slope towards the proscenium, and will afford space for the accommodation of 1,000 persons. The stage will be fitted up for the various uses to which it will be applied, and is to be connected with the rest of the building by a lift, by means of which any appliance may be brought from the general apparatus room, which is on the upper story, without risk or difficulty. Above the stage a room has been formed, which will be used partly as a store-room for diagrams, and also for electrical apparatus. The alterations made expressly for the members of the general department include, on the upper floor, the provision of a news-room, 27ft. wide and 50ft. long; and a writing-room, which is 17ft. wide and 27ft. long. In contiguity are spacious lavatories. On the same floor, but entered from a separate doorway, is a reading-room, about 27ft. by 30ft., for ladies. The In-

dustrial department has been rearranged. The old classrooms have been altered, and new classrooms added. Above the lecture-theatre two sets of rooms have been provided, part of which are devoted to the Institute, and part to the accommodation of the School of Art. The Science department has been remodelled. The laboratory has been more than doubled in area, and two special lecture-rooms have been added. There has also been a large room provided for the scientific apparatus, and a special room for the meteorological instruments and the electrical clocks. The Archaeological section will have a room of its own, in which it can keep its various collections, and where the members will be able to assemble. The School of Art, on its reopening, will be in possession of a set of rooms far superior in all respects to any that it has ever occupied. The rooms are specially lighted from the north, and are lofty and well ventilated. Only a portion of the reconstruction which has been going on for the last three or four years is visible from the street. That part which is now to be seen in Paradise-street is the building containing the cloak rooms, offices for the staff, newsrooms and writing-room belonging to the general department, and a portion of the rooms of the School of Art. The building is of stone, and is in the Gothic style. The principal features of the front are the entrance doorway, to the right of which is a series of windows lighting the ground-floor. The windows are deeply moulded, and all the jambs are square-headed, with corbelled angles. The first floor is lighted by four large groups of windows, each of two lights, but surmounted by a single arch, the foot of which is carved with a design of flowers. In each of the window heads there is a traceried panel, which has been filled with mosaic work, executed by Salviati. The windows are divided by deeply-recessed niches, which are ornamented by gabled and crocketed canopies, running partly into the story above them. It is hoped that at some future time these niches will each hold a statue. The wall space between the niches and the tops of the windows is covered with carved diaperwork. The third story is comparatively plainly treated. The fourth story consists of four large and bold gables, rising a considerable height, each containing a four-light window, with a large head filled with tracery. The spandrels of these windows are carved in a free and bold manner, with panels filled with beautiful floral and foliage designs, including representations of the lily and the vine. The gables are completed with crockets and finials. The parapet is pierced with open tracery, and above all these rises a lofty roof, which covers the upper story used by the School of Art, and terminates in a steep ridge, with two ornamental wrought-iron finials at each end.

The work has been carried out from the plans and designs of Messrs. Martin and Chamberlain. The contractors are Messrs. Horsley, of Newton-street. The carving has been executed by Mr. Barfield, of Leicester, and the wall-tiling is being specially done by Messrs. Minton. The ornamental and other glazing is the work of Mr. Hawkes, of Bromsgrove-street, and the structural ironwork has been supplied by the Horsley Company.

FLORENTINE TAPESTRIES.

IN a letter to the *Times*, "Ouida" calls attention to the cruel fate awaiting the valuable collection of arazzi in the city of Florence. "Many have hung for years in the famous corridor running from the Pitti to the Uffizi; and here they were safe, although the light was execrable, and the dust from the reddened stone floor injurious to them; while the extreme narrowness of the passage prevented full enjoyment of their proportions and perspective. But besides these in this corridor, a very large number (I believe *circa* 600) of yet finer tapestries have been all these years thrown down on ground-floors and underground floors of the Pitti, left on the bricks like so much rubbish, a prey to every insect that chooses to burrow in them. Other tapestries, all of extreme value, historical and artistic, are doubled up and stowed away in chests. When the custodians are asked if the tapestries do not injure in this treatment, they answer merrily '*S'certo!*' as if it were the best joke in the world. Of course, they are injured, but what does it matter? Nobody cares. Now, since the new commission has been appointed to rearrange the galleries of Florence, matters are still

worse. All the tapestries that were safe in the corridor have been taken down and added to the quantities already lying on the floors of the Pitti. As a consolation we are assured that they shall be 'put away in chests.'

"The interest, the preciousness, the beauty of these doomed arazzi, and of the many in the darkness of the Pitti that are slowly rotting away, as if they were bales of damaged calico, cannot be disputed by any educated person, and are undeniably so great that any other nation would have a gallery or museum dedicated to their preservation with scrupulous love and care. The corridor was far from what one could wish, but at least they had walls there on which to hang, and air to keep them from destruction; and further on there is a much wider and lighter corridor now occupied by inferior engravings, in which the tapestries now lost to the public on the floor of the Pitti might be suspended and well seen. It is frightful to know that these arazzi, so incomparable, so full of interest and of instruction for the student and the artist, should be thus thrust out of sight, and doomed no doubt, eventually, to 'disappear,' as so much that is precious has disappeared from the galleries, palaces, and libraries of Italy, without the offenders ever being discovered, or, at least called to account. There is a promise, indeed, in the air, of making either San Marco, or the old Monastery on Monte Oliveto (now a barrack) into a gallery of the arts. I would fain, through your columns, summon all who care for the past and its matchless labours to bestir themselves, and insist loudly that some fitting resting-place be found, and that at once, for the tapestries of Florence. When I wrote to you some two years ago concerning the works upon the Tiber, I received frantic abuse from the Italian and a great part of the English Press; but when I passed this last season in Rome, I found that everyone had come to my opinion as to the madness and futility of those devastations. The very engineers themselves stand aghast before the ruin they have wrought and the breeding-pits of fever they have dug, where a little while since the grand trees of the Farnesina cast their historic shade.

"The arazzi of Florence are certainly of less grave import than the sacrifice of Rome to engineers' crochets and contractors' greed; yet it is one which must profoundly concern all who care for art and history. Some years past one of the greatest capitalists of Europe offered to buy for an enormous sum all these tapestries. Shameful as it would have been for Italy to 'barter her children' by acceptance of such an offer, in the interests of the arazzi themselves it had been better accepted, for the great financier would not have thrown them on brick floors, nor would he have shut them up in chests."

NEW DOCKS AT LIVERPOOL.

THE Alexandra Docks at Bootle, $3\frac{1}{2}$ miles north of Liverpool, which have just been completed from the designs of Mr. G. F. Lyster, the engineer to the Mersey Docks and Harbour Board, were formally opened by the Prince and Princess of Wales on Thursday in last week. The new works add 110 acres of water-space and more than six miles and a half of quay berthing to the accommodation for the shipping trade of Liverpool; and the entrances have their sills laid at a level which gives a depth of 23ft. 7in. on an average neap tide and of 30ft. 10in. on an average spring tide. The entrance to the new dock system is through the Canada Basin, in which the tide ebbs and flows, and which forms a sort of vestibule to the most northern docks which existed before the latest additions. This basin at the mouth of the river has been considerably enlarged and deepened to meet the new requirements, and the width of its entrance from the river has been increased from 250ft. to 400ft. On each side of this entrance are being constructed piled timber jetties or piers projecting into the river. That on the north side is completed, and is a remarkable work. The river-wall here curves outward somewhat sharply, and terminates in a massive, rounded pierhead of granite. The jetty projects backward from this about 40ft., and ends in another pierhead of concrete, whence another arm extends to the river-wall. The main jetty is supported by greenheart posts let into a solid base of granite

to the depth of 17ft. On the north end of the horn pier is a small look-out tower, and beside it is an ironwork standard 80ft. high for the electric light. On the north side of the Canada Basin are two passages by which the newly-constructed docks are reached. The first is the Langton Dock, with a water area of 18 acres and a quay or berthing-space of 4,000ft. in length. Opening from the eastern side of this dock are two graving-docks (each 951ft. long), which may be subdivided into four docks. On the quay between these graving-docks buildings are erected, which contain powerful engines and machinery for pumping the graving-docks. Here, also, are powerful engines which supply the motive power of the hydraulic machinery for opening and closing the dock-gates, bridges, sluices, working cranes, and other mechanism throughout the new system. Over this great engine-house are a number of dwellings built on the "flat" system for the foreman and engine-men. On the quay is also constructed a clock-tower 120ft. high to inclose the accumulator. The group of building is in a free Gothic style of architecture. On the east side of the Langton Dock (and north of the graving-docks) is also a branch dock, with three acres of water area and 2,013 lineal feet of berthing-space. A hydraulic crane to lift 100 tons is being constructed on the south quay of this branch dock for moving heavy boilers and machinery. On the north side of the Langton Dock are two passages which lead to the Alexandra Dock, which is specially constructed for steamers of vast size. This Alexandra Dock is 1,600ft. long from north to south, and opening on its eastern side are three branch docks which extend inshore almost to Regent-road. These branch docks vary in length from 1,100ft. to 1,338ft., and with the Alexandra Dock itself have a water area of 44½ acres, and provide 11,811 lineal feet of quay berthing-space for ships. The dock walls are mostly built of cement concrete faced with red sandstone of the district, and with a coping of granite, while the entrance walls are faced with granite. The steps and slips of the graving-docks are constructed of granite, but in other respects these docks are built of concrete. All the dock gates are made of greenheart timber, which Mr. Lyster considers the most durable wood for this sort of work. The berthing-quays of the new docks are provided with lock-up sheds, 80ft. to 95ft. wide, for the protection of cargo in transit, and these sheds directly communicate by road with the city, and by rail with the stations of the several railway companies who have termini in Liverpool. In the west gable of No. 1 Branch of the Alexandra Dock has been inserted a fine piece of stone carving lately discovered in the interior of the King's tobacco-warehouses, at the south end of the docks. It represents the arms of Great Britain before they included the shamrock, and is supposed to have been in the old tobacco-warehouses erected in the reign of George III. On the east side of the main entrances by which vessels enter this new group of docks a solid block of buildings—a free adaptation of the Domestic Gothic in style—is being erected to provide residences for officers. North of the Alexandra Dock is being constructed another new dock, with 16 acres of water area and 4,000ft. of quay berths. The river-wall extends to the southern limit of the estate, and in time the promenade, 21ft. wide, already open for a considerable distance, will extend across Bootle to Seaforth. The whole of the docks northward from the Prince's Dock are completely inclosed either with a wall 11ft. high or with loftier buildings, thus protecting the ships and quays from depredations.

TESTING FULL-SIZED BRIDGE COLUMNS.

A SERIES of experiments has lately been made to determine the strength of wrought-iron columns manufactured by the Phoenix (Pa.) Iron Company, and known as Phoenix columns. These tests were made in the Government machine at U. S. Arsenal, Watertown, Mass., and upon full sized columns of from 12 to 18in. sectional area of metal and from 5in. to 25ft. in length. Twenty-two samples were submitted to ultimate compression strain. The elastic limit and deflection and the total compression are given in a table published by the American Society of Civil Engineers,

from which it appears that they are stronger than theoretical formulæ heretofore used have made them; for example, a column 28ft. long, 8in. diameter, or 49 diameters in length, having a sectional area of 12in., was compressed 0.19 of an inch under a load of 300,000 pounds, and gave way under 421,000 pounds, or 35,159 pounds per square inch of section. Another sample 25ft. long, of 18.3in. sectional area, was compressed 0.115in. under 300,000, and was crushed at a load of 659,000 pounds, or 36,010 pounds per square inch of section. The shortest sample, about one diameter in length, 11.9 square inches sectional area, showed only 0.008 of an inch compression at a load of 300,000 pounds, and was crushed at 680,000 pounds, or 57,130 pounds per square inch. The loads sustained at various states of deflection were also observed and tabulated by Mr. James E. Howard. It is a new and important departure from old methods to test full-sized, complete members of engineering structures, in lieu of small samples of the material proposed for their construction—the only available way before this enormous machine was built by the United States Government.

WEST WINDOW FOR ZANZIBAR CATHEDRAL.

WE have been invited to inspect a west window for this cathedral to be inserted in connection with the Universities Mission to Central Africa. The design has been made by Mr. Murray, of the firm of S. Belham and Co., 155, Buckingham Palace-road, S.W., who have executed the work under the directions of Mr. C. F. Hayward, architect. The window is circular, its diameter being 15ft., and the design is of Geometrical character, with circular piercings. The principal openings occur in four groups of circular lights arranged round a centre with pierced lights between of triangular shape. The design is simple and conventionally treated. From a central sun, radial branches diverge in four directions, and the main circles have been arranged as terminals, in each of which a folial design with flowers is introduced. The foliage is freely drawn, and is coloured green in varied tints on a rich ruby ground. The borders to the medallions are largely relieved by blue, and the triangular perforations are filled with colours which do not distract the eye or lead it away from the leading design. The whole of the window has been executed in richly coloured antique glass. It may be of interest to say that the glass is inserted in tracery constructed of concrete, in which red coral, abundant in the locality, is introduced.

WHITBY ABBEY.*

ON the 5th inst., a section of the members of the British Association paid a visit to Whitby, where they inspected the abbey and the church, under the guidance of Mr. Charles Noel Armfield. At the former building, Mr. Armfield delivered an address, in which he said that the building of an abbey on that site was begun about the year 658. That abbey was commenced and completed by Lady Hilda. Of that abbey, however, we have no remains, and the magnificent building of which they now saw the ruins was the work of a later period. The abbey which Lady Hilda built was not, as many supposed, built of stone, but of wood and thatch. The original abbey of St. Hilda, being built of such slight material, could not be expected to last long, and, consequently, it was rebuilt, and here was placed the first stone of which we have any record, and upon which was erected the building which we see this day. When the first stone of this abbey was laid we have no record; but it is supposed that this abbey gave the name, or suggested the name, of Whitby, because of the whiteness of the stone. One historian says that it could not be the bay itself which suggested the name, for the sea and the cliffs south of the harbour are black, and the more appropriate name apparently would have been Black Bay. The building of this abbey, the ruins of which

they were now standing among, was commenced about the year 1220, and it is worthy of remark that it was built almost entirely in one style. It was not an abbey that had been built at different ages, and it is probable that it was completed in the year 1300, after which, later work was inserted. In the general plan of the edifice there was one remarkable point, and that was, that whereas the axis of the nave of the church points due east, the axis of the chancel points five degrees more to the north, instead of being in a straight line. Mr. Armfield related, in a simple and entertaining way, the two traditions which are supposed to explain the cause of this. Continuing, Mr. Armfield said that the architecture of the church contained the purest type of Early English, and the purest type of Gothic, that there are in the whole world, and he pointed out where these in particular occurred. Mr. Armfield made the remarkable statement that the church had never been vaulted, notwithstanding some historians and antiquarians had written as though such had been the case. He gave his reasons for forming such an opinion, amounting to conviction in him, and pointed out the peculiarities of the tops of the walls, which, he said, showed that it was impossible that the edifice could have been vaulted. While the building had so many choice pieces of architecture in it, it was one of the worst-constructed in the world. He pointed out where the magnificent tower was erected in the north transept, and stated that it fell on the 26th of June, 1830, on the spot where they were now standing. He pointed out an inscription, in Latin, on one of the pillars, which, in effect, was "I, John of Brunton, built this altar to the glory of the most blessed Virgin Mary." Dr. Young, in his History of Whitby, says that this is all nonsense. With all due respect to Mr. Young, he, Mr. Armfield, begged to hold a different opinion, as he was certain that the transept was dedicated to the Virgin Mary. In the church of Rome they always made the Lady-chapel the most blessed place, and it was no wonder that this inscription, seeing that it is on the most beautiful part of the building, was put there as a dedication to the Virgin Mary. Standing there as they now stood, in the sight of that magnificent pile, they saw, taking all in all, the most lovely specimen of Gothic architecture in the whole world—there was nothing like it in France, Germany, or Spain. Whithy had reason to be proud of its specimen of Gothic art: people might come to Whitby to study that, as they went to Athens to study Greek art. Mr. T. Hayter Lewis, late of University College, London, expressed his entire concurrence with Mr. Armfield's address, having been over the edifice and carefully examined it.

EXAMPLES OF DOMESTIC ARCHITECTURE.*

PART I. of a recently published work under this heading illustrates a series of executed designs by Mr. Thomas Hartas, architect, of King's Chambers, Manchester, in which the author claims to have applied a new system of geometric proportion. The part before us contains four photo-lithographic illustrations of detached houses recently executed by the author, with descriptions, though there is little in the designs to suggest that "numerical principles of geometric proportion derived from the laws of music" had been consulted. The author, in his preface, says: "Each of the houses has been built at a price at which it would be absolutely impossible to carry out any equally effective design, in which these new principles of form harmony are not applied." What the system is to which Mr. Hartas alludes it is difficult to say, as there have been so many theories based on numerical ratios. We are quite willing to admit that the harmonies of sound, colour, and form are closely analogous, and if Mr. Hartas has discovered simple rules for the application of these ratios to every-day architecture, he has achieved a success which other painstaking engineers in the same field have failed to accomplish. The author, at least, claims to have reduced theory to practice, and he mentions the works of the late Mr. D. R. Kay, of Edinburgh, who is well and deservedly known for his scientific investigations in to har-

monic ratios. By a few simple geometrical rules, the author says "it is possible to transform a monotonous street tenement into a pleasing architectural composition; which, while it cannot claim to be a specimen of high art, is yet devoid of all that offends the eye." The application of these principles, the author has further proved, greatly "increases the commercial value of the houses which he has designed."

Having thus, in the author's own words, explained the object of the work, let us take the designs, as indicating in a practical form the value of the theory. The first is a design for a cottage erected near the Broadway, Salford, for Mr. T. Bebbington, registrar. In the plans there is certainly very little to lead us to suppose that the laws of harmony had been brought to bear; there is nothing in the arrangement which appears to have been arrived at by geometrical means. The elevation shows a corner window and oriel turret at one corner and a gable at the other. The style is a kind of Gothic, and the house is built of dark red stock bricks relieved by stone dressings with roof of Westmoreland green slates. The contract, taken by Messrs. Hibbert, was for the sum of £713, certainly a moderate price. With respect to the design, we cannot say that the result is such as to prepossess us in favour of Mr. Hartas's system; the proportions and details are not perfect, and we might even be disposed to think that the empirical formula for design usually adopted by architects can be made to yield equal if not more pleasing elevations. The house in Melton-road is decidedly open to criticism—the centre bay partly placed beyond the divisional wall,—to say nothing of the upper arrangements,—is, to say the least, awkward; and the bay externally, square below, octagonal, and square again at the top, is rather too acrobatic to be pronounced harmonious. Large detached villas at Mansfield, and a farmhouse, Stretton, Derbyshire, are other designs; the last is simple and unpretending, and is more satisfactory to our minds than all the others. The ingenious theory through which the author has introduced his designs have induced us to examine them more carefully than we otherwise should have been disposed to do. To propound a system of design is very well; but to profess to have rules which are unknown to the profession savours too much of charlatanism, even though the author's motives are the highest.

THE BEER QUARRIES.

THESE ancient West Country quarries were visited, by invitation of the directors, by a large number of the principal architects and builders of Devonshire last Monday. The works have recently come into the hands of a new company, and it is hoped that these fine quarries—which in mediaeval times were so extensively worked, but which, for want of energy and available capital, have for many years been comparatively idle—may once again come to the fore. Beer is a romantic fishing-village, near Under Seaton, upon the south-eastern coast of Devon, and the quarries are of immense, yea, of unlimited extent. The stone itself consists of carbonate of lime, silica—25 to 30 per cent.—and lime; it is finer in texture than Bath-stone, and much whiter than Caen, and is delivered in London at 1s. 4d. a cubic foot. The strata of stone cover a space of 3 by 2½ miles, of which, during the last 1,000 years, not more than three quarters of a mile square have been opened out. The party left Exeter Station in saloon carriages, amongst them being Messrs. Ashworth, Rowell, Keats, Pinn, Crocker, Peters, Bridgman, Webb, Medley, Fulford, Jerman, Wills, Packham, Boulnois, and other architects; Messrs. Harry Hems, W. R. Cumming, H. Phillips, and so many gentlemen interested in the stone trade. The quarries, which lie in combes amidst wild scenery, consist of two distinct portions, one part being worked open, and the other tunnelled. The blocks of stone raised are similar in size to those obtained in the well-known Bath quarries. The present underground workings cover 13 acres, and were illuminated for the occasion. The effect of many hundreds of candles, lighting with uncertain and flickering rays the vaulted roofs of the tortuous, winding caverns was weirdlike and curiously fascinating. Particularly interesting were the old Norman workings. These have not been touched since the days when the Cathedral at Exeter was

* This abbey has been illustrated in the BUILDING NEWS by the following drawings:—Perspective of interior of north transept, by Mr. E. H. Spence, Oct. 29, 1881; sections of mouldings, by the late Mr. Edmund Sharpe, Aug. 25, 1871; exterior of north transept, by Mr. J. Langdon, June 25, 1875; and measured elevations and sections by Mr. A. P. Gunston, July 2, 1880.

* Examples of Domestic Architecture. By THOMAS HARTAS, architect, Manchester. Price 1s. Published by the author.

built, of which time old manuscripts still exist, showing that the stone came from these self-same quarries. Further on are the portions worked in the 14th and 15th centuries. In those days, Beer stone was used universally throughout nearly all the ecclesiastical and secular buildings of Devon. After carefully inspecting these quarries, the party drove to Beer Church, a handsome building, erected recently from Messrs. Hayward and Son's designs, at the expense of the Hon. Mark Roile. This edifice is built largely of Beer stone, and was much admired; the excellent masonry and the carving (by Mr. Harry Hems) being a fair sample of the capabilities of the material. Adjourning to the Clarence Hotel at Seaton, the visitors sat down to an excellent repast, and in responding afterwards, Mr. Edward Ashworth (Exeter), Mr. J. W. Rowell (Newton Abbot), and Mr. J. Keats (Plymouth), testified to the satisfaction they had derived, as architects, from a long use of Beer stone in their buildings, and expressed their intention to continue to specify a material which they found, in its working and lasting powers, to be at once economical and satisfactory.

A NEW CHINESE LIQUID INK.

IT has long been the aim of artists' colourmen to supply a really good Indian ink in a liquid form, free from sediment and film, and so meet an established want experienced by most draughtsmen. In this way several preparations of lampblack and Indian or Chinese inks have been produced, each in turn claiming to have solved the problem. The continued general use of the old-fashioned stick ink, notwithstanding the waste of time which its rubbing down involves, may, however, be taken as a very fair evidence that the desideratum thus described has not hitherto been manufactured. The necessity of rendering the ink indelible seems to have been the chief difficulty in the way of such a production, coupled with the equally desirable quality of absolute blackness as well as an absence of sediment or film. Within the last few days, Messrs. Wolff and Son, the well known pencil manufacturers, have sent us some specimens of the new Chinese liquid ink, of which they are the makers. We have subjected this ink to several tests, with most satisfactory results. It seems to answer all the requirements above-mentioned, and it has certainly all the sheen and also smell of the better kinds of stick ink. We have likewise tested it from a small quantity exposed to the air for twenty-four hours, and in this rather severe ordeal it has shown its indelible qualities. Ordinary Indian ink, as is well known, will wash up if used from a palette in which it was mixed and in which it has stood since the day before. Wolff's ink has thus a decided advantage. It flows freely from the pen, and allows of the finest lines. It dries quickly and is capable of being graduated to any degree of blackness, from a shade of delicate grey as may be required, by diluting it more or less with water. Washes of colour do not disturb it, and even burnt sienna does not cause it to run. The makers say that it will keep good for any length of time. For outdoor sketching as well as office work it seems equally suited, and thus may be recommended to our readers for trial.

OUR COMMONPLACE COLUMN.

PANEL.

FR. *panneau*, through Latin *pannus*, a piece of cloth.—In Late Gothic, the "linen pattern" was a favourite design; it is also seen in Elizabethan woodwork such as dados. Traceried panels and shields are also common in Gothic of the Perpendicular period. Early English panels are ornamented with cusped circles, quatrefoils, circles, which become more elaborate and subarcuated towards the Later style. Bosses of foliage, portcullis, lilies, Tudor roses, &c., were common enrichments in the 16th century.

PANTAGRAPH.

An instrument for copying plans. The copy can be made to any scale. The instrument consists of four rods jointed together. When one point is fixed, the other points can be made to describe similar figures, the outer point describing to a larger scale than the centre one. The

points are determined by the ratio of proportion the scale of the copy bears to that of the original. One point is weighted and made the centre of motion, and the central point holds a pencil, while the outer point is used as the tracer of the original drawing. The last-named tracer is made to travel over the outline of the original, and the pencil-point makes a copy to the required scale. By exchanging the positions of the pencil and tracer, a larger or smaller copy can be made. The instrument depends upon the principle that the two triangles which have for their angular points the fulcrum, the pencil-point, and a joint, and the fulcrum, tracer-point, and a joint, must always preserve their similarity. A recent French application of the pantagraph has been made, by which sculptures can be copied, enlarged, or reduced to any proportion, in which case the instrument is placed in vertical planes.

PAPIER MACHE.

PULPED and moulded paper is said to have been in use for more than a century in Europe. In India, China, and Japan papier maché has been long known, and is employed for trays and snuff-boxes. Its first application has been stated to have been the manufacture of snuff-boxes by a German in 1710. As a material for architectural and decorative purposes, it has been extensively employed. The ceilings of several Elizabethan mansions, and those of Chesterfield House, are made of it, and when stucco-workers raised the price of their labour some time ago, papier maché took the place of stucco in house-ornamentation. Carton-pierre is a similar material, and is made by combining stucco and paper. The high polish given to papier maché articles is obtained by coating them with successive layers of asphaltic varnish, which is submitted to heat in ovens till the volatile part is dissipated. It can then be polished. Inlaid mother-of-pearl is produced by applying thin flakes of the shell on the varnish, and afterwards ground down and polished.

CHIPS.

The permanent bronze bas-reliefs for the Temple-bar Obstruction have been modelled by Mr. C. H. Mabey, and cast by the ironfounders, and in the course of three or four weeks the London rough will have the opportunity of breaking pieces from the real bronze panels, instead of impelling his liberty by practice upon the plaster models.

During the restoration of Matherne Church, near Chepstow, a stone coffin has been discovered, which is supposed to be the one in which was buried Theodoric, or Tewdric, King of Glamorgan, afterwards hermit and martyr, who was mortally wounded in battle, A.D. 560. The coffin has been found lying lengthways in the chancel, and immediately under a tablet on which was written a long descriptive epitaph by Godwin, Bishop of Llandaff, 1601-17, who tells us that he opened the coffin and saw the body of Theodoric. The coffin is 5ft. 5in. long inside, 6ft. 9in. outside, 16in. to 20in. broad interior, and 6 1/2 in. deep. The stone is native and in good preservation. In the coffin there were found human bones and portions of skull in fair preservation. Near to the foot of the coffin there was found also an urn, in which it is supposed that the heart and bowels of Bishop Miles Salley were interred, as the said bishop directed that these portions should be so buried.

The surveyor of Bournemouth, Mr. W. H. Andrews, has been reprimanded by the town commissioners for having violated the terms of a sewage-outfall contract by permitting the substitution of thinner pipes than those contracted for. His salary was also reduced from £300 to £250 a year. It was at first proposed to dismiss the surveyor.

The Docks Company of Falmouth, at their meeting last week, resolved to expend £11,000, subject to the sanction of the Public Works Loan Commissioners being obtained, in deepening the large graving-docks and the entrances, and in providing a 30-ton power crane, as recommended by their engineer, Mr. J. B. Tilly.

The *City Press* states that the destruction has already begun of one of the most picturesque portions of Lincoln's Inn. The chambers now being cleared away from the west end of the chapel were built about 250 years ago, and presented some fine specimens of old Jacobean brickwork. The mural tablets on the chapel staircase—including one in memory of Spencer Perceval, who, at the time of his death by the hand of Bellingham (May 11, 1812), was treasurer of Lincoln's Inn—are now removed into the chapel.

ARCHITECTURAL & ARCHEOLOGICAL SOCIETIES.

WARWICKSHIRE ARCHEOLOGICAL SOCIETY.—This society visited Napton on Wednesday week, after having inspected the church of St. James, Southam, on their way. The members were met at the church of St. Lawrence by the vicar, the Rev. J. Baldwyn Pugh. The exterior of the north wall of the chancel was pronounced to be of the Early Norman period. The principal window of the north aisle—of the Early English style—was then examined. The next window on the same side was considered to be as recent as the 17th century, but in its surroundings there were traces pointing to the latter part of the 13th century. The porch was of great age, but it was regretted that the old arches at the sides had been filled. Portions of the oak carving of the former rood-screen (dating from about 1450) are inserted in the modern pulpit. In the wall above the pulpit on the south side were found traces of the doorway of the vanished rood-loft. Beneath this is a small hagioscope looking obliquely into the chancel. The south aisle was probably the chapel for which a licence was found to have been granted by the Bishop in the 16 Richard II. unto one John Adams, of Napton, that he might have divine service celebrated therein. In the north aisle, a mortuary chapel of the De Naptons are two vaults, one of which was accidentally broken into some years ago, and a body encased in leather was found and re-interred. Mr. Matthew Helbecke Bloxam, of Rugby, said it was the custom at one period, about the 12th century, to encase a corpse in bull's hide. The party also inspected the earthworks in the vicinity of the church, supposed to have been a stronghold of the ancient tribe of the Dobuni. In the afternoon the churches of Upper and Lower Shuckburgh were visited.

CHIPS.

A college for 260 boys, to be known as Kingsley College, is in course of erection at Westward Ho, and will be opened in January next.

The foundation-stones of new local-board offices, mortuary, and other buildings were laid with public ceremony yesterday (Thursday) at Hornsey, N.

The exterior of the ancient chapel of the Castle of Vincennes having been found to be in a much decayed, if not dangerous, condition, it has been resolved to remove the *clochetons* of that edifice, transport them to Paris, and re-erect them in the garden of the Musée de Cluny.

The negotiations for the transfer of the Royal Institution, Manchester, to the corporation of that city have been concluded on the eve of the opening of the annual autumn exhibition of pictures. The proposal of the proprietors was to hand over their land and building in Mosley-street, with its pictures and statuary, to the municipal body, free of all cost but the payment of chief rent (about £100 a year), and a guaranteed endowment from the city rates of £2,000 a year for the purchase of pictures to enrich the permanent collection. This public-spirited offer has been agreed to, on the understanding that the endowment should be limited to the next 20 years, anything contributed after that to depend upon the public opinion of the time. The art gallery will be open free to the public on such days of the week as the committee shall determine. The building thus acquired for the public was erected from Sir Charles Barry's designs; the front is of stone, and has a handsome Greek portico, but suffers from half a century's exposure to the soot and sulphur from Manchester smoke.

The memorial-stones of a new Wesleyan chapel were laid at Treeton on the 8th inst. The style is "semi-Gothic," according to a Sheffield newspaper; the cost will be £700, and seats will be provided for 150 worshippers. Mr. F. J. Jones, of Treeton, is the honorary architect, and Mr. Earnshaw, of the same village, is the sole contractor.

The corporation of Birkenhead have resolved to erect a cast-iron covered tank, holding 66,000 gals., over part of the recently-completed reservoir. The work will be carried out from the plans and under the superintendence of Mr. W. A. Harrison, C.E., water-engineer to the corporation.

Captain Hildyard, one of the inspectors of the Local Government Board, attended at the Guildhall, York, on the 8th inst., for the purpose of inquiring into the application of the York Corporation for authority to borrow a sum of £20,000 for street improvements.

CONTENTS.

The Destruction of the Park Theatre, and its Lessons	349
New Buildings at the West End	349
Decorative Art	350
The Water Question—XVI.	351
The Sanitary Improvement of our Pavements and Footways	352
Parks and Squares in and round London	353
The Furniture Trade Catalogue	353
Practical Notes on Plumbing—XIII.	354
Holloway College and Sanatorium, Virginia Water	355
The New Buildings of the Birmingham and Midland Institute	355
Florentine Tapestries	357
New Docks at Liverpool	357
Testing Full-size of Bridge Columns	357
West Window for Anglican Cathedral	358
Whitby Abbey	358
Examples of Domestic Architecture	358
The Beer Quarries	358
A New Chinese Liquid Ink	359
Our Commonplace Column	359
Chips	359
Architectural and Archaeological Societies	359
Our Lithographic Illustrations	359
Archaeological	359
Building Intelligence	359
Competitions	359
To Correspondents	359
Correspondence	359
Intercommunication	359
Statistics, Memorials, &c.	359
Standard Tiles	359
Water Supply and Sanitary Matters	359
Legal Intelligence	359
Our Other Table	359
Trade News	359
Tenders	359

ILLUSTRATIONS.

SAINT ETIENNE, ABBAYE-AUX-HOMMES, NORMANDY. THE MONASTIC ARCHITECTURE. — ELY GRANGE, FRANT.

OUR LITHOGRAPHIC ILLUSTRATIONS.

SAINT ETIENNE, CAEN.

SAINT ETIENNE, the church of the Abbaye-aux-Hommes, is illustrated in Pugin and Le Keux's "Normandy." The present illustration of the nave will be found to supplement Pugin's in several particulars. It will be seen that actual measurements were obtained for the whole work up to the crown of clerestory windows. The main vaulting-ribs were put in from sketches and observation, and will be found to differ slightly from Pugin's drawing. The carving in the capitals is slightly varied, but the prevailing types are illustrated. The triforium and clerestory are given in Viollet-le-Duc's "Dictionnaire de l'Architecture," Vol. IX., p. 302.—J. A. G.

BUSINESS PREMISES, 31, NORTH-STREET, MANCHESTER-SQUARE.

THESE premises, in the occupation of Messrs. T. Jennings and Son, engineers and lift-makers, consist of entrance-space and storage-rooms, on the ground and basement floors, and show-room on the first floor, the space above being used as a dwelling. The main workshops form a separate building in the rear. Attention has been paid to the method of dealing with the heavy goods of the business, as regards loading and unloading. The vans can drive inside the building, or the iron derrick, shown on the drawing, will lift from a cart standing in the street, and either lower on to a small truck running on a tramway right into the workshops at back, or will lower directly into the basement, through an opening left by the light, in front of shop-window, travelling back on wheels. The brackets terminating in heads, on the upper part of front, can be used for raising goods, and in addition for slinging a cradle, kept on the premises, so that painting or repairs can at any time be done to the front without ladders or scaffolding. The walls are of Bent's white bricks, with red rubbers for the herring-bone work, and glazed at the top. The ornamental tiles on the front are red, but the roof is covered with Red tiles. The building has been carried out by Messrs. Jennings and Son themselves, and the work done on the premises by machinery. The whole has been executed from the drawings of Mr. Walter Henman, and has cost about £10,000. Our illustration is reproduced from the drawing of the premises hanging in the late Royal Academy Exhibition.

THESE premises, in the occupation of Messrs. T. Jennings and Son, engineers and lift-makers, consist of entrance-space and storage-rooms, on the ground and basement floors, and show-room on the first floor, the space above being used as a dwelling. The main workshops form a separate building in the rear. Attention has been paid to the method of dealing with the heavy goods of the business, as regards loading and unloading. The vans can drive inside the building, or the iron derrick, shown on the drawing, will lift from a cart standing in the street, and either lower on to a small truck running on a tramway right into the workshops at back, or will lower directly into the basement, through an opening left by the light, in front of shop-window, travelling back on wheels. The brackets terminating in heads, on the upper part of front, can be used for raising goods, and in addition for slinging a cradle, kept on the premises, so that painting or repairs can at any time be done to the front without ladders or scaffolding. The walls are of Bent's white bricks, with red rubbers for the herring-bone work, and glazed at the top. The ornamental tiles on the front are red, but the roof is covered with Red tiles. The building has been carried out by Messrs. Jennings and Son themselves, and the work done on the premises by machinery. The whole has been executed from the drawings of Mr. Walter Henman, and has cost about £10,000. Our illustration is reproduced from the drawing of the premises hanging in the late Royal Academy Exhibition.

removed. The walls and chimneys are of red brick, and the old tiles are used for the roofing and weather-tiling. The internal fittings will be of varnished pitch-pine. Brokenhurst is a village prettily situated in the middle of the New Forest, and is on the line of the London and South-Western Railway, which has a station very near the building illustrated. It is a favourite resort of naturalists and admirers of forest scenery.

ST. PETER'S CHURCH, PLYMOUTH.

ILLUSTRATIONS of the exterior and interior (looking east) of the above-named church, appeared in the BUILDING NEWS of Nov. 12, 1880, from drawings shown in last year's Academy Exhibition. The present illustration is reproduced from a drawing hung at the Academy this year. The view is taken from the sanctuary looking west. In the rebuilding, the sanctuary and vestries had to be retained. The sacristian being low, and the fault of the site being want of length, it was thought best to keep the sacristian as such entire and form a chancel under the nave-roof. The continuity of the nave-roof and the main lines of the building being thus unbroken from west to east, more apparent length is obtained. In order to give special firmness to the chancel, the arches on either side are filled with early tracery and a low-pierced stone screen divides the chancel from nave. It is proposed to surmount this low chancel-screen with an elaborate iron and brass one, for which the design has already been prepared by the architect. A somewhat novel but rich effect has been gained by placing stone figures of the Apostles in the niches formed in the wall immediately above chancel and transept arches. The whole of the interior walls are faced with unpolished Devonshire marble, the colour of which is extremely beautiful; the columns, strings, and dressings are of Corsham Down stone. The effect gained by the contrast of the warm grey Devonshire marble and the rich, yellow sandstone is pleasing. Considerable difficulties were found to exist in connecting the new and old work, and also in making good the foundations, but these difficulties have been overcome, and the church is now nearly completed, and it is hoped will be opened in October. The work, as previously stated, is being carried out from the designs, and under the directions of Mr. Geo. H. Fellowes Pryne, A.R.I.B.A., of 11, Adam-street, Strand, W.C., the builder being Mr. Alfred Guy, of London.

ELY GRANGE, FRANT.

ELY GRANGE is a property at Frant, three or four miles from Tunbridge Wells, and belongs to F. H. Kay, Esq., for whom the house and lodge illustrated have been erected. The materials are Hooker's red bricks from Dunton Green, Corsham Down stone, local tiles for hanging, and Broseley tiles for the roofs. The chimney-stacks are of rubbed bricks. The exterior woodwork is generally of a dark claret, the balusters being painted white. The house has been planned with a central hall, top-lighted, with a gallery at first-floor level round three sides, and a high chimney-piece against the unoccupied wall. On the main staircase off one corner of the hall is a large stained-glass window, which aids in lighting and ventilating it. The doors, linings, dados, and chimney-pieces to principal rooms and hall are either of oak or walnut, the dining-room and hall ceilings of timber, those of the drawing-room and morning-room of moulded plaster. The work has been carried out by Messrs. George Mansfield and Son, of Tunbridge Wells, from the designs and under the direction of Messrs. Ed. Salomons and R. Selden Wormin, architects, London. The small plan given with the others shows the distribution of the rooms in the entrance-lodge, of which building we hope soon to give a view, as well as ground-plan and details of the Grange itself.

St. Paul's Church, Brixton, S.W., was consecrated on Friday, July 23rd. It is situated in the Ferndale-road. It was built by Mr. Jones, of Gloucester, from the designs of Messrs. H. Herchaw and Fawcner, of Bloomsbury-square, who have made the very best use of the limited space they had to deal with. The lighting arrangements are very effective. They were carried out by Jones and Willis, of London and Birmingham, and we understand the same firm supplied the other interior fittings.

ARCHÆOLOGICAL.

GUATEMALA.—The Royal Museum of Berlin has just received some sculptured stones from Santa Lucia de Consumalapan, in Guatemala, the excavation of which has occupied the attention of the Prussian Government for the past five years. After the visit of Prof. Bastian to the spot in 1876, Dr. Berendt, one of the first authorities in American archaeology, was commissioned to explore the ruins. But, after a short time, he died from over-exposure; and his place was taken by Herr W. von Bergen, the German consul-general in Guatemala, who has at last succeeded in excavating the sculptures and shipping them to Germany.

CHIPS.

We regret to hear that the wife of Mr. James Piers St. Aubyn, F.R.I.B.A., architect, of Lamb-buildings, the Temple, died at their residence in Cambridge-street, Eccleston-square, W., on Wednesday. Mrs. St. Aubyn was in her 67th year.

A monument will probably be erected in Dunfermline Abbey to the memory of Dean Stanley, a committee having been formed for this purpose.

At the half-yearly meeting of the Helston Railway Company, the first held since the passing of the Act, the directors were authorised to enter into a contract with Mr. Maddison for the construction of the line. Mr. S. W. Jenkin is the engineer.

The foundation-stone of a new church was recently laid at Northam, near Southampton. It will be Early English in style, and built of Swanage-stone with Bath-stone dressings. The internal walls will be of stone in chancel and faced with stucco in nave. The church will consist of nave 71ft. 6in. long, and chancel 42ft. deep to east wall of apse, and sittings will be provided for 610 persons. The architect is Mr. Woodyear, of Grafton, near Godalming; the builders are Messrs. Bull and Sons, Southampton, the clerk of works is Mr. Vennell, and the foreman Mr. Dibben. The total estimated cost is £3,794, but only the first section of the building, including the nave and chancel, is being carried out at present.

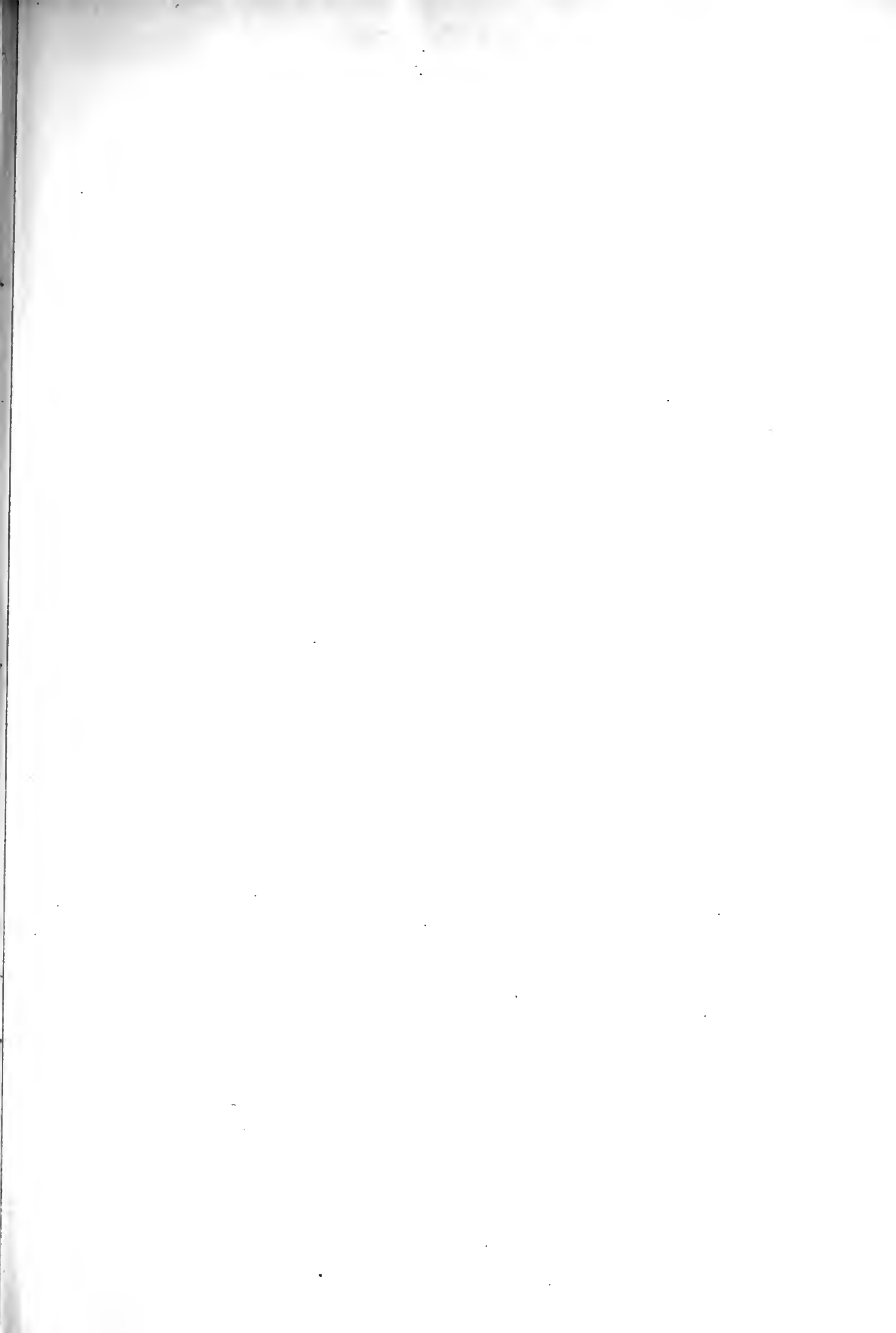
The boring operations at the Channel Tunnel experimental works near Dover have been suspended for a short time to admit of the removal of some of the machinery. The boring at the Abbott's Cliff heading having been successfully carried to the distance contemplated, the machinery is being removed to the other heading at the Shakespeare's Cliff shaft. Up to the present time, it is stated, the progress of the work has been of the most satisfactory character.

A corona of polished brass bearing 24 burners, has been placed in the chancel of St. Mary's Church, Bury St. Edmunds. It was supplied by Messrs. Benham and Frond, of London.

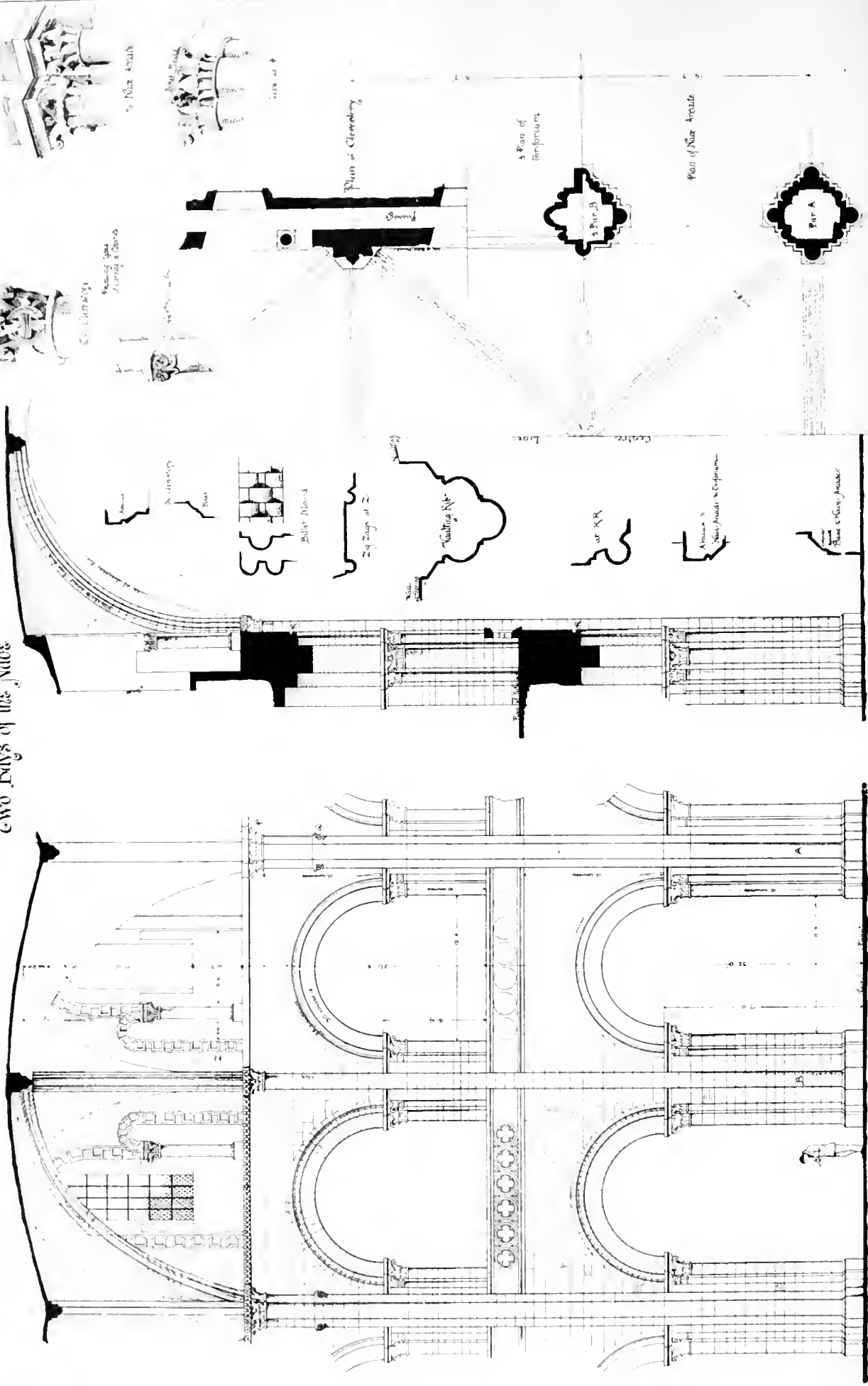
A new police-station and court-house, erected in the Quay-road, Bridlington, were recently opened. Messrs. Smith and Broderick, of Hull, are the architects, and the cost has been £2,500.

At the half-yearly meeting of the Swindon, Marlborough, and Andover Railway Company, the engineers, Messrs. W. J. Kingsbury and J. R. Sheppard, reported that the first section, that from Swindon to Marlborough, had been opened, and that of the second section, from Savernake Junction to Andover, 71 per cent. of the total earthworks, and 81 per cent. of the bridgework, had been completed, and a portion of the line near Andover completed by the contractors, Messrs. Watson, Smith, and Watson, who had also obtained the contract from the South Western Railway Company, for widening their lines, and effecting a junction with the new line at Andover. It was also reported that the Swindon and Cheltenham extension bill having received the royal assent, that work would soon be commenced.

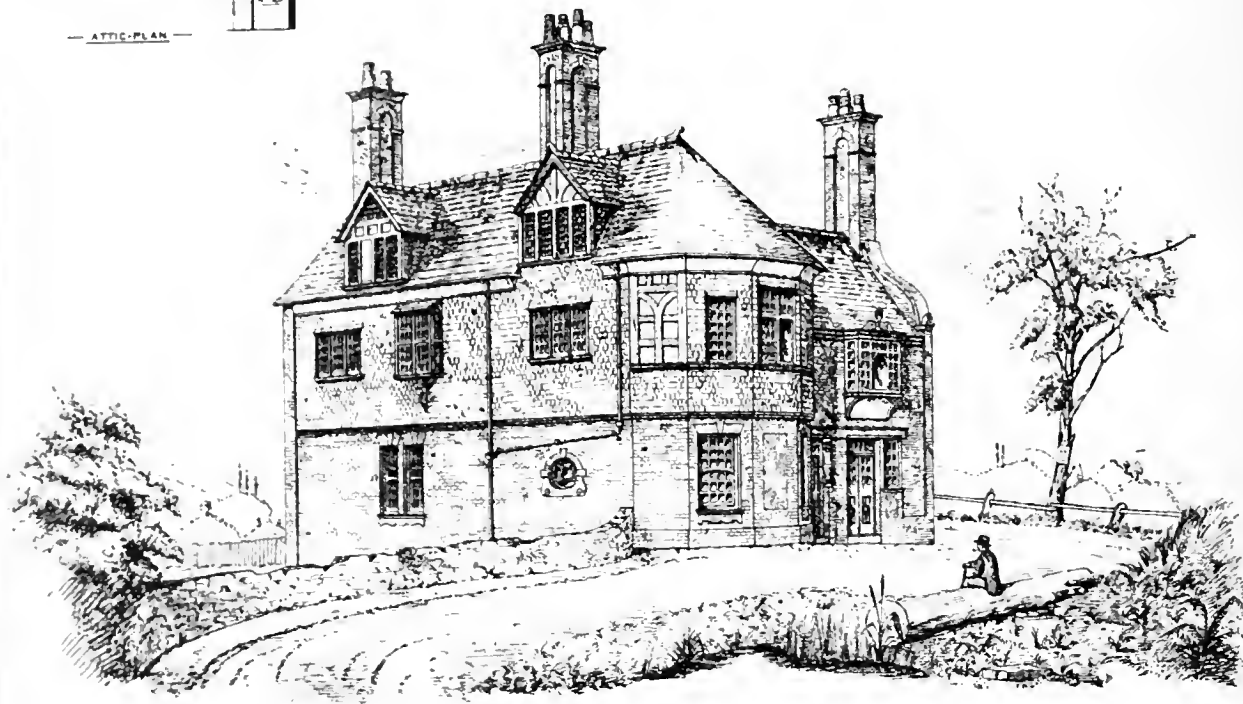
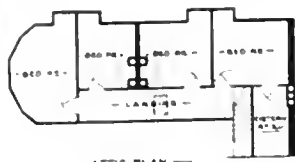
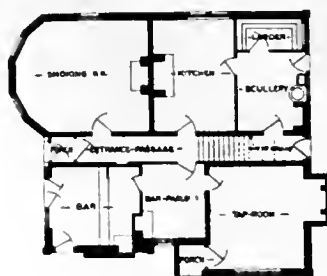
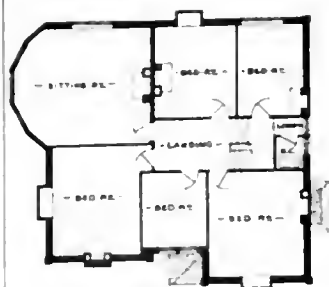
An inquiry was held at Bedford on Thursday, the 1st inst., before Captain Hildyard, an inspector of the Local Government Board, respecting an application from the town council for sanction to borrow £5,520 for works of paving. It was stated that it was now proposed to pave the footways of the outlying districts, the central thoroughfares having been paved under a former loan, and that after much discussion it had been resolved to use York flags, and not Staffordshire blue brick, as originally intended, as the borough surveyor reported that the greater initial cost would be more than recouped by the better wear of the former material. In several parts of the town blue bricks had been tried, but had been taken up and replaced by York stone. It was suggested in the course of the inquiry by members of the council that blue bricks would be good enough for the smaller streets, but the inspector said the experience of bricks at Brighton had been very unsatisfactory.



Saint-Elizene & Castel Two Bays of the Nave





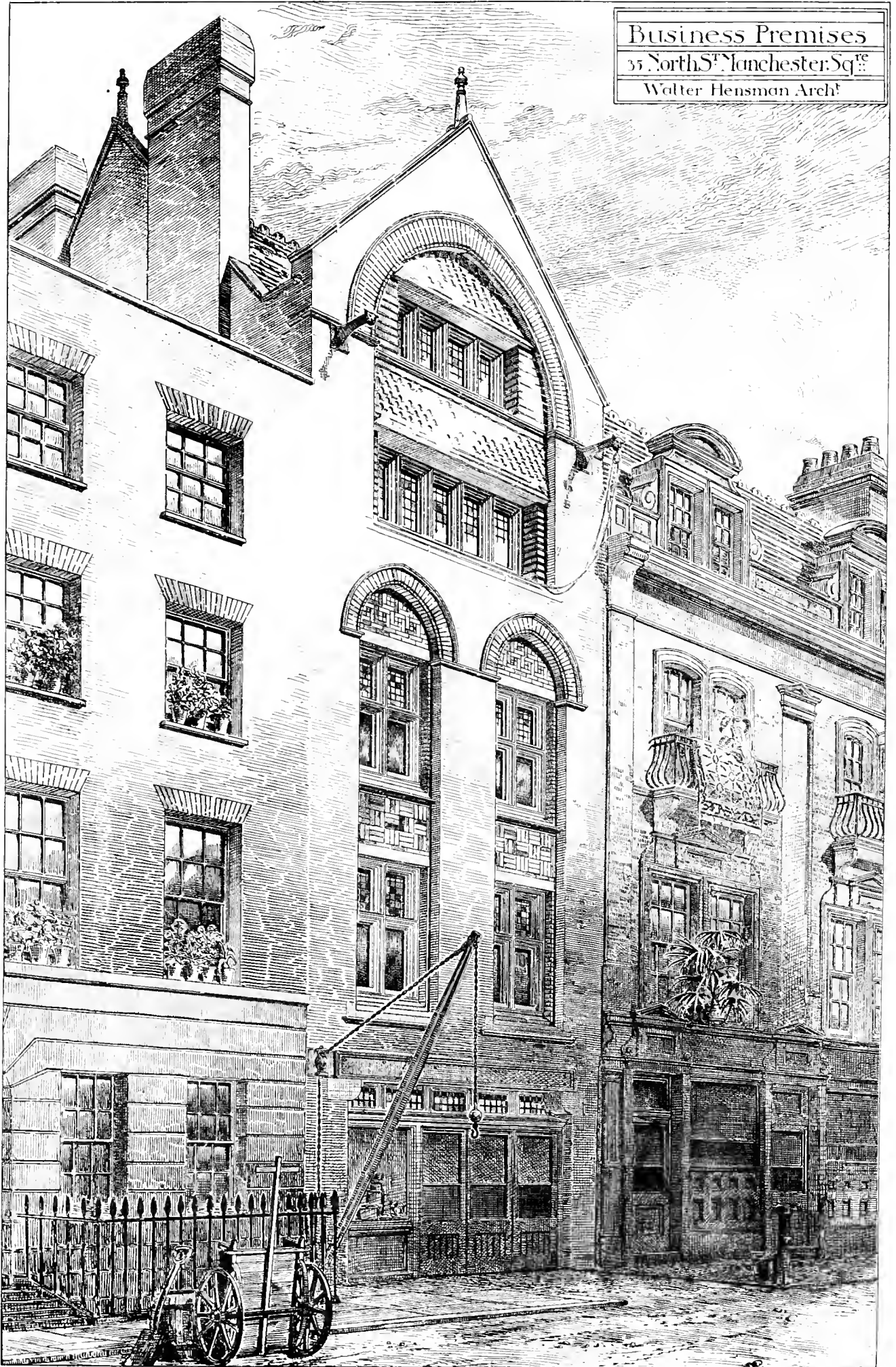


— THE MORANT ARMS — BROKENHURST — HANTS — — FOR JOHN MORANT ESQ^{RE} —

JOHN HARDING & SON ARCHTS
SALISBURY



Business Premises
35 North St Manchester Sq^{re}
Walter Hensman Arch^t



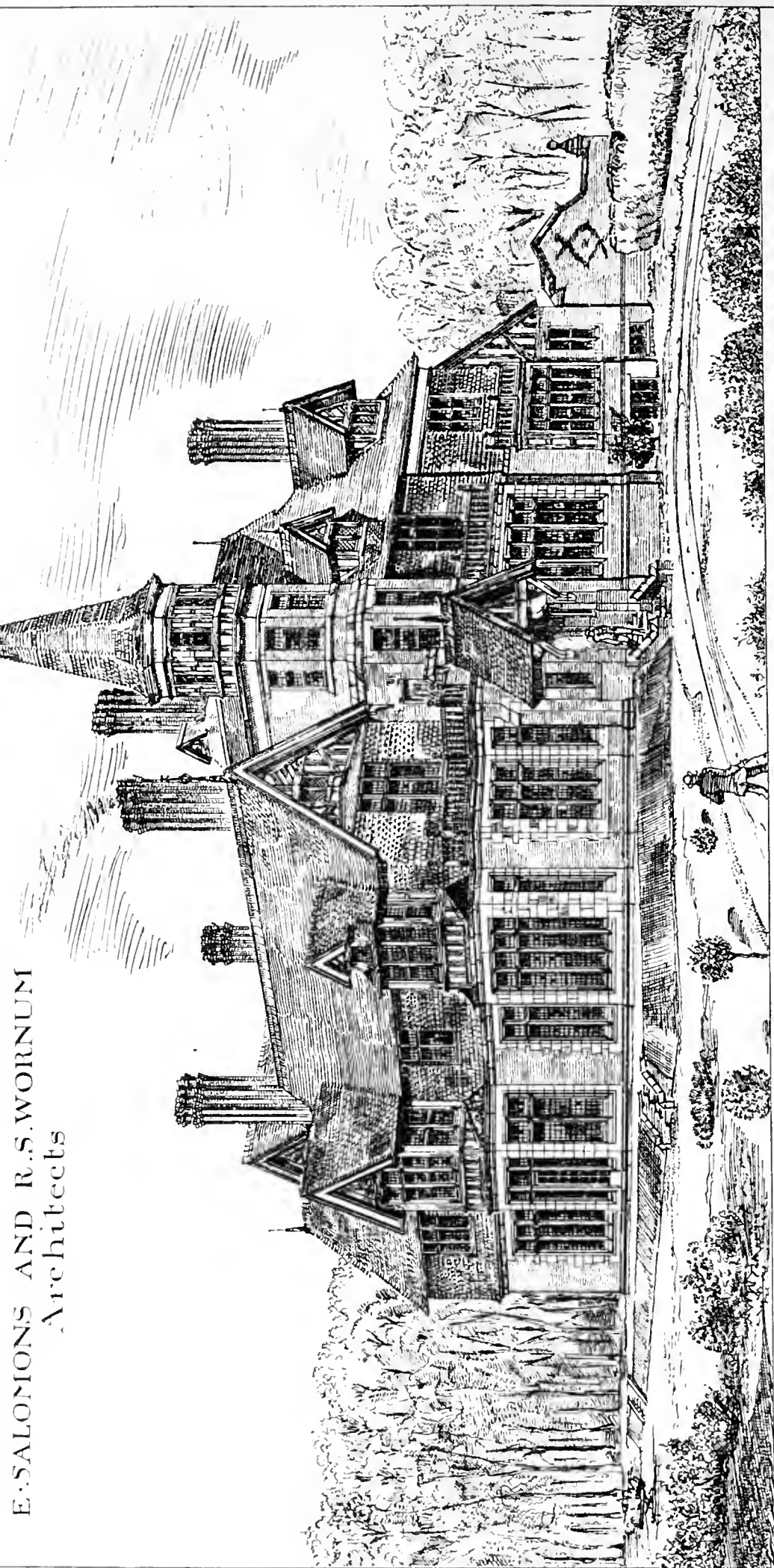


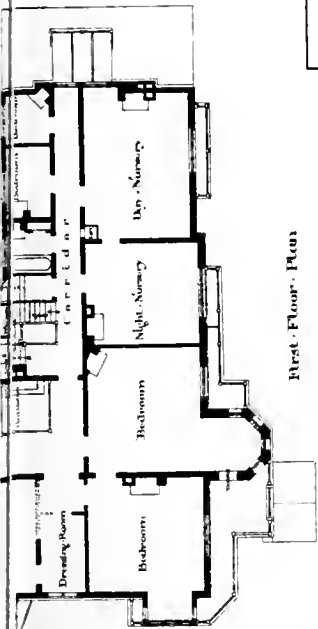
Photographed & Printed by T. Agnew & Sons, Manchester. Drawn by J. H. Stanger, N. Y.

Geo. H. Brown & Pym, Architects. St. Peter's Church, Plymouth. Interior View, looking West.

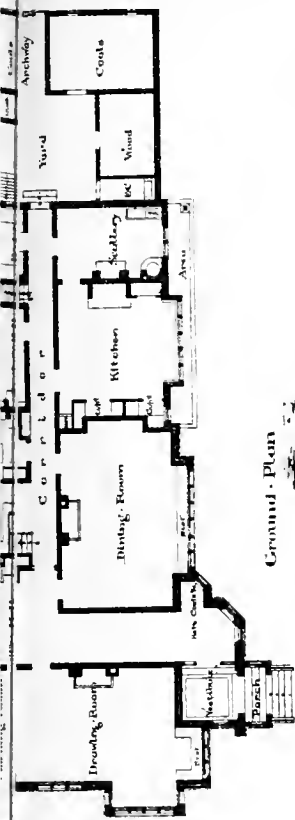


ELLY · CRAN · GE · FRANT
E · SALOMONS AND R · S · WORNUM
Architects

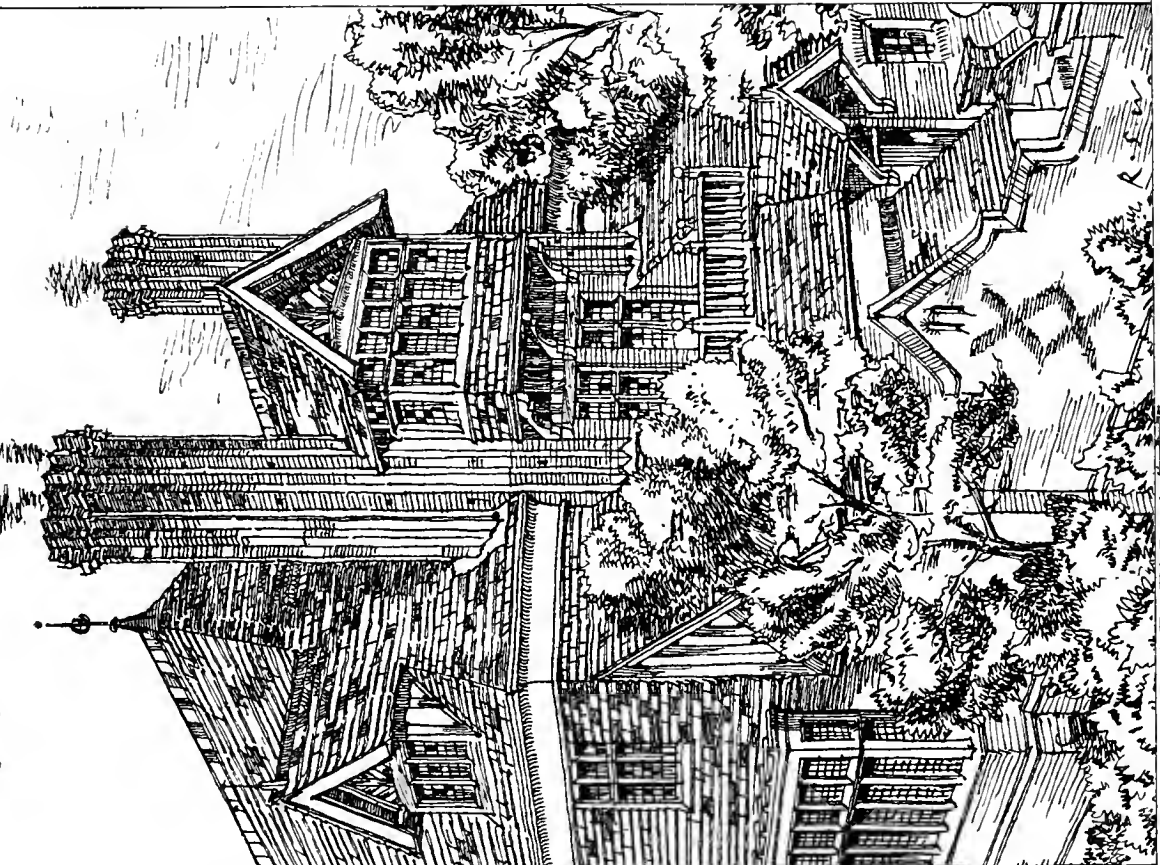
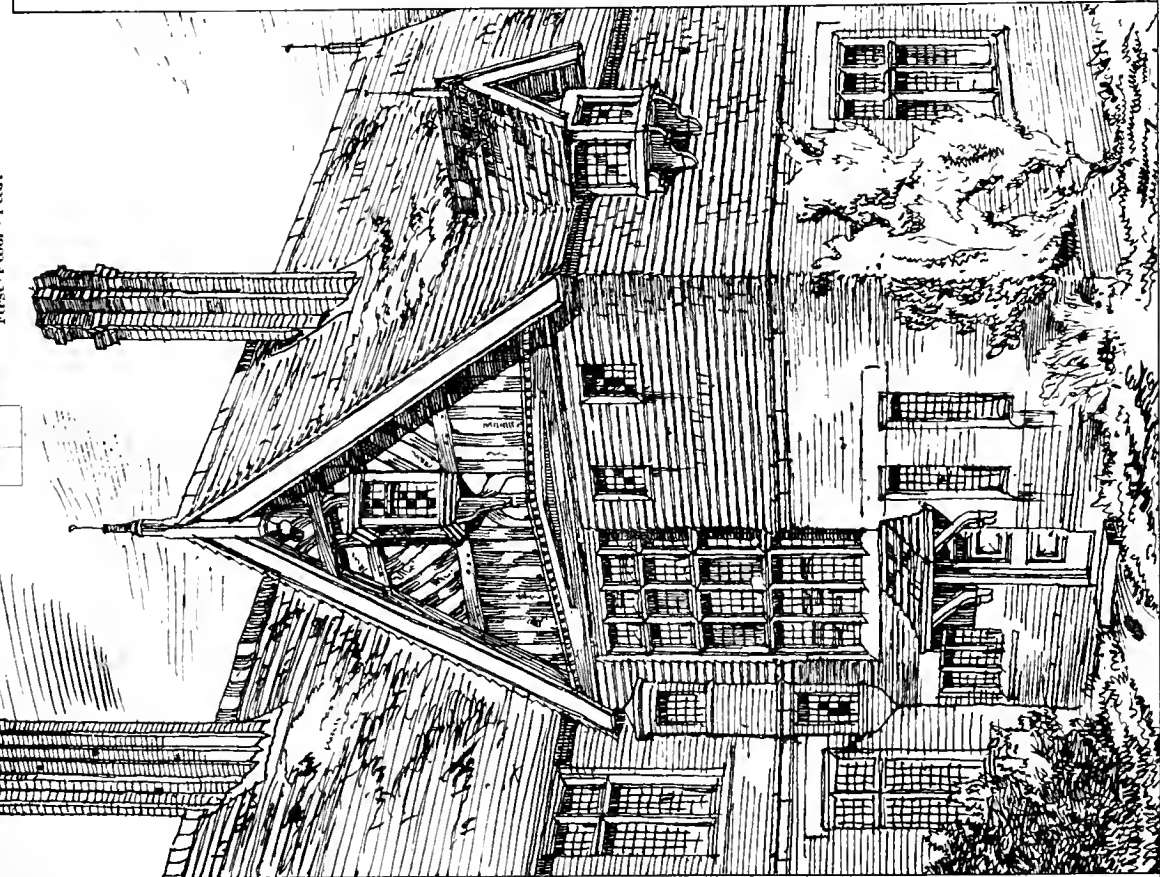




First Floor Plan



Ground Floor Plan



I
is
reg
in
dis
res
sil
pal
do
an
of
by
wh
th
ra
A
po
sil
ot
ar
to
E
ca
of
di
be
et
w
K
St
th
h

L
a
s
d
f
fr
s
th
a
s
T
E
o
s
p
b
b
o
w
n
G
V
b
C
C
a
A
a
h
b
P
h
C
T

t
n
t
o
t
o

Building Intelligence.

BELFAST.—The new U.P. Church in Clifton-street was opened on Sunday week. The style is Scottish Medieval, adapted to meet the requirements of modern churches. The roof is in one span, 41ft. wide and 68ft. long, this dimension being increased to 77ft. above the vestibule. The ceiling is formed with three sides plastered between the semicircular principals. The Clifton-street entrance includes two doorways, each five feet wide, under a moulded and carved series of arches resting on columns of polished red granite. The church is lighted by traceried windows, five at each side, between which are buttresses. The large window above the main doorway is of five lights, with elaborately traceried head, and with moulded jambs. A tower, to be hereafter capped by spire, of important dimensions, is carried up to the level of sill of belfry-windows. The pulpit, pews, and other joinery are of pitch-pine. The pews are arranged in a series of concentric curves, so as to insure an uninterrupted view of the preacher. Behind the pulpit is placed, in an arched recess, canopied stalls and session-room. The walling of the church is of rubble, with cut-stone dressings of Scrabo sandstone. The church is heated with hot water, and the lighting is effected by means of two of Stode's sunlights, which have been executed by Mr. John Dowling, King-street, Belfast. The contractor is Mr. John Smith, who has worked from the plans and under the superintendence of Messrs. Young and MacKenzie. The cost will be about £4,000.

BIRMINGHAM.—The Church of St. Nicolas, Lower Tower-street, which has been repaired and redecorated, was reopened on Sunday. New seats of English oak have been placed in the chancel, and the chancel itself has been extended farther into the nave, and inclosed with a low freestone wall laid with marble panels. The screen, which is of Gothic character, rests upon this, extends the whole width of the chancel, and rises to a height of about 20ft. The western screen has been continued across the south aisle. The church has been redecorated by Messrs. J. R. Lee and Co., of Ann-street, the decorations consist chiefly of bands and pattern-work stencilled on a greenish-grey ground. The plastering between the rafters of the nave has been finished in a salmon colour, and that between the aisles and chancel rafters has been coloured a bluish-grey. Texts have been written upon the walls, and the spandrels of the nave, arcade, and of the windows have been filled in with stencilled pattern-work in Indian and Venetian red and black. The east window has been partly filled in with stained glass, by Messrs. Camm Brothers, the design representing the Crucifixion. The organ has been reconstructed and enlarged by Messrs. Stringer, of Hanley. A new roof has been put to the organ-chamber, and the roofs of the side aisles and vestry have been retiled. The structural alterations have been executed by Messrs. C. Jones and Son, of Belmont-row; and the whole of the work has been carried out from the designs of Mr. John Cotton, architect, of Temple-row, Birmingham. The outlay has been about £350.

EASTBOURNE.—The sea-wall of Eastbourne is being extended, at a cost of £34,000, from the Anchor Hotel to the eleven-gun battery or great redoubt, along the coast in the Pevensey direction; while at the west-end of the Grand Parade the Duke of Devonshire has carried and is carrying the broad promenade, which is now two miles and a half in length, far up the cliff on the way to Beachy Head.

SOUTHPORT.—A new wing to the Palace Hydropathic and Spa Hotel was opened on Friday. It communicates with the main edifice by means of a wide corridor, from which access is gained to the new dining-room, which measures 40ft. by 30ft., and is lighted by windows coming down to the floor-line. Beyond this is the recreation-room, which is 80ft. long, 40ft. wide, and 25ft. high. It is seated for between 300 and 400 persons, has a stage, also available for platform or orchestra, at one end, and a coved ceiling; pilasters of composite design divide the walls into panels. This room will be used for concerts, amateur theatricals, and other amusements. At the end of the corridor a door gives access to a second corridor, lighted from above by means of coloured glass. Leading off from

from this passage are ten gentlemen's baths, all of marble. To each bath two dressing-rooms are attached. At the end of the corridor is the Turkish bath, a room terminating at one end with an apse, into which stained-glass lights are introduced. Attached to this bath are dressing-rooms and a cosy smoking-room. The ladies' baths, which are similar in style to the gentlemen's are reached from a corridor on the opposite side of the wing. Powerful pumping-engines, tanks, filtering-beds, and 1,700 yards of pipes have been laid down for the supply and distribution of the sea-water, which is obtained from the channel at a point facing the hotel. Messrs. Mangnall and Littlewoods, of Manchester, were the architects, and Messrs. Bridge and Son, of Burscough, the contractors. The hotel and new wing were illustrated in the BUILDING NEWS for Aug. 27, 1880, by a general plan and bird's-eye view.

SIDBURY.—Holy Trinity Church, Sidbury, a village six miles south of Bridgnorth, was recently reopened after restoration, from plans and under the direction of Mr. R. Griffiths, of Stafford. The general fabric was found to be in a very dilapidated condition, the whole of the roof having been stripped, and the mortar removed from all the exterior walls. The stonework has been repaired, and partly rebuilt in herringbone to correspond with the old work. The old timbers in the roof (where required) have been removed, and the space between the rafters plastered and left visible, including the bold oak principals. The roofs are covered with tiles obtained from the Billingsley Brickyard. The chancel has a pitch-pine boarded ceiling, formed in panels with moulded ribs. The old timbers of turret have been properly reconstructed, and new louvre-boards to holly windows; new roof to the same provided, covered with tiles, and the apex finished with a wrought-iron ornamental finial. The old porch has been taken down, and a new one built to correspond with the other portion of the work. A new window has been added to the north side of nave, and the whole of the jambs to doors and windows have been cleaned down. A chancel arch has been added, with label and carved bosses. The old stone paving has been removed, and the aisle and chancel are paved with Messrs. Maw and Co.'s encaustic tiles. The whole of the seating in the chancel and nave is in pitch-pine, with moulded bench-ends, the front portion of the seats having traceried fronts. The pulpit and reading-desk have been reconstructed with the old oak framing, with carved panel-fronts. The ancient font has been restored and cleaned. The windows have been reglazed with cathedral glass by Mr. John Davies, of Shrewsbury. The whole of the work has been carried out by Messrs. Nevett Brothers, contractors, Ironbridge, at a cost of about £500, exclusive of stone, which was a special gift. The rectory and outbuildings have been restored in the Elizabethan style by the same firm.

WESTON-SUPER-MARE.—The new Masonic hall erected at the corner of the Waterloo Boulevard and Longton-grove road, by the St. Kew lodge, was opened on Monday with an art exhibition. The hall has been built from the designs of Messrs. Hans Price and Wooler, architects, of Weston, Brother S. Taylor Harvey, of the same town, being the builder. It is in the Late Tudor style, and is faced with Bath stone, laid in irregular and narrow courses. At the corner nearest the boulevard is a tower having a projecting embattled and panelled cornice, resting upon bold corbels. Above is a low, half-timbered roof, terminated by a flat-pitched spire. The windows throughout the building are large, and are divided by stone mullions and transoms. The upper parts are filled with coloured glass in dull tints, geometrically arranged. In sunken quatrefoil panels, along the upper part of the facade facing Longton-grove road, are shields bearing various Masonic emblems. The two entrances are moulded and carved, particularly the main one. Over this is a recessed and canopied niche, whereon stands a sculptured figure, in Ketton stone, of the patron saint, St. Kew. This statue is the work of Brother Harry Hems, carver, of Exeter, by whom also all the ornamental carving in stone and wood throughout the building has been done. St. Kew, who is rather under life-size, is represented in the dress of a Somersetshire recluse of the 15th century. The carved work on the building is all in the local Perpendicular style of Gothic ornament. The lodge-

room itself has an open-timbered roof, ornamented by carved wood bosses, which have a double duty to pay, for they are at once ornamental stoppings to the mitres of the timbers and serve as ventilators. In the billiard-room is a carved stone mantelpiece. The whole of the interior wood fittings are stained deal, framed on to pitch-pine panels. The front, facing the boulevard, is separated from the road by an embattled wall. Almost immediately opposite to it is the new Church Institute, which has also just been erected from Messrs. Hans Price and Wooler's designs.

WHITFIELD - COURT.—Extensive alterations have been carried on at Whitfield-court, South Herefordshire, the seat of Mr. and Lady Katherine Clive, during the past 2½ years, from the plans and under the superintendence of Mr. Cheiako, architect and county surveyor. Viewed from the outside, the most conspicuous change in the mansion consists of its enlargement by the addition of a new block on the south-west. The principal apartment added is a drawing-room, measuring 41ft. long, by 24ft. 6in. wide, with a height of 22ft. in the clear, in addition to an octagonal bay window. The walls of this block are 3ft. thick, faced with stone from the estate, worked in their courses, and lined with brick inside, so as to guard against damp or uneven temperature. The approach from the library to the drawing-room is through a secret book-door, and behind a triple arcade, opening immediately into the drawing-room. This arcade consists of three arches, resting upon twisted columns with caps and bases, the latter being supported by a carved plinth. There is also an entrance from the first landing of the principal staircase to the drawing-room through a richly-carved door, which Mr. Clive purchased in Florence. This door was sent to Whitfield, and designs made for having it encased in jambs to match. This portion of the work, as well as the book-shelves and the arcade from the library, was executed by Signor Berrani Piazza, Santa Maria, Novella, Florence. It is worked in Italian walnut, polished, with the mouldings relieved by gold. The floor of the drawing-room is of parquetry, and was constructed in Venice and sent to England in pieces of about 2ft. by 2ft. All the rest of the woodwork is teak, with the exception of the chimney-piece, which is constructed in wainscot oak. The fireplace is open for burning wood, having Portland stone moulded inner jambs and head, with richly-coloured tiles and cast-iron ornamental back. The hearth is laid with inlaid tiles of mosaic design, and is furnished with antique brass firedogs. The ceiling is executed in plaster, with moulded and enriched ribs, forming panels adorned by foliage decorations. Underneath this ceiling is a moulded cornice and enriched frieze, which have been decorated from the design and under the superintendence of Lady Katharine Clive, while the cove, executed by her ladyship's own hands, represents 26 cherubs, with double sets of wings, the interspaces between each pair of cherubs being filled in with wreaths of fruit and leaves. A new principal staircase has been constructed in wainscot oak, with open-timbered roof above it, of oak grown on the estate. Balustrading has been placed upon the parapets, going round the entire building. The gardens have been rearranged, the terrace extended, and a new carriage-drive formed. On the sheep-walk, a reservoir holding 25,000 gallons of water has been constructed. The water supply arrangements have been carried out by Messrs. Easton and Anderson, Whitehall-place, London, whilst Messrs. Rosser and Russell, of Charing-cross, London, have furnished the heating and hot-water supply to housemaids' closets, baths, &c. Mr. James Bowers, of Hereford, has been the contractor for the whole of the works. The carving was intrusted to Mr. Robert Clarke, of Hereford, and the bell-hanging, gun-metal casements, and other works of this kind, were executed by Mr. W. Letharen, of Cheltenham. Mr. Clive has, within the past few months, caused to be erected in the neighbouring church of Wormbridge, a new chancel arch and east window (the latter being filled with fine stained glass, in memory of the late Mr. and Mrs. Clive), and has otherwise beautified the church from the plans of Mr. Cheiako; the immediate restoration of St. Devereux Church is contemplated by those interested in the parish, and the same architect has prepared plans and specifications for carrying out the works.

COMPETITIONS.

DUBLIN SCHOOL OF ART MUSEUM.—The Commissioners of Public Works for Ireland announce that they are prepared to receive competitive designs from architects for the museum of science and art, which it is proposed to erect in a site adjoining Leinster House, Kildare-street, Dublin. A block plan of site, with a statement of the conditions of competition, has been published.

FULHAM WORKHOUSE INFIRMARY.—The building committee of the Fulham board of guardians examined on Tuesday thirty sets of designs sent in for the new infirmary, but came to no conclusion upon them, except to recommend the board to call in as professional adviser the President of the Royal Institute of British Architects (Mr. G. E. Street, R.A.). The board were to consider this suggestion at their meeting yesterday (Thursday). After a decision has been arrived at, the designs will be publicly exhibited.

MANCHESTER.—A premium of £50 is offered for the best plans and concisely-written suggestions for covering over the Irwell, having regard to utility, beauty, and economy, showing the best arrangements of the open space, the best approaches and gradients to the new station, the best utilisation of the Salford land up to the Salford Bank for a station, with the least injury to Chapel-street, stating advantages, and giving approximate cost.

OLDHAM.—The time for sending in designs for the Oldham Free Library and Museum has been extended to the 5th October. The limit of cost is £5,000.

WOODSTONE CEMETERY.—The premium of five guineas offered by the burial board of Woodstone, near Peterborough, for plans and specifications for fencing in the new cemetery in Woodstone-lane, and for erecting thereon a boardroom, has been awarded to Mr. J. R. Naylor, of Derby. The estimated cost of work was not to exceed £130.

CHIPS.

The Liverpool Corporation, as part of a water-scheme, are about to erect a water-tower at Norton, Cheshire, and from thence nine miles of 42in. cast-iron socket-pipes will be laid to Prescott, Lancashire. The total weight of iron in the mains is estimated at 12,000 tons. Mr. Thomas Hawley, of Westminster, is the engineer-in-chief, and the work will be carried out under the superintendence of the engineer to the corporation, Mr. G. F. Deacon.

A quantity of relics, which bear marks of Roman origin, have been found in an ancient grave at Oensingen, in Solothurn, Switzerland. Among them are swords, daggers, round and flat buttons, painted glassware, and a number of ornaments made of a substance supposed to be fossil gum, but probably a composition. The graves, only two of which have been opened, are lined with masonry and vaulted. The appearance of the ground gives reason to suppose that it was once the site of a cemetery, and that it contains many more graves, which it is proposed to open and examine.

The new High School for boys at Oxford was to be opened last (Thursday) evening by Earl Jersey. The school is erected in George and New Inn Hall streets, with the chief frontage to the former thoroughfare. The style is Renaissance; the architect is Mr. T. Graham Jackson, M.A., of Devereux-court, the Temple, W.C., whose designs were selected in competition. Mr. Claridge, of Banbury, is the builder, and Mr. Meekford the clerk of works. We illustrated the principal facade of the school on Feb. 13th, 1880.

Horncastle is about to be provided with a new water-supply from springs at Cawkwell, which are estimated to furnish a minimum supply of 60,000 gallons per day. Mr. Teague is the engineer, and Mr. Thorpe the surveyor.

The town-council of Newcastle-on-Tyne resolved, on Thursday week, to construct the southern portion of the sheep-market, with wrought-iron pens and cement flooring, at an estimated cost of £1,300, and the finance committee were authorised to accept the lowest tender for the work, which will be carried out under the supervision of Mr. A. M. Fowler, borough engineer.

A commencement has been made with the extension of the tramway system at Newcastle-on-Tyne, from the borough boundary on the Moor Edge to the village of Gosforth. The work is being executed by Messrs. Ridley and Co.

"To a practical man with a taste for mechanics, and the bumps of construction fairly well developed, we can conceive no more mentally tiring than a couple of hours spent over the June numbers of this truly marvellous publication the *Eng. Archt.* In a hundred and fifty odd pages that make up the bulky mass of the paper, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Architect*. Price Two-pence of all newsmen, or post free 2d.—3, Tavistock-street, Covent-garden, W.C.

TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.

All letters should be addressed to the EDITOR, 31 TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and SIXPENCE for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum post free to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 3fr. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—G. S. D.—J. A. and Co.—B. B.—A. U.—D. E. of M.—J. B. of H.—G. H. F. P.—W. E. P. of D.—R. H. of G.—A. W. of B.—J. D.—J. R. of O.—J. C. of B.—R. S. W.—T. P. of A.—J. R. of R. B.—H. H. of E.—W. P. B. of G.—H. and O.—E. B. S.—H. C. W.—S. V. of M.—T. H.—F. A. S.—J. M.—J. O'S.—H. M'L.—E. H. S.—H. I. N.—E. C. of K.—R. W. of K.—J. W. C. of G.—H. P. of G.

T. C. K. of M. (Reference to any school arithmetic book will enable you to answer your query.)—JOHN H. CERRIG.—Your query is answered on p. 346, last issue, in No. 6627, "Intercommunication" column.)

"BUILDING NEWS" DESIGNING CLUB.

J. HOLLGATE. (The award will be published shortly.)

Correspondence.

FULHAM INFIRMARY COMPETITION.

To the Editor of the BUILDING NEWS.

SIR,—It is rumoured that some drawings sent in for this competition are likely to be excluded, on the ground that they are "coloured drawings," and consequently not in accordance with the terms of the competition.

I am desirous of asking your opinion whether a light wash of colour over the whole area of the land to be devoted to the use of the infirmary (including airing-yards, &c., &c.), and laid on simply to show that no buildings are beyond the restricted boundary of the land set apart from other land belonging to the Union has been encroached on by the Infirmary building; the plan of the buildings, yards, &c., being wholly drawn in Indian ink line, and the walls etched—can be considered or construed into a coloured drawing.

A reply in your issue of this week, if possible, may be the means of preventing an injustice being unintentionally committed by the Guardians, who will have the matter under consideration next week.—I am, &c.,

A COMPETITOR.

EXTRACT FROM INSTRUCTIONS.

No. 8.—Those drawings are to be made to a scale of 1 inch to a foot, and are to be finished as line drawings with Indian ink only.

No. 10.—All drawings to be mounted on plain strainers. No framed or glazed drawings, and no perspective drawings, will be received.

[Having regard to the clause No. 8 of the Instructions, we certainly think a plan tinted in the manner our correspondent describes is excluded by the terms.—Ed. B. N.]

EXPANSION OF CEMENT AND CONCRETE.

SIR,—That Portland cement concrete is subject, in a certain degree, to change of form through variations of temperature is a fact; but my experience differs in the results from some others of your correspondents. Mr. Petrie instances a case where the concrete paving-flags of a street were moved out of position by a rise in temperature, and of steps being split across the ends through the worn centre portions being cut out and refilled with cement. But the latter method of repairing worn steps has been done in thousands of cases, and personally, I have never noticed a similar result. A continuous concrete floor on iron girders, 10ft. from the ground and 142ft. in length, which was constructed about two years since, has, up to the present time, certainly not disarranged the perpendicular line of the end walls in a perceptible degree; and this should be a good test of the behaviour of concrete in the slab form. The fact is that cement, in most cases, is used too fresh from the manufacturer's, but if sufficient time were allowed for the coarser-ground particles to slake (should the user be unable to obtain it ground sufficiently fine to avoid this necessity), no very bad results would ensue. The expansion and contraction of concrete are probably about the same as brickwork, and if the material were usable in the same way as bricks, the changes would be equally as unnoticeable. The fine cracks found on cement after it has been applied, might be avoided if a sufficient time were allowed for it to rest before use, or if it were passed through a fine-mesh sieve so as to eliminate the coarser particles. The use of the strips of wood to divide concrete paving or concrete floors (when laid *en masse*), into compartments, and afterwards filling up the crevice when the wood is withdrawn, with cement or lime mortar, is an advantage. I have tried this for a long while, and find that when shrinkage does take place the result is a straight crack, and one open joint is certainly preferable to an infinity of small cracks. That the poorer the concrete, the less the signs of contraction or expansion, is certainly not my experience; the more necessity there was for avoiding change of form, the greater the proportion of cement I should use. On the other hand, the worst specimens of concrete I have seen have been those where the proportion of cement was a small one. It is against all theory, but the concrete walls least liable to crack are, I find, those where blue lias lime and no cement whatever has been used; and this applies to walls a hundred feet in length or more. Is it owing to there being less rigidity and more elasticity in lime concrete than in cement concrete? Where blue lias lime is used as a matrix very great care is necessary. The nature of the aggregate has a good deal to do with the change of form concrete is liable to, for I have found the least signs of contraction and expansion when slag from iron ore has been used, and the most when river or pit-gravel of too great uniformity of size, and its angles rounded by attrition, has been employed. While on the question of the contraction and expansion of limes, can any reader state what lime and sand were used for the mortar of the brick inclosure wall of the new Military Barracks at Devizes, built about two years since, and which appears ready to fall at any time? A cross section of the same, instead of appearing perpendicular, and straight, would more resemble that of a dome. This peculiar curve must be surely due to the expansion of the lime, as no settlement would produce such a result.—I am, &c.,

Alresford, Hants.

THOMAS POTTER.

UNTRAPPED GULLY-HOLES.

SIR,—I can vouch for the accuracy of what I said on page 282. What proves pretty conclusively in my mind that the sewer-gas was the cause of the typhoid fever is that both persons caught it at the same time.

I wish every person who takes the trouble to carefully ventilate his own drains would, at the

same time, attach a ventilating-pipe to the sewer side of his trap. If this were done at every house the effluvia from the sewer would be very much less obnoxious. Attention has often been drawn, in the *BUILDING NEWS*, to this way of ventilating the sewer; but it is not to be expected that people will go to this expense "pro bono publico" without being compelled to do so by Act of Parliament.

It strikes me as being rather anomalous that we should have an Act of Parliament with regard to the building of our houses, but not one having regard to the draining of them. Surely the latter is quite as important a point; and seeing how various, and very often mistaken, the notions are concerning sanitary matters, it seems to me the sooner we have some law on the subject the better.—I am, &c.,

C. F. M.

61, Bedford-gardens, Kensington, W., Sept. 6.

DAVIES' O-TRAP.

SIR,—Your correspondent "H. B." has written in your last issue a letter which, in justice to myself, calls for a reply.

I refer to that part wherein he says there is but a trifling difference between my method of striking the O-trap and the proper (?) method in general use—viz., 12in. across the cheek, &c. First let me ask what is the proper method? as, until I first struck the O-trap with the compasses and the right line about 25 years ago, I knew of no method of striking it excepting by rank rule of thumb. I, of course, knew then that my system was far from perfect, as I could not depend upon the length of the outgo in different-sized traps.

This last addition is my complete geometrical trap, and is, I believe, as near perfection as possible. I am quite aware that at least 80 years ago plumbers had a mania for striking traps geometrically; but what did they do? Simply struck a rounded bottom with heel and outgo perpendicular to the top line. If this is what "H. B." means, of course he must then have a 12in. circle; still, I cannot think he intended this. Does he call my rule of first striking 9in. circle and 12in. from heel to outlet, with the outlet line striking the belly at a true tangent, the proper method? If so, he cannot be aware that this system was mine originally, and I first put it on record in 1858, and that he is consequently paying me the greatest compliment I ever received.—I am, &c., P. J. DAVIES.

SIR,—I went to the discussion on Mr. Hellyer's lectures, at the Society of Arts rooms, on the 13th of August last, and saw Mr. Davies test his model O-trap. I have also read with great interest the correspondence published in your columns, between Mr. Emptage and Mr. Davies upon the subject. Mr. Emptage describes this model business as being "most misleading." I think this is too mild a term: to my mind it is insulting (although not intentional) to our common-sense as practical men, because it supposes that we do not know the difference between a small draught trap placed beneath a lavatory basin, and a full-size soil-trap beneath a w.c. I know Mr. Davies personally and have great confidence in his abilities, and I feel sure he would not have been led into this mistake had not Mr. Hellyer himself set him the example. I have spoken to several working plumbers upon this matter, and find they entertain the same opinion, and are, like myself, watching the course of the arguments.

I only know Mr. Emptage from the paper which he read at the discussion, and his subsequent letters. These, however, are to my mind quite sufficient to show that he is fully up in this matter, and I would suggest to him the desirability of discontinuing this toy play, which is most bewildering, and give us the results of some real work, for by so doing he will be giving useful information to many.—I am, &c.,

A PRACTICAL PLUMBER.

Kensington, September 12th.

SIR,—I have tested my model O-trap, made after Mr. Davies' plan, and with it, at the same time, Dent's 2in. T and S-siphons. My arrangements were the same as Mr. Davies used at the discussion, viz., pail, with 2in. valve, and 1½in. pipe, with 9in. fall into trap. I put into the body of trap a handful of pebbles, 114 in number. Three pints of water cleared them all

out; two pints would not do so. I tried this six times, and the most I sent out at one time was 14. Now, I was curious to know how Mr. Davies had managed to clear them, as he says, with one pint of water. I therefore placed in dip-pipe a funnel 13in. long, 4½in. diam. at top, and 1½in. at bottom. With one pint thrown down this funnel I cleared all out but 20, and this was the best I could do. With two pints I could not clear all out, but left in three or four. I put in a piece of flannel, which took three separate pints to send it through.

I now repeated the same tests with Dent's 2in. T and S-siphons. I could see no difference in the effect between these and the O as regards the gravel test, but with the flannel there was a marked difference, ¾ pint clearing as well as did one pint with the O. On looking at and thinking over these arrangements, I was struck with the folly of trying by such means to ascertain the action of a w.c.-trap: for instance, under what conditions is it possible to fix a w.c.-trap that there shall be a direct fall of 3ft. between the basin and the seal of the trap? Again, the w.c. basin is always flushed by a discharge from a pipe to the arm of the basin, and not by a pail of water thrown in.

I, therefore, determined to put the small traps on one side, and to carry out my trials with my proper w.c.-traps. This I propose to do in the fullest manner, in order to clear up this long-standing dispute as to the superiority of the O over the O-traps. I have fitted up a flushing tank 6ft. above w.c., with 1½in. pipe to arm of basin. This will enable me to compare flushes in the ordinary way with that of pails thrown in. I intend to test the traps fixed below valve-pans and direct-action closets, and will forward to you the results.—I am, &c.,

DANIEL EMPAGE, S.E.

Danehill Sanitary Works, Margate, Sept 12th.

TERRA-COTTA.

SIR,—I notice an extract from the *Guardian* in last week's *BUILDING NEWS*, and am pleased to find terra-cotta so well approved. But having manufactured the material for both works mentioned—viz., the Natural History Museum and Messrs. Christy's, No. 1, Old Bond-street, must protest against the assertion of its alarming (money "no object") cost. Terra-cotta will bear very favourable comparison on this point with any material for facing buildings (setting aside its undoubted durability), and should a repetition of parts occur, is at a still greater advantage, particularly so if the repeated parts are enriched, and this will be confirmed by any architect who has had experience with it. Hoping this will show terra-cotta as more available than your paragraph would suggest,—I am, &c.,

CHAS. WHITFIELD,

Manager for Gibbs and Canning, Tamworth, Sept. 13.

VENTILATION OF SOIL-PIPES.

SIR,—In regard to the ventilation of waste-pipes a good deal depends upon the position of the appliance, and how the ventilation is carried on, as also upon how the ventilating-pipe is joined. As Mr. Davies on page 345 refers to sinks specially, and to their discharging into or over disconnecting traps, I shall simply deal with them here. One plan which I understand Mr. Davies disapproves of is putting in the waste-pipe without a lead siphon-trap, and its outer end exposed to the open air. This I join in condemning, because the waste-pipe then acts as a stinking air inlet-pipe to the house. This plan is apt to cause sore-throat and blood-poisoning to the inmates. Another plan is to use the lead siphon-trap close under the sink with the outer end of the waste-pipe discharging over the grating of a gully-trap outside. This does very well so far as the sink is concerned, although it often happens that around the grating of the gully-trap tealeaves and pot and dish washings will be seen exposed to view in a nasty, dirty-looking manner. I do not like this style. Another plan, and still using the lead siphon-trap inside, is to make the waste-pipe discharge under the grating as into one of my disconnecting ventilating drain-traps. This is the plan I generally adopt myself, and I think I lately observed Mr. Rawlinson, C.E., also stating he preferred the waste-pipe to discharge "under" the grating.

In these last two plans some put in a ventilating pipe from off the top of the out-go of the trap to prevent gases lying in the waste-pipe. Mr. Davies seems to think this will cause the water in the trap to freeze much more easily. That depends upon circumstances. If there is only one sink I do not

think it will matter much. The hole where the waste-pipe passes through the wall not being tightly built, is ten times more apt to cause freezing than the air-pipe. When the air-pipe is being joined it should be so pointed as to direct its air in case of a back-draught away from the water in the trap and not right on to it, as is often unthinkingly done. In the case of only one sink near an outer wall, and the waste-pipe discharged 2ft. under the grating, the frost from the small air-pipe can have little effect. If wished during a long frost the top of the grating could be temporarily covered with a bit of old carpet, &c. This is much better than having a month's accumulation of slops flowing all over the ground, as I have sometimes seen with exposed waste-pipes discharging over gratings. Lastly, as to the plan Mr. Davies speaks of—viz., not using a lead siphon-trap, but instead dipping the outer end of his waste-pipe below the surface of the water in the outside disconnecting-trap. This plan is better than having no trap inside, although inferior to having the lead siphon-trap inside. The outer end of the waste-pipe should only dip slightly under the water—the less the better; for this reason, that less than ½in. of cover is sufficient to prevent blow-in, whilst with only a small cover, when the water is discharged from the sink, it may easily force this outside seal before it, and so push out the bad air that may have accumulated in the waste-pipe, whereas with a deep outside seal this may not be managed, and so stinking air may more readily be smelt. This is one reason why "the further the end of the pipe enters the trap the more objectionable it is."

The unsanitary inspector's plan of no trap on waste-pipe is very bad. Mr. Davies' plan of dipping its outer end under water is an improvement upon that, especially if the dip is small. The proper plan is to have a siphon-trap as close as possible to the appliance, and the outer end of the sink's waste-pipe discharging under the grating of a properly ventilated and set disconnecting-trap. If wished, I will give sketches of the plans above described.—I am, &c.,

W. P. BUCHAN.

SIR,—Mr. Emptage declares "the necessity of an efficient orifice: this is, in fact, all my contention. Thus the controversy between us is narrowed to the question, What is an efficient orifice? Hitherto I have maintained that any size of orifice, small or great, is (in proportionate degree) efficient, and that a ½in. pipe is satisfied and economically effective. This is, only in part, contradicted by the results of the interesting experiment described by Mr. Emptage. If that description is correctly and accurately recorded, I must conclude that something larger than a pin's-point puncture is necessary to prevent siphonic action. I purpose closely testing the suggested experiment in different sizes of pipes, from ½in. to 4in. bore, and will report the result of my investigations in a future letter.—I am, &c.,

MICHAEL DEURY.

VICTOR EMMANUEL MEMORIAL.

SIR,—It would appear from a letter from Baron Heath, the Consul-General of Italy, in the *Daily News* last week, that the monument about to be carried out in Florence has nothing to do with the competition in question. This will explain the mistake, which, however, is not mine, and I do not know that I need apologise for drawing attention to the matter.

The original misleading announcement in the *Daily News* was given officially, and with many circumstances and detailed particulars in confirmation.—I am, &c.,

12th Sept.

COMPETITOR.

LEAMINGTON SPA COMPETITION.

SIR,—Has any decision been arrived at respecting the proposed public buildings at Leamington Spa, for which designs were invited some months ago? Surely it is time some announcement was made public.—I am, &c.,

Sept. 11th.

OBSERVER.

There was a large attendance and a spirited competition for the front lots at Mr. R. J. Collier's sale last week of building-land at Eufield. The total sale was £2,431.

During the first six months of the year the London and North-Western Railway Company spent £19,175 on improving and increasing the accommodation at its London stations, £52,133 on that of its Liverpool stations, and not less than £123,150 on additional accommodation at its Manchester stations. The expenditure at all the three great centres of the Company is being continued during the present half-year.

At Tuesday's meeting of the Dunfermline town council, the account of Mr. French, the contractor for the recently-completed waterworks, was presented and proved to be £3,389 1s. 3d. in excess of the price which Messrs. Leslie, of Edinburgh, the engineers, had recommended should be paid. The account was returned for details to be added.

Intercommunication.

QUESTIONS.

[6532]-Nuisances within the Law.-A man proposes to bring cement works near to a residence. How near may such works or a brickkiln be brought within a dwelling without infringing the law?—W. B. AND L.

[6533]-Monuments.-Would any of your readers kindly inform me whether the designer of Sir Walter Scott's monument in Edinburgh was a mason or joiner?—R. H.

[6534]-Dimensions of School.-In designing schoolrooms, what is the usual number of square feet to allow for each child? Also, what is the best proportion of length to breadth for a standard school?—A. S. S.

[6535]-Museum Roof.-Does any reader know of a thoroughly good museum-shaped roof without the beams or collars, and not constructed on a flat? If so, would he kindly explain the construction?—S. S.

[6536]-Round Timber.-Will some reader be good enough to give me the name of a good book on conversion and uses of round timber, and oblique?—P. H. G.

[6537]-Architect's Prospects in Australia.-Is there any chance of a person who has been two years in an architect's office and measured the buildings in a similar office in Australia? If so, which would be the best city to go to—Melbourne, Brisbane, Sydney, or Adelaide? 3rd. What is the salary likely to be?—N. Y. Z.

[6538]-Ventilation.-Being about to erect a ball-room on the ground floor of a small building, I would feel very grateful if any of your numerous readers would kindly give me in plain words what would be the best method of ventilating the room. The room is 20 ft. by 10 ft. and the walls are 12 ft. high from floor-level to window-sill. There are two windows in the side wall, and one in the front, each 6 ft. by 4 ft. The roof is supported by a row of posts in the ceiling. The height from floor-level to ceiling posts is 10 ft. 6 in. —R. G.

[6539]-Sandial-Plate.-Can any reader of this column tell me how I can obtain an engraved plate for a sandial?—S. S.

[6540]-Plasterer's Work.-In measuring up plasterer's work, should one only should the cornice be measured in the ceiling and walls, and how would you measure run of cornice?—W. G. G.

[6541]-Science and Art Exam. in Architecture.-Would some correspondent who has passed the above give me some information concerning it, and mention where I could get copies of past examination papers? Also the best book for pursuing the necessary knowledge of the subject.—J. F. T.

[6542]-Roads.-Will any of your readers inform me the price per yard super. of the Val de Travers compressed asphalt pavement, as laid in the metropolis, and also of the improved road pavement, both to include the concrete foundations requisite?—T. S. S.

[6543]-Road Material.-Will Hugh MacLachlan or any other influential reader inform me how many yards or loads of ball core and of ballast a 40 ft. road will require per lineal foot or otherwise, the hard core to be 18 in. and the ballast 4 in. thick?—T. S. S.

[6544]-Disinfecting Stoves.-Will some kind subscriber inform a constant reader of this journal who manufactures the best disinfecting stoves suitable for various wards, such to be sufficiently large for fumigating lods as well as wearing apparel?—B.

[6545]-Rain, &c., Penetrating into Building.-I have just erected an Elizabethan building, the timbers composing the framework being grooved to receive the panels, which are formed of strong lath-and-plaster, coated over with cement. In extreme weather the rain penetrates through the joint between the panels and framework to the inside. In order to remedy this I had thought of raising out the joints, and pointing with putty and white lead. Can any of your readers suggest a better plan?—B.

REPLIES.

[6532]-Baptistery.-It may be made from 6 ft. to 8 ft. long, by half that width, and having a depth of 6 ft. and about, with water sufficient for baptismal services from 2 ft. to 2 ft. 6 in. deep. Five or six steps will be necessary to lead down into the bath and fixed inside it. The walls should be of at least 1 1/2 bricks thick built in Portland cement, and backed up by the earth round. The floor may be of concrete, or of brick, and covered with glazed tiles laid in cement, and the walls of the same, instead of lath and plaster. It should be fitted with a 1 in. or 2 in. service pipe with key outside, and drain and overflow pipes, an 1 1/2 in. diameter. The service pipe should lead off from the bottom of the bath. The whole should be covered when not in use by strong framed and locked covers in the form of a door, to be lifted when required by means of stout counter-sunk drop-handles of iron or brass.—H. H. MacLachlan.

[6533]-Pencil Sketches.-As to these I have found nothing better than ordinary paper. I happened once to use a sheet of water in slightly shading a pencil and sepia sketch, and then found it fixing the pencil work. I have washed the sheet with beer to start with.—W. K. B. B.

[6534]-Architect's and Valuer's Licence.-The information given by "W. B." in the Secretary of Inland Revenue at Somerset House shows that an appraiser's licence is necessary for a valuer, but it does not answer the question, if it is so many architects and surveyors measure and value work every day without a licence? There is no doubt that the profession in general ignores on this point, and custom at least has sanctioned the practice of surveyors without licence valuing the work, so that if a licence is necessary at all, nine-tenths of the valuations made on buildings have been made

without legal sanction. I am inclined to think the opinion given is hardly satisfactory till the above facts have been explained, and I am alluding chiefly to architects and surveyors who often value work. If the valuation is made of their own works, I do not think a licence is required. Of course, for those who practise as valuers and arbitrators, it is necessary.—G. H. G.

[6535]-Books on Construction.-I consider the little work by Dobson, "The Art of Building," to be one of the best, notwithstanding the mistakes in the theoretical part of it; it is one of Weale's series. Tarn's "Science of Building," published at 8s. 6d., will make good the defects of the last. Perhaps the best work is Rankine's "Manual of Civil Engineering," but the student thereof must be well acquainted with mathematics. There are other works on construction by Aschpitzel, Eckert, and Dobson, which I believe will be found useful, though have only an acquaintance with the first. It also considers the styles of architecture. I am doubtful of any works on construction approved by the Science and Art Department; they are generally prepared by men with little or no practical acquaintance with the subject. I do not condemn the work recommended by Mr. Freeman, but would not invest therein until I had looked well into it. I took in Scott Burn's "New Guide to the Country," when it came out about seven years ago in parts, and consider the money as good as wasted. Tredgold's, though an older work, is to be preferred, and I believe is Nicholson's. Pacey's "Gothic Moldings" gives advice on their measurement, with other most valuable information, and illustrations on the subject. The best way for student to learn architectural sketching is by practice. I believe there is no good work on it; read the last "B. N." leader on "Holiday Work." For Gothic architecture Mr. Hickman's work, recommended by Mr. Freeman in his answer to No. 6528, should be read; also works recommended in my answer to No. 6529. "The Principles of Gothic Architecture," by P. H. M. is now very antiquated, even the latest editions. "Architectural Student" should also look up answers to "B. N." last volume.—Hugh MacLachlan.

[6536]-Government Berths.-If "A. J." would write to Mr. Henry Tanner, H.M. Office of Works, Whitehall, asking him to oblige; I believe he could ascertain what he requires.—Hugh MacLachlan.

[6537]-Fumigating Oak.-Oak is fumigated by liquid ammonia, strength 880, which may be bought at any wholesale chemist's at five shillings a gallon. The wood must be placed in a dark and air-tight room or compartment, and plates or dishes of ammonia stool upon the ground. This done, shut entrance and secure cracks with pasted strips of paper. Remember, the ammonia does not touch the oak; the gas acts in a wonderful manner upon the tannic acid in the material, and browns it so deeply that a shaving or two may be taken off without removing the colour. The grain is not raised in the least, and the depth of shade will entirely depend upon quantity of ammonia used, and the time the wood is exposed. Try an odd bit first, and then use your own judgment.—H. H. G.

[6538]-Work Expected from Ex-Pupils.-They should, at least, be able to trace and copy drawings well. B. sides this, many ex-pupils are able to work out ordinary details, prepare working drawings from sketches, write simple specifications, and even to design. It will depend upon how long the ex-pupil has been articled, whether for three or five years, the opportunities of learning, the advantage he has taken of them, how hard he has worked, and his natural abilities. The wages would, of course, likewise vary, say from ten shillings to two guineas per week. I expect there is not much difference between English and Scotch offices, and know several who, brought up in the latter, are now in London offices.—Hugh MacLachlan.

[6539]-Work Expected from Ex-Pupils.-"Scotch Youngster's" question cannot be fully answered without knowing his capabilities. As a general rule, a pupil who has served his time is expected to be able to draw pretty well, to be able to get out plans from rough sketches, to make elevations with tolerable accuracy from sketches, also sections. With regard to wages, he must not expect much at first, though this will depend on the progress he has made, and his power of drawing. Generally speaking, if he gets in the first office, say 15s. a week, he may be content, and a considerable master will not grudge to increase this wage after the first year. A pupil just out of his time, however, often goes as an independent, and expects to give his services at a nominal salary for the experience he gains. In a good London office he might get 30s. a week, or more; he can make himself useful. The difference between a Scotch and English office is trifling, except as regards draughtsmanship is mainly required, but it would be better to go into an office where general work is done at first, and an office in a large provincial town is preferable for gaining general experience.—G. H. G.

[6540]-Land Agent.-One of the best and most comprehensive treatises I know of is Ryde's "Handbook for Architects, Surveyors, Valuers, &c." For calculating value of estates, Hudson's "Tables for Land Valuers" is a useful compendium of tables, and also "The Appraiser, Auctioneer, House and Estate Agent's Pocket Assistant," by Wheeler. The latter contains inventories and prices. We may also recommend a very useful guide on "House Property," by E. L. Turbuck; Inwood's "Estate Tables," all of which books are published by Crosby Lockwood and Co. There is also a work on "Auctioneering," published by the same firm.—G. H. G.

[6541]-Powers of Urban Sanitary Authorities.-Of course they have power to refuse. "D. H. V. T." would not think of so building over the ground of a neighbour, and he has equally no right to build over public ground without permission, it is not his own. If the authorities were unable to refuse, narrow streets or ways might be so bridged across, or stry pointed over story as in the middle ages, that the streets would both be deprived of daylight and ventilation. Permission is sometimes given, in which case a favour is conferred by them; but such permission can be considered as a precedent for a claim, and so might lead to abuse, therefore authorities are rather chary in such favours. I cannot imagine anyone contesting the point with them, and certainly know of no cases tried.

though grumbling at refusal is no common occurrence.—Hugh MacLachlan.

[6542]-Powers of Urban Sanitary Authorities.-The urban sanitary authority have power by their by-laws to prevent overhanging structures such as balconies. I am not able to refer to a case that has been tried.—G. H. G.

[6543]-Iron in Structures.-Smith's work includes the fixing and setting up of iron work in buildings, though the terms "Ironfounder" or "Engineer" would be more appropriate in describing such work in the specification. The firm which supplies the ironwork usually undertake to fix it in the building, and they employ men for that purpose.—G. H. G.

[6544]-Skew Bridge Construction.-A good work on above is "A Practical and Theoretical Essay on Oblique Bridges," by George Watson Buck, M. Inst. C.E., third edition, revised by his son, J. H. Watson Buck, M. Inst. C.E. (London: Crosby Lockwood and Co.) This book was spoken of in the BUILDING NEWS, Jan. 21st of the present year.—FRED. J. FREEMAN.

[6545]-Skew Bridge Construction.-"D. M. B." would do well to obtain Buck's "Oblique Bridges," published by Lockwood and Co. I know of no other practical work, or one a workman can comprehend.—G. H. G.

[6546]-Skew Bridge Construction.-I would recommend as one of the simplest which treats on this abstruse subject, Dobson's "Masonry and Stonecutting," in Weale's Series.—Hugh MacLachlan.

[6547]-Removing Whitewash.-Two processes are given in BUILDING NEWS, June 21, of this year; the second would, in all probability, be found applicable to the case in point.—Hugh MacLachlan.

[6548]-Removing Whitewash.-"Landlord" does not say whether the 18th century dwelling-house is built of brick or stone. However, try the following:—Scrub the walls with sand and water, being previously acidulated with 100 of hydrochloric acid. The common acid will do very well, and may be bought at 5d. or 6d. per lb.—FRED. J. FREEMAN.

[6549]-Restaurants.-A list would occupy too much space, restaurants and coffee-taverns being very numerous in London. Perhaps the best restaurants are those of Gatti, in Villiers-street. Strand, and in a short street at the east end of the church of St. Martin-in-the-Fields, close to the last-mentioned. More imposing restaurants are to be found in Regent-street and the neighbourhood of Golden-square. They are to be found mostly in the Strand, Regent-street, Oxford-street, and adjoining neighbourhoods, and are, as a rule, kept by Italians, Swiss, and other foreigners. Coffee-taverns will be found more at the east end of the town, at Knightsbridge, and in fact, now nearly all parts where large numbers of working men are to be found, a few even in the City. Note the cooking and bar arrangements, also the small marble tables and small compartments with other details.—Hugh MacLachlan.

[6550]-Ventilation of Soil-Pipe.-I should advise "T. P. F." to call in a practical man from a good firm of plumber's, who would, no doubt, tell him the real cause of the sewer-gas ascending the w.c.'s. Putting an "Empress" ventilating cowl on top of the air-pipe, as he proposes, would have but very little or no effect in carrying off the sewer-gas.—J. S.

[6551]-Ventilation of Soil-Pipe.-"T. P. F." might stick all the ventilating cowls in the market on top of each other upon the 2 in. ventilating pipe of his soil-pipe, and do no good to the evil he speaks of. A pan closet in many houses stinks from itself and from the inside of its own large container, independent altogether of the soil-pipe. Sometimes, when close to an outer wall, the putting in of two 1/2 in. ventilating pipes off the top of the container stops the complaint. "T. P. F." does not say if his soil-pipe is trapped and ventilated at its foot. Is such done, and how? Further, is he sure there are no holes in his soil-pipe, or that siphon action does not take place? Lastly, any ventilator which is movable, and especially with screw blades in it, upon a soil-pipe is an inferior appliance to use. It should be a fixed one, acting upon the induced current principle.—W. P. BOGANS.

[6552]-Ventilation of Soil-Pipe.-The only remedy for the bad smell of which you complain in connection with your pan w.c. is the removal of the apparatus. No amount of ventilation will cure it. A good direct-action closet, such as Phillips' sanitary or Hellyer's artisan, is the best thing to fix; but they require properly fixing and ventilating. If there is any doubt as to this, you had better fix a good Bramah pattern valve closet, which will answer very well. A cowl on top will make no difference.—DANIEL EMPELLE.

A new church of St. Mary is about to be built at Hawshaw, near Tottington, Lancashire, from the plans of Messrs. Maxwell and Tukey, of Manchester and Bury.

Dr. Frankland, of the Royal College of Chemistry, writes to the Times that he has received from H. M. consul at Jeddah, a sample of water from a sacred well of Zemzem, Mecca. Analysis proves this water, of which large quantities are sent out as gifts to all Mussulman lands, to be of the most abominably polluted character, containing no less than 570 grains of solid matter per gallon. It would, he adds, be scarcely possible to provide a more effective means for the distribution of cholera poison throughout Mohammedan countries.

Mr. Frederick Bailey has been appointed manager of the Retford gas and water undertakings, both of which belong to the Corporation, at a salary of £400 per annum.

The memorial-stone of a new wing now being added to the industrial boys' school in Marygate, York, was laid on Tuesday week. Mr. Demaine is the architect, and Mr. Dennison the contractor.

STATUES, MEMORIALS, &c.

ROTHERHAM.—A large font and canopy have just been erected in All Saints' parish-church at Rotherham, as a memorial to the late vicar, the Rev. Wm. Newton. The work has been carried out by Mr. Harry Hems, of Exeter, from the designs of Mr. J. P. Seddon, of Queen Anne's Gate, Westminster. The new font, which is placed near the south-west porch, is octagonal in plan, and is made of red Corsehill stone, quarried near Dumfries. The steps and general approaches are in the same material. The base, supporting the bowl, consists of eight detached and flying buttresses, resting upon a central support. The bowl is rich in carved work; the carving upon the old capitals in the neighbouring nave serving as suggestive types for the work. The embattlement above, all around the top of the bowl, is also similar to that upon the abaci of the capitals. The canopy is movable, and works up and down by a balancing weight. It is 12ft. high, and is of well-seasoned English oak. At each of the eight angles are chains of electro-gilt, connected with the lifting apparatus. We illustrated the design as now executed on Feb. 20, 1880, and its publication led, it may be remembered, to an animated correspondence in the *BUILDING NEWS*, it being asserted that the former black oak font of the church had been lost during Sir Gilbert Scott's restoration—a statement which proved to be unfounded. One result of the controversy was that a quaint Jacobean font-cover, which had been removed from Rotherham to the neighbouring chapel of ease at Greaseborough, was returned by the vicar of the latter parish, and now stands in the south chancel aisle. This old cover was illustrated from measured drawings by Mr. Charles Hadfield, of Sheffield, in our issue for April 9, 1880.

GOSPORT.—A monument has been erected in Haslar Cemetery, to the memory of those lost by the capsizing of the *Eurydice*, off the Isle of Wight in March, 1878. The memorial is 10ft. high, and 23ft. by 17ft. at the base. It is of novel design, representing a rough rock with seaweed thereon, and the sea pouring over it; whilst the original anchor and chain of the ill-fated ship surmount the whole. The base, which is of polished granite, and records the names of the 319 officers and men who went down, was prepared by the convicts at Chatham, while the superstructure was prepared by the convicts at Portland, with stone from the neighbouring quarries. The memorial was designed by Colonel Pasley, C.B., Royal Engineers, Director of Works, and it has been erected by the Works Department of the Navy.

On Wednesday week, Mr. Robert Morgan, C.E., one of the inspectors of the Local Government Board, held an inquiry at Penistone into an application for the local board to borrow further moneys for works of water-supply. The board has been constructing works of water-supply at Hornthwaite Bank, in Thurlstone, the water to be obtained from a deep well by pumping. The original estimate was for £5,000, and another £2,500 had been granted; and this was an application for a further sum of £2,500, making £10,000 in all. In almost every item of the last estimate a considerable excess of expenditure had been incurred; and one of the members of the local board asserted that economy had not been used, that money had been wasted, that the engineer had been dismissed, and that the work was now being carried on under the supervision of the waterworks committee and a clerk of the works, who knew nothing of the work, and were not competent to carry it out. The chairman of the local board defended the board's action, stating that the engineer had caused them great expense by his bad advice, and that the board had acted wisely in getting rid of him.

Great progress is being made with the large fort which is being constructed at Borsal, near Rochester, for the defence of Chatham Garrison and the Dockyard. The whole of the labour is being carried out by convicts, some 600 or 700 being daily employed upon it. Another fort, the ground for which has been laid out, will be constructed on the Maidstone-road, about five miles from Chatham; whilst a third will be constructed on the Canterbury-road, about four miles from Chatham. The convicts who have been employed in carrying out the extension of Chatham Dockyard are being drafted for work at Borsal, for as the Dockyard extension approaches completion there is not work for so many men as formerly, as many as 1,700 convicts having at one time been employed upon the extension works.

An observatory of iron is to be erected at Boston, which will, it is stated, be the highest building in the United States. The shaft is to be cruciform on plan, with a well 3ft. square in the centre. The "column" will be secured by "guys" of steel wire, and a couple of cars will be provided for elevating visitors to the galleries, whence they will "observe" the surrounding country.

STAINED GLASS.

HALIFAX.—**MILITARY MEMORIAL.**—A two-light stained-glass window has been erected in the north aisle of the old parish-church of Halifax by the officers of the 33rd (Duke of Wellington's) Regiment, as a memorial to four of its late officers deceased during service—viz., Major A. J. Weeding, Captain E. S. Wason, Lieutenant R. S. P. Robinson, and Second Lieutenant J. B. H. Carmichael, the two last having been victims of the landslide at Naini Tal, India, Sept. 18, 1880. The subjects (from Acts x.) are—1. The "Angel Appearing to Cornelius," with legend, "Thy prayers and thine alms are come up for a memorial before God." 2. "Peter Visiting and Raising the Kneeling Cornelius"; legend, "But Peter took him up saying, 'Stand up. I myself also am a man.'" As Cornelius was a Centurion the selection is evidently intended to vindicate the consistency of a religious spirit with military service. Each subject-group is surrounded by a canopy. The colouring and ornamentation, though effective, pure and but moderately rich, the enframing window and tracery being of severe 15th-century style. In the bases of the lights are respectively the crests of the Duke of Wellington and of the regiment. A surrounding riband bears the names of the battles inscribed on the regimental flag. The window, by Messrs. Powell Bros., Leeds, was erected under the superintendence of Mr. Jackson, architect, Halifax.

WATER SUPPLY AND SANITARY MATTERS.

THE UPPER INNY DRAINAGE WORKS.—The Commissioners for Public Works in Ireland have just issued their consolidated award with reference to the repayment of the loan obtained from Government for these extensive works. More than 11,000 acres are included in the award as having been saved from the injurious effects of flood waters, but the area actually benefitted is far larger than this. The works, which extend along 80 miles of rivers and tributaries, passing through four counties, are the largest yet completed under the Drainage Act of 1863, and have included the erection of many bridges of large span, and of weirs and sluices, together with two very large self-acting regulating weirs. The works were designed by and carried out under the direction of the chief engineer, Mr. James Dillon, M.I.C.E., of London and Dublin.

The Middlesbrough and Stockton water board proceeded on Monday to elect a general manager for their waterworks, at a salary of £500 a year. 119 applications had been received in reply to the advertisement, many of the candidates having had extended experience in connection with waterworks. Notwithstanding some protests, the board, by seven votes to two, appointed Mr. D. D. Wilson, of Middlesbrough, a late member of the board, to the office. Mr. Wilson, who was unsparing in his criticisms on expenditure when he sat at the table of the board, is, no doubt, absolutely the best qualified man that could have been selected for the post; but, that being so, it appears somewhat unnecessary for the board to have invited strangers to send in their testimonials and applications.

The church of St. James, New Mills, Derbyshire, erected about three years since, was, after undergoing decoration to internal walls and roof, reopened for service on Sunday last. A novel detail is the introduction, within four pointed-arch wall recesses in the nave, of as many groups of spirit fresco painted figures, embracing the subjects of Christ Blessing Little Children, the Sermon on the Mount, Feeding the Five Thousand, and the Final Commission to the Apostles, with suitable text legends beneath. These groups are in dark outline, relieved by a dull Indian red background, with here and there a little gold. In the ornamented bases are emblems of the Four Evangelists. These recessed frescoes are, in their individual entirety, further relieved by the diapered vellum-tinted walls, rising above dado of two shades of deep red, which surround them. The artists, and of the whole decorations, are Messrs. Powell Bros. (Leeds), Mr. W. Swinfen Barber, of Halifax, being the supervising architect.

A stained window has just been placed in the north transept of Wistanstow Church, Salop, in memory of members of the Hoggins family. The subject chosen is "The Ascension." The stonework of the window is of the Early Decorated style, with three lights, and trefoils in the head. In the centre light the figure of Our Lord appears ascending, surrounded by a halo of light, while two disciples kneel beneath. In the two side lights other disciples are seen in postures of adoration. In the head of the window are angels and the figure of a dove descending, the background being pale blue studded with stars. It has been executed by Mr. John Davies, of the Wyle-coop, Shrewsbury.

LEGAL INTELLIGENCE.

DANGEROUS STRUCTURES.—At Marlborough-street on Sept. 7th application was made to Mr. Newton by Mr. H. W. Napier, representing the Metropolitan Board of Works, for the removal of the inmates of No. 30, St. Martin's-court, on the Salisbury estate, which had already been partly pulled down as dangerous by the Board's contractor on the magistrate's order. The district surveyor (Mr. R. Walker) proved the dangerous condition of the property, the back wall of the house having been pulled down. A woman—one of the occupiers—attended to defend the case, and said, her rent having been demanded, she had paid it up to the 29th of September, and she produced her rentbook to show the fact. Mr. Newton expressed his sympathy with her, but told her that it would be better for her to remove than possibly to be buried in the ruins, and he hoped she would tell the other inmates of the house what he had said. The order asked for was made.

IN RE A. M. COHEN.—Bankruptcy Court, Sept. 13th, before Mr. Registrar Brougham.—This was a first meeting. The bankrupt was a builder, carrying on business in Portsdown-road, Maida-vale. He had filed a petition for liquidation, but the proceedings became abortive, and an adjudication was recently made. The statutory accounts were not filed, but proofs of debt for about £700 were admitted, and the creditors appointed Mr. Solomon Barnett, of Brondesbury-road, Kilburn, builder, to the office of trustee, together with a committee of inspection.

CHIPS.

Mr. Arnold Taylor, an inspector from the Local Government Board, held an inquiry on the 7th inst., at Ovenden, as to an application to borrow £1,200 for street purposes by the local board, £300 being required for widening Holdsworth-lane and £900 for making a new road from Shay-lane to Moorside, through land belonging to the Ovenden Worsted Company.

The Smack-boys' home, at Ramsgate, was opened on Tuesday week by the Marchioness Conyngham. Mr. A. R. Pite, of Bloomsbury-square, is the architect, and Mr. W. Martin, of Ramsgate, the builder. The cost has been £2,000.

It has been decided to complete the façade of St. Petronis, the principal church in Bologna. The plans of a young architect, Signor Guiseppe Ceri, have been adopted, and appeals have been scattered by the committee broadcast for the required funds, about £50,000.

The directors of the Warwick and Leamington Tramway Company have entered into a contract with Mr. John Fell to lay their lines for £14,800, and the working of the line is expected to commence in October.

A new Primitive Methodist chapel is to be erected at Walbottle. Mr. T. Southron, of King-street, South Shields, is the architect.

Messrs. Bedford, of Phoenix Mills, Boston and Sleaford, have been making large additions to their Boston Mill, more than doubling the size, and adding new machinery to their plant. Mr. W. M. Cooper, corn merchant, has also been building a second large granary, and close to the railway at Boston. Both works have been carried out by Mr. John Lucas, builder, of Boston, and on Saturday week the men employed on the two buildings supped together at the Guildhall.

The tenth annual exhibition of the Kirkcaldy Fine Art Association was opened on the 8th inst. by the Earl of Glasgow.

The Stockbridge local board, last week, adopted a scheme by Mr. Crowther, their engineer, for the extension of the waterworks.

It is proposed to construct a new railway from Sheffield through Newark and Sleaford to Boston, joining the L. and N. W. system at Newark, and the Great Eastern at Boston. Mr. Parry is the engineer.

The foundation-stone of a new church of St. Peter was laid at Sicklinghall, near Weatherby, Yorks, on Monday. It will seat 150 persons, and will cost £800. Mr. Parkinson is the architect.

The Skipton rural sanitary authority, on Saturday, elected Mr. John Varley, builder, Gargrove, as clerk of works, to superintend the carrying out of the Gargrove water scheme, under Mr. E. Filler, C.E., the engineer in charge. There were 76 applicants for the post.

New schools attached to the Roman Catholic Mission of Our Lady of Mount Carmel, Corby, have been opened. The architects are Messrs. Goldie and Child, of London, and the builders, Messrs. Story and Son, of Swinstead.

The foundation-stone of the new Free Library and School of Art at Newport, Mon., was laid on Tuesday by the mayor of that borough.

Our Office Table.

WE record with regret the death of Mr. Thomas Jeckell, of St. George's-terrace, Queen's gate, Kensington. He was certainly an architect of considerable ability, and perhaps better known for his admirable skill in designing both wrought and cast ironwork. Messrs. Barnard, Bishop and Barnard's well-known slow-combustion grate-fronts were designed by Mr. Jeckell, and for many years he was extensively engaged by the same firm in working out ornamental ironwork designs of all kinds and of every degree of richness. Usually, a thoroughly Japanese-like character is noticeable in the decorative forms employed in Mr. Jeckell's work, which had a manner peculiarly its own. He was among the first English artists who grasped the spirit of that style and turned his knowledge to a practical account. Among the more recent of his designs we may name the costly and richly-detailed wrought-iron pavilion, executed by Messrs. Barnard, Bishop and Barnard, at Paris, for the International Exposition in 1878, which has recently been permanently erected in the Chapel-field, Norwich. Some of the cast-work consoles or trusses to this structure are perhaps equal to anything of the kind that we have seen; notably so for giving figure-subjects in low relief at once adapted to the material used. For some time the deceased had suffered from a mental derangement, and he died at Norwich on the 30th of last month, at the comparatively early age of 54 years.

A NEW town-hall is about to be erected at Cork; but from a report just sent us of the Town Council meeting, there is some disagreement among the members about the advisability of such a project. "Let us improve and purify the back lanes of the city first, and beautify it afterwards," was the not un sensible remark of one member, provided, of course, that the very desirable sanitary work here referred to be carried out. Mr. John L. Robinson, of Dublin, had prepared plans, but the mayor said the designs would cost them nothing, as their author had sent them unsolicited and free of charge. Some correspondents have written us in consequence on the subject, objecting to the reported action of Mr. Robinson, who, it will be remembered, was the architect of the Kingston town hall, illustrated by us some time ago; and we are requested to expose and condemn such unprofessional practice. There are, however, always two sides to every question, and, in this instance, we have only one account of the story before us. Architects are often asked by private members of public bodies to furnish designs informally, specially when the building contemplated is only the scheme of a section rather than the project of the whole body, and it appears that a request of this kind was made in the present instance, the list of required offices being furnished by the City Engineer, and the two sites proposed for the contemplated building being shown at the same time. Anyway, we read that Mr. Robinson has received the official vote of thanks from the Cork town council for the trouble he had taken in the matter, and "for his very admirable sketch."

THE largest stone slab ever quarried in the United States has recently been placed before the new residence of Mr. W. H. Vanderbilt, on Fifth-avenue, New York City. The stone measures 25ft. 2in. by 15ft., and is 8in. thick. It weighs about 41,000 pounds. It was quarried at Barreville, Sullivan county, N. Y., and the block from which it was cut is described as perfectly level, and about 90ft. long and 19ft. in width. From this surface the block was cut out and then raised by wedges. In this instance the seam was so open that the stone was raised without difficulty, and what was unusually gratifying to the contractors was the perfectly clean and level bed below, which required comparatively little dressing. The block could have been made 35ft. in length, but the great weight would have made its transportation very risky. As it was, a great deal of difficulty was met in bringing it to New York.

MR. J. KENWARD, F.S.A., announces that in cutting a drain through a carriage-drive, in Park-lane, Harborne, near Birmingham, he has discovered a cylindrical well dating from the

Roman occupation of Mid-England, and not later, therefore, than the fourth or fifth century. It is about 4ft. in diameter and 20ft. in depth, constructed of large blocks of local sandstone, solidly put together with breaking joints and bonding tile; the mortar is compounded of lime, pounded tile and gravel. The well, Mr. Kenward adds, is exactly of the Vitruvian type, occurring in other districts, such as at Stanwicks (Abballaba) and Housesteads (Bor-covicus) on the Ficts' Wall, where the diameter is also between 3 and 4ft., while the material is freestone in large blocks. No coins, pottery, or other relics have as yet been found in or near the well, of which no record exists. The site is about one mile west of the Icknield-street, where it skirted Harborne in its way from Droitwich (Salinis or Saline) to Wall (Eto-cetum), and it is at about the same distance from the remarkable camp which, if not made by the Romans, was occupied by them in Metchley Park. The old well will be retained, if not in an open, at least in an accessible condition, as a memorial of good Roman work in a district of the Flavia Cæsariensis which has very little of that era to show.

THE *Salisbury Journal* asserts that steps have already been taken, doubtless under the sanction of Sir Edmund Antrobus, towards the "restoration" of Stonehenge. "The only remaining outer trilithon on the north-eastern side of the rings has been bolstered up by means of a gallow-like wooden erection, very similar in construction to that which supported Temple Bar during the last month of its existence. This is placed transversely beneath the upper stone; and, as it is of a very substantial nature, it completely destroys the picturesque effect of that side of the ruin. The huge pillar which inclines inwards on the south-western side will, presumably, be next taken in hand; for, since the work has been commenced, it is but natural to suppose that it will be completed, and that all the stones will ere long be safely buttressed by a number of unsightly props and scaffoldings." Mr. William Cunningham, F.S.A., now residing at Clapham, S.W., but well-known in connection with excavations into "pre-historic" mounds in Wilts and Berks, writes to say that this is a complete misapprehension of the works at Stonehenge. Sir E. Antrobus, the owner, is, Mr. Cunningham explains, "about to replace in an upright position two of the stones of the outer circle, with their impost, which are now in much danger of falling, to the great peril of visitors. There is no fear that anything will be done to injure the building or to mar its picturesque appearance. At the same time, it is to be hoped that, as much of the earth will necessarily be moved, the opportunity will not be lost to search for fragments of the old rocks, and to elicit any facts connected with the building."

MR. JAMES LOVEGROVE, surveyor to the Hackney District Board of Works, has just published his annual report of the works carried out in the twelvemonths ended March 31st last. Building operations have, he says, increased, and gone on far beyond what was anticipated at the commencement of 1880. Three miles, 1,000 yards of new streets, 23 in number, were approved by the Board, and are estimated to have cost over £23,400. The hard core sifted from dust-bin rubbish is unsightly, but it forms, in the author's opinion, one of the best available materials for the formation of new roads, while its use keeps down the cost of dust-collection. Of new sewers 2,378ft. of 3ft. by 2ft. brickwork have been laid, as well as 864ft. of 15in. pipes, 2,810ft. of 15in., and 4,230ft. of 12in. The Metropolitan Board of Works have resolved to construct a new storm overflow sewer, to commence from the River Thames in the neighbourhood of Ratcliff Cross, to connect with the Great Northern High Level Sewer in Mare-street, opposite the Anhurst road. Suggestions are made by which Mr. Lovegrove thinks the extent of floods could be considerably reduced, by passing the water into the River Lea and the old river. During the year the North Metropolitan tramway system has been extended from Stamford-hill to Edmonton. A large amount of asphalt foot-paving has been laid, principally by the Stiebel, the Limmer, and the French asphalt companies.

NO 1, STANHOPE-PLACE, W., is being decorated by Messrs. Holland and Sons, of Mount-street, Grosvenor-square. We have seen the admirably-

executed and handsome satinwood mantelpieces just completed, with ebony and walnut inlay work, the ornamentation being executed chiefly in carved boxwood, with quiet and good effect. The sculptured frieze panel of boy figures is exceptionally pretty. Large oval silvered glasses, inclosed with fluted double pilasters and pedimented cornice over, occupy the entire width of the chimney-pieces, and are in harmony with the style chosen. Used together, these two fireplaces will thus give an air of size and brightness to the drawing-room, for which they are intended. The brass basket-grates are handsome pieces of work, though, perhaps, scarcely elaborate enough in detail for so richly treated an apartment. The general walls are divided out by pilasters tinted in quiet warm colour, and a series of panels with dado and light frieze are thus formed.

"To Builders' Men," is the title of a characteristic letter which has just been printed by the Rev. J. W. Horsley, the well-known chaplain of H. M. Prison, Clerkenwell. The writer evidently has had no little experience of the class he addresses, while his knowledge of human character has enabled him, in a few pointed words, which are both well-timed and chosen, to give some home-thrusts in a manly and honest style. There is no cant about his letter, and it may, with profit, be read by thousands of whatever creed, or even by those who have none. "Let us be men," writes the author. "Build up a tower of manly life," to quote the words of Tennyson, "four square to all the winds that blow," "laying well the foundations of Prudence, Justice, Temperance, and Fortitude." These are the virtues selected by Solomon, the great Temple builder, and by Socrates, as the basis of all good honest work, and Mr. Horsley has done well in thus practically enlarging upon them in language specially adapted "to Builders' Men."

At the end of 1879 Victoria possessed 1,125 miles of railway; New South Wales, 736; South Australia, 559; Queensland, 503; and Western Australia, 72. In all the three first mentioned, considerable additions have been made since the commencement of 1880, and New South Wales and Queensland are both pressing for great trans-continental lines. Both countries propose to construct these and other lines for opening up the country by land grants to capitalists who will undertake the work. For similar purposes New South Wales has already alienated 16,357,000 acres of land out of a total of 208,000,000, leaving 191,643,000 still unalienated. Queensland contains 428,492,800 acres. Of this, 3,442,389 acres have been alienated, and taking the estimated capital required for the new railways at £4,000,000, and reckoning the land worth 6s. 8d. per acre all round, 12,000,000 acres would have to be alienated to construct the line, leaving about 199,000,000 acres untouched. The chief railways proposed are a trans-continental line from Roma to Point Parke in the Gulf of Carpentaria, and a grand trunk line to New South Wales.

THE annual value of property charged with the inhabited house-duty in Great Britain is now estimated at upwards of fifty-five millions sterling, the duty on which the last official year of the returns amounts to £1,815,170. These figures, however, are far from indicating the total value of houses and buildings, since the houses not liable to duty by reason of their low rental, or from their not being used as dwelling-houses, together with hospitals, schools, work-houses, Royal palaces, and houses occupied by foreign ambassadors, which are also exempt, are estimated at over fifty-seven millions; or more than half the entire value of our house-property.

THE following report from Mr. Wilson, head gardener to the Manchester Corporation, will be of service to those charged with planting trees in or near great towns:—"The planting has been done at two periods—March, 1879, and March, 1880. At the second period the poplar, ash, and thorn only were planted, this kind having been the most successful in 1879. The trees were specially selected and well rooted. At the Infirmary 117 poplar, ash, and thorn were planted, and the number dead up to the present time is 19. At All Saints 227 trees—ash, lime, poplar, and sycamore—were planted, and 87 were now dead. In St. George's Churchyard 234—ash, poplar, thorn, willow, and shrubs of alder and

privet—were planted, and 75 are now dead. It thus appears that out of 578 trees, 203 are now dead. Since the trees have been planted they have had my constant supervision, and all possible means have been taken with a view to their preservation. I may say that the sort of trees appearing to thrive the best were the common ash, Ontario poplar, and the plum-leaved thorn, but I am of opinion that until our atmosphere can be relieved from the noxious gases now existing, tree-planting in Manchester will be very unsatisfactory, if not a failure."

THE Court of Quarter Sessions for Kent have drawn up the following regulations, with the view of insuring protection against fire at places which shall henceforward be licensed for music and dancing, or music only, in Kent, outside the jurisdiction of the Metropolitan Board of Works:—All doors and barriers to open inwards; all gangways, passages, and staircases intended for the exit of the audience to be kept free from chairs and other obstructions, whether permanent or temporary; an ample supply of water, with proper appliances for extinguishing fire, to be provided on the premises; all fixed and ordinary gas-burners to be furnished with guards; no white-metal gaspips to be used. The report of the county surveyor, or other person accredited by the Court, that the above rules have been complied with must be produced, and no structural alterations made without the sanction in writing of the justices of the petty sessional division in which the building is situated.

THE Trade Union Congress is being held this week in St. Andrew's Hall, Newman-street, London, W. The business was opened on Monday by an address from Mr. Crawford, of the Durham Miners' Association, in which the principal topic was the attitude which trade unions should take up in order to influence legislation. Mr. Edward Coulson, secretary of the Operative Bricklayers' Society, was elected president for the year, and delivered on Tuesday his inaugural address, in the course of which he remarked that the trades unionists were not willing to tolerate any reverting to the old nonsense of protection—a remark which was greeted by prolonged cheers. He recommended the Congress to concentrate its strength on advocating the abolition of the law of conspiracy. The Congress discussed the Employers' Liability Act, and passed a resolution instructing the Parliamentary Committee to take steps for procuring the amendment of the Act, in order to remove from it the power of parties to contract themselves out of the Act. At Wednesday's sitting a variety of subjects were discussed, including the administration of justice at petty sessions and the immediate codification of the criminal law. Mr. Inderwick, Q.C., M.P., addressed the Congress upon the last-named subject, and Professor Beesley upon the law of conspiracy. A somewhat excited discussion occurred in the afternoon in connection with the credentials of the delegates. In the evening the Lord Mayor and Lady Mayoress received the delegates and their wives at the Mansion House.

MR. THOMAS BRADLEY, of New York city, has patented an improved machine for sweeping streets, gathering the sweepings, and delivering the material gathered to carts at one operation. The object of this invention is to save the use of horses and men, especially for the sweeping machine, by furnishing a machine adapted for attachment behind the carts used to convey away the sweepings, so that the sweeper can be attached, drawn along, and, when the cart is filled, the machine disconnected and left for the next cart.

ABOUT eighty applications from various parts of the country have been sent for the vacant office of Borough Engineer and Surveyor for Leeds, the salary offered for which is £600 per annum. The applications were considered on Tuesday by the Special Committee appointed for this purpose by the Town Council, and the following were selected for final choice, viz.:—Mr. James Jowett, Manchester, district engineer and surveyor; Mr. R. L. Mestayer, Salford, deputy borough engineer; Mr. J. Cartwright, Bury, Lancashire, borough engineer; Mr. W. J. Morley, Bradford, architect and surveyor; Mr. Thos. Hewson, Rochdale, borough surveyor; Mr. Garrett J. Barry, Liverpool, engineer.

THE Rev. Robert W. Eyton, the distinguished

antiquary, and author of "The Antiquities of Shropshire" and other works, who died last week at Winchfield House, Hants, was the son of the Rev. John Eyton, vicar of Wellington and Eyton, Salop, by his marriage with Anna Maria, only child of Edmund Ploeden, of Ploeden, Salop, and was born December 21, 1815. He was educated at Rugby and at Christ Church, Oxford, where he obtained a second class in classics and graduated in 1839. He was rector of Ryton, Salop, from 1841 to 1863, during which time he composed his great work, "The Antiquities of Shropshire." The minuteness and extent of his researches into the history of his native county will be appreciated when it is stated that, although he has not carried his history further down than the reign of Edward I., the work extends over 12 volumes. Unlike most county histories, which deal almost entirely with genealogical and local questions, Mr. Eyton's work is a valuable contribution to the history of the feudal and judicial systems of the country for the first two centuries following the Norman Conquest. Mr. Eyton was also the author of "Digests of the Domesday of Dorset, Somerset, and Staffordshire," and of the "Itinerary of King Henry II." His latest work has been the editing of the "Pipe Rolls" and early charters of Staffordshire for the William Salt Archaeological Society. In Mr. Eyton, says the *Times*, the country has lost an antiquary who for accuracy and fulness of research could hardly be surpassed.

WE have had sent to us by Mr. Alfred Widcomb, of Thorougham House, Gloucestershire, a photograph of an interesting carved oak mantelpiece at that old house, from York-place, the palace of Cardinal Wolsey till his disgrace and fall in 1529. It is said to have been given by Henry VIII. to Abbot Parker, the last mitred abbot of Gloucester. The mantelpiece is divided into three oval medallions or panels, each having a carved subject. The shell carving at the top and bottom of the panels, and especially the figures, faces and draperies, are carved with wonderful expression. This work is supposed to have been done at Rome about 1520, though from the style we should think it is later.

CHIPS.

The local board of Widnes, having considered alternative schemes of sewerage, prepared by Major Cross, C.E., and by their surveyor, Mr. J. T. Higginson, have adopted the former plan. The estimated cost is about £38,000.

Extensive linendraper's and house-finisher's premises in Wine-street, Bristol, were reopened on Monday, after rebuilding. The work has been carried out from designs of Messrs. Fripp and Saunders, of Exchange Buildings, Bristol, and has involved the destruction of a carved 14th-century wooden gateway leading into Guard House-passage. Messrs. Cowlin and Sons were the builders, and Messrs. Colley and Son executed the carving.

M. Gambetta, and M. Tirard, the minister of Commerce, were present on Tuesday week at Honfleur at the ceremony of opening sluices that had been constructed in order that the outflow of water might deepen the harbour, which is threatened with being silted up with sand. The experiment was completely successful, and it is believed that the harbour was deepened by 10 to 12 ft.

On Tuesday week an additional line, constructed by the directors of the Great Western Railway, in order to accommodate their increasing suburban traffic, was opened between Uxbridge and West Drayton, under the supervision of Mr. A. Higgins, divisional superintendent of the London district.

Tickhill Church has just undergone extensive restoration under the direction of Mr. J. D. Webster, architect, of Sheffield. The chancel, nave, and south aisle have been freshly roofed, and the parapets to the nave and chancel, which were in a very dangerous condition, have been taken down and re-set. An oak reredos, manufactured by Messrs. Dutton and Evans, from designs by Mr. Webster, has been placed in the church, and a new method of heating has been adopted. Owing to want of funds, the restoration of the north aisle has been left to a future occasion.

It has been proposed to hold an international exhibition at Manchester next year, the profits to be applied to the establishment of a local museum on the South Kensington model.

At the last meeting of the town council of Lincoln, some discussion arose as to the proposed size

of the ventilation shafts, several members contending that 4 in., as specified by Mr. Mansergh, was extravagantly large. The Mayor said the Special Sewerage Committee thought the ventilating shafts very large, but the Local Government Board would sanction nothing less, and so it was not in their power to allow a smaller pipe to be used. In answer to a question as to whether 4 in. ventilating pipes had been used in other places, it was explained that the idea was a very recent one, being only about four years old.

The will of Mr. John Collier, late of Wychwood Lodge, Putney, architect, who died on June 3rd last, was proved on the 29th ult. The personal estate amounts to over £9,000.

At the last meeting of the Tunbridge Wells local board two tenders, amounting together to £21,944 1s., were accepted for the construction and asphaltting of the water storage reservoir, out of thirty received, and Mr. Peter Todd was appointed assistant surveyor.

The death occurred last week, at Cheshunt, of Mr. Frank Shaw, articled pupil to Mr. F. Chambers, architect, of Queen-street-place, E.C. Deceased was a youth of considerable promise and ability.

Mr. C. L. Eastlake, keeper of the National Gallery, and for some years secretary of the R.I.B.A., is preparing to publish a series of illustrated volumes designed as guides to the great Continental picture-galleries.

The heritors of Dailly, Ayrshire, have resolved to erect a new parish-church, the present one being old and inadequate. Messrs. Wardrop and Reid, Edinburgh, are to be the architects.

Extensive alterations have been made to the workhouse at Rogby, and are now almost completed. Mr. Manning is the architect, and Mr. Coleman the contractor.

The former residence and counting-house of the great family of the De la Poles, the original founders of the House of Suffolk, situated on the east side of High-street, Hull, opposite Blackfriargate, so long familiar by the ancient, grim-looking figures affixed to its exterior, has just been demolished, and is to be replaced by a building to be erected from the designs of Messrs. Smith and Brodick, of Hull. Two marble statues, by W. Keyworth, jun., to the memory of William and Michael De la Pole, have recently been placed in the entrance-hall of the Hull Town Hall.

The Edinburgh and District water trustees, on the 8th inst., appointed Mr. Alexander Jarvis as inspector of the works now in progress at Rosebery reservoir, from the plans of Messrs. J. and A. Leslie, of Edinburgh, engineers to the trust; the salary is at the rate of £250 a year.

Mr. John Studd, architect and surveyor, late of Hong-Kong, died very suddenly when at South-sea, on the 7th inst. Deceased was in his forty-eighth year.

The German Sanitary Congress was opened at Vienna on Tuesday.

A new Primitive Methodist school is about to be erected at Wingate, Co. Durham, from plans by Mr. Joseph Shields, architect, of Durham city.

St. Saviour's Church, Falkner-street, Liverpool, was reopened on Sunday after renovation effected under the supervision of Mr. Hartley, architect, of Lord-street, Liverpool. The contract for painting and decorating was carried out by Messrs. Hensham and Son, of the same city. The cost of the work has been £400.

An infectious hospital is approaching completion at Sittingbourne, and is being roofed in this week. Mr. W. L. Grant is the architect, and Mr. W. J. Beaumont the contractor.

A Local Government Board inquiry was held at Skipton on Friday before Mr. J. T. Harrison, C.E. inspector, into an application from the local board for sanction to borrow £1,726 15s. for street improvements and extras incurred on the sewage farm.

A trade and mining school is about to be built in Unity-street, Bristol. A local newspaper states that the first premium in the recent competition was awarded by the Merchant Venturers to Mr. Stuart Colman, of Bristol, but that the school will, however, be built from the plans of Mr. Robins, of London.

A stone coffin, 6 ft. 6 in. in length and a foot in depth, was found on Wednesday week during some excavations at Ipswich in Messrs. E. F. and F. Turner's ironworks, which adjoin St. Peter's churchyard, and occupy part of the site of the college founded by Cardinal Wolsey, and previously occupied by the priory of SS. Peter and Paul. The coffin, which contained crumbling human remains, was placed with head to west and had no lid, so that no clue exists to the identity of the remains. The coffin has been placed in the recently opened museum in High-street.

The corner-stones of a new church to be erected in Lawkholme-lane, Kighley, were laid on Saturday week. The architect has adopted the Early English style of architecture. The church will seat 730 people, and the cost of the nave, aisles, and transepts—all that is being built at present—and the boundary walls will be about £3,000. Mr. J. B. Bailey, of Kighley, is the architect.

Extensive works of sewerage are about to be carried out by the Altrincham Local Board of Health, from the plans of Mr. John Stokoe, their surveyor.

The water was admitted on Friday to the wet dock at B'n-ss on the Forth, which has been in course of construction for three years, and is 7½ acres in extent. The sluice was turned on by Mr. Jopling, resident engineer, and Mr. Houston, contractors' engineer. Messrs. Thom, Meik and Son, Edinburgh, are the engineers in chief. The cost of the work has been about £180,000.

Doddridge Chapel, Northampton, was reopened last week, after the completion of extensive internal alterations and improvements. Messrs. Woodford and Sons, of Bath-street, Northampton, were the contractors.

Two fountains are in course of construction in the circular well lights at the east and west ends of the market roof in the Waverley-gardens, Edinburgh. The work is being carried out by Mr. Morham.

A memorial font was placed on Monday in the parish-church of Aston, near Birmingham. It was designed by Mr. Chatton, architect of the church restoration, and carved by Mr. John Roddis, of Aston.

Mr. Gilbert R. Redgrave has been appointed secretary of the Royal Commission on Technical Education; the first meeting was held on Tuesday at South Kensington Museum.

Mr. Thomas Fraser, borough engineer of Edinburgh, who has been in the service of the town council over 26 years, resigned office on Wednesday on the ground of failing health. The town council, while accepting the resignation, appointed Mr. Fraser as consulting engineer at a salary of £200 per annum.

An organ-screen is being erected in Eton College chapel, as a memorial of the Etonians slain in the recent campaigns.

The foundation-stone of the new grammar-school at Carlisle was laid on the 6th inst. by the Duke of Devonshire. The architect of the building is Mr. Geo. D. Oliver, of the firm of Hetherington and Oliver, whose design was recently selected in competition. The contractors are Messrs. Beay Bros. for brickwork and masonry; and Messrs. H. and R. Court for carpenter and joiners' work. The total cost will be upwards of £10,000.

Mr. J. F. Tunc, C.E., died on Tuesday week, at his residence in West Jesmond, Newcastle. He was engineer to the Blyth and Tyne Railway before its amalgamation with the North Eastern Railway Company; and, associated with the late Mr. Joseph Laycock, he surveyed and superintended the construction of the several lines in connection with the smaller undertakings. He also performed a similar duty in the case of the Border Counties line, previous to its absorption by the North British system.

An inquiry was held at Warwick on Friday, before Mr. J. Thornhill Harrison, C.E., on behalf of the Local Government Board, respecting an application to borrow £1,000 for sewerage works in West-street. Mr. Broughton, borough surveyor, explained the scheme, which was approved by the inspector.

The Queen has presented a stained-glass window to St. Mary's Church, at Bury St. Edmunds, to the memory of Mary Tudor, daughter of Henry VII., often called "Mary, the French Queen," as she married first Louis XII. of France, and afterwards Brandon Duke of Suffolk.

The commission for piercing Mont Blanc is said to be of opinion that, with a sum of 100 million francs, the boring of the tunnel and the hues of access could be made. The engineers, Lepinay and Gault, show that it is possible to arrive at Ivrea as south exit, and at Bonneville as north entrance, with out serious difficulties.

At a meeting held at Brighton town-hall on Monday it was decided to hold in that town, in December next, a domestic sanitary and scientific exhibition, including foods, their economic preparation and use, with cooking and other apparatus. A competitive exhibition of the electric light is also contemplated.

The memorial-stone of a new Congregational Church at Rutherglen, Glasgow, was laid on Saturday. Mr. Matters is the contractor.

An important work in tiling at the School-board offices, Leeds, costing over £1,000, has just been completed by Webb's Worcester Tiles Company, Limited, Worcester.

Tenders were opened on Friday for the erection of the Gibson Memorial Hospital at St. Andrew's, N.B. By the trust disposition and settlement the amount to be expended in buildings and furnishings was restricted to £1,000, and it was found that the gross amount of the estimates for the building was £3,200, leaving a margin of £200 for extras and furnishings. It was resolved forthwith to proceed with the erection of the hospital. The architects are Messrs. Hall and Hendry.

Mr. Thomas Wait, builder, of Peasmarsh, near Rye, an elderly man, went to the village public-house on Saturday evening to cash a cheque. On his return home he was waylaid by some hooligans and so brutally assaulted that he died in a quarter of an hour.

A medal has been gained at the Sanitary Exhibition, Eastbourne, by Mr. Henry Chalk Webb, of Worcester, for his new diachromatised wood pavements. The peculiarity of this invention is that the pattern, in any number of colours, is perfect through the wood blocks, 1½ in. thick. A special medal has also been awarded this invention by the Sanitary Institute of Great Britain.

The galleries of the Royal Academy, Burlington House, are now being redecorated by Messrs. Holland and Sons, under the directions and from the designs of the Royal Academy Surveyor, Mr. R. Phene Spiers, F.R.S.B.A. The cornice is to be ornamented in its frieze with stencilled patterns, rather Arabesque in character. The general wall-colours, we believe, will be carried out as before.

St. Luke's Church, Sheffield, was reopened on Sunday, after a thorough restoration and redecoration; also the addition of a stained-glass window, by Mr. A. Gibbs, of London, in chancel; the subject being a "Jesse window." The reredos immediately below is decorated with the emblems of the Four Evangelists, and two panels on either side being filled with the passion-flower, wheat, vine, and lily. The other portions of the church are decorated with diapers, texts, emblems, &c. The architect was Mr. H. D. Lomas, of Sheffield. The decorations were executed by Messrs. Johnson and Appleyards, of the same town, from designs of their artist, Mr. E. Baillie Smith.

At the half-yearly meeting of the Leominster and Bromyard Railway Company, the engineer, Mr. William Clark, C.E., of Westminster, reported that the line would be completed from Leominster to Steens-bridge by the end of the present year. The contract for the last section, that from Steens-bridge to Bromyard, has not yet been let.

A new mission church in connection with the parish of St. Michael's, Hulme, Manchester, which has been erected at the junction of Victoria street and Tomlinson-street, Stretford New Road, was opened on Sunday. The structure has cost £2,200. It is of simple Domestic Gothic architecture, containing chancel, vestry, organ-chamber, and classrooms. Provision has been made for 300 sittings. The warming and ventilating apparatus were supplied by Mr. E. H. Sherland, of Manchester.

A statue was inaugurated at Boulogne-sur-Mer, on Monday, to Frédéric Sauvage, to whom is attributed the invention of the screw propeller. The statue has been erected facing the bridge leading from Capcécure, and in front of the Hotel Christol, and is of bronze; it represents him in a standing attitude, with one hand resting on a screw-boat.

The Walsall town council have agreed to purchase Reed's Wood, within one mile of the bridge, and containing 46 acres, offered by Earl Bradford, at the nominal sum of £1,200, of which £880 is expected to be recouped by the sale of a portion. The cost of inclosure and laying out is expected to bring the outlay to about £7,000.

At St. Michael's Church, Maidstone, the small windows of the baptistery have just been filled in with the baptismal types of the Old Testament, and three other windows are now in course of preparation, viz., one for the south of the chancel, to represent St. Michael the Archangel, which is being prepared by Messrs. Heaton, Butler, and Bayne; and two for the south aisle, to illustrate the expulsion of Adam and Eve from the garden of Eden, and Abraham offering up Isaac, both of which are to be executed by Messrs. Hardman and Co. It is intended to fill in the whole of the windows in the church with Scriptural subjects referring to the ministry of angels.

The new church at St. Michael, Bolingbroke-grove, Wandsworth-common, was dedicated on Saturday afternoon by the Bishop of Rochester. The church has been built at a cost of £1,500, and will seat 700 persons.

It is proposed to reseat and decorate the Unitarian chapel, Kendal. The ceiling will be paneled and ornamented in plaster, and the new seats will be of pitch-pine. The cost of the works, including new organ, will be about £1,000. Mr. Eli Cox, of Highgate, Kendal, is the architect.

The restoration of Kirkleavington parish-church, near Yarm, has been commenced. The contract has been secured by a Whitby firm. The cost will be over £1,000.

A new grain-elevator, which has for some time been in course of fitting up at the extensive warehouse of Messrs. Bush, in Prince-street, is now complete. The machine is so constructed that it will deliver grain direct from the edge of quay at any floor that may be desired. It has been manufactured by Messrs. Spencer and Gillett, iron-founders, of Melksham, and is worked by an eight horse-power Otto gas-engine. It is the only apparatus of the sort fitted up in Bristol.

The reopening of Gwyddelwern parish-church, Merionethshire, after restoration, took place on the 8th inst. The structure, from being in a most dilapidated and miserable condition, has been completely restored, renovated, and beautified at a cost of nearly £3,000.

An exhibition of artistic productions was opened on Tuesday in Lyme Hall, Cheshire, the object being to raise funds for the enlargement and improvement of the organ of Disley parish-church.

A traussept is being added to All Saints Church, South Lambeth. Mr. Sidney Smith, A.R.I.B.A., is the architect, and Mr. William Sheppard, of New-road, Bermondsey, the contractor.

The new portion of St. Paul's Church, Walkden, near Manchester, is now near completion, and will be opened on November 1, All Saints' Day.

A fire broke out on Tuesday on the premises of Messrs. Alexander Young and Sons, organ builders, Eldon-street, Chorlton-on-Medlock. An organ in course of construction for Worsley Parish Church and four or five second-hand instruments were consumed, together with a large quantity of valuable timber. The damage is estimated at between £1,500 and £2,000.

Trade News.

WAGES MOVEMENT.

NORTH WALES SLATE TRADE.—The North Wales slate trade, especially as regards the Bethesda and Llanberis quarries, still continues very dull. At the latter quarries the men engaged by Mr. Assheton Smith are working at a reduction of wages, while at Lord Penrhyn's extensive Bethesda quarries the output is still limited to four days, but there is a prospect of full time being shortly resumed. In Nantlle and Festiniog there has been a brisk summer trade, especially for export.

Lamplough's Pyretic Saline is refreshing, most agreeable, and the preventive and curative of FEVERS, BILIOUSNESS, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by chemists throughout the world, and the Maker, 113, Holborn Hill. Use no substitute. See Medical Testimony.

Holloway's Ointment not only heals sores, wounds, and relieves external ailments, but, rubbed upon the abdomen, it acts as a derivative, and thus displays the most salutary influence over stomachic disorders, derangements of the liver, irregularity of the bowels, and other intestine inconveniences which mar man's comfort.

Douling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to CHARLES TRASK, Norton-sub-Hamdon, Ilminster, Somerset. —[Advrt.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates.

General Repairs and Alterations Executed: Experienced Workmen always in readiness, and sent to any part of the country. —[Advrt.]

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE
CORSHAM DOWN

CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.
(See trade advt. on p. XXV.) Advrt.

TENDERS.

* * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

AYLESBURY.—For the erection of four semi-detached cottages in New-street, Aylesbury, for Mr. T. Phillis. Mr. G. Luckett, Aylesbury, architect:—Darvell, R., Aylesbury (accepted)... £500 0 0

THE BUILDING NEWS.

LONDON, FRIDAY, SEPTEMBER 23, 1881.

LINCOLN'S INN CHAPEL.

A CORRESPONDENT in the *Standard* draws attention to what he calls an act of vandalism at Lincoln's Inn. It appears that the benchers of the Inn are enlarging their chapel, a well-known building in not the purest phase of Gothic, erected from the designs of no less an architect than Inigo Jones. As we may imagine, the very fact of this master of revived Classicism having had a hand in a Gothic building, does not say much for the correctness of the style, and yet there is a strange if not rich medley of details in this debased type of 17th-century Gothic, which makes it dear to the student of English architecture, if for no other reason, because it shows what so illustrious a master of Italian in this period of Gothic degeneracy did in a style which was then being everywhere deposed in favour of its successor. The chapel was built in 1621-3, and frequenters of this rather secluded spot know its features well. The existing chapel was three bays in length, and is 40ft. in the clear of the walls. Externally, the principal feature of interest is the groined basement, the walls pierced by four centred arches of wide span between the buttresses, and used now as a kind of store for all sorts of debris and fragments of masonry. The groining is massively treated, with large moulded ribs and traceried panels, and the style of the detail of the period is remarkable for the curious admixture of Classic and Gothic features. The outer-arch mouldings rest upon engaged columns with Tuscan capitals and other vagaries are noticeable.

Buttresses of considerable projection, having several deep set-offs, and pierced below by small archways, strengthen the upper walls of the chapel, and their use has evidently been dictated by the best considerations. The height of the walls, which rest on the series of piers of the basement, and the wide span of roof, which has only a collar near the ridge to tie it in, has justified certainly the employment of lateral support. The buttresses are cemented over, and the walls between them, pierced by windows of Perpendicular design, appear to have been constructed in a loose manner with old rubble and brickwork. The end gables have large pointed Perpendicular windows filled with stained-glass. The chapel, as everyone knows who has any acquaintance with Lincoln's Inn, was partly concealed by old chambers on the east side, and its large window was little noticed. A rather interesting feature at this end of the chapel was the old staircase which led to the chapel, described by the correspondent in his letter as a "beautiful groined staircase of Inigo Jones." It was square on the plan, with a centre square newel of masonry, and the quarter-spaces were groined in the same heavy manner as the crypt, with corner pendentives and moulded cusped ribs of massive section; the arches and pendentives sprang from massive corbels, semi-circular on plan and deeply moulded. Those who know Inigo Jones's work will not be surprised to find that these ribbed groined ceilings were anything but good specimens of constructive masonry. The principle of the arch is absent, and it is rather surprising to observe that the weight of the thick stonework was held up simply by the cohesiveness of the masonry, without any key. A piece of timber thrown across over the ceiling, suspended the middle pen-

dant, and the whole seems to have received support from this means. The curious way one of the corner pendentives sprang from the flank of a flat Tudor archway below may be noticed as an instance of the want of constructive knowledge of its architect, as no mediæval or modern mason would ever have thought of weighting the weakest part of a flat-pointed arch. This staircase has been taken down, and the stonework is, we are informed, to be carefully preserved. In the process of demolition, many curious instances of the want of knowledge of Gothic has been brought to light. The jointing of the stones of the ceilings we have been describing is one: no radial jointing is seen, and the arched form was given by small wedge-shaped pieces of stone, or a sort of "closer," which was used to fill up the joints. The stones are of shapes that show complete ignorance of stone-cutting of this character. It was also found that there was no stone sill to the great east window, which is being partly restored; the stone mullions were discovered to have rested simply on some very rotten brickwork, and no care at all seems to have been taken to give a good foundation to the pier, which is carried on a flat arch of only one half-brick rim. From what we have said, the staircase was not such a "beautiful" work as the correspondent of our contemporary stated it to be; and its loss is chiefly to be deplored because it robs us of a somewhat curious example of the age.

Entering the chapel, the chief objects of interest are the unique carving to the oak pews, the arched screen at the entrance end, the oak pulpit, the stained-glass windows, and the plaster groined ceiling. The pews are constructed out of solid oak plank, not framed into panels, and are in a capital state of preservation, dark with age; but the admirer of the grotesque carving of this period will be glad to learn that it is not proposed to remove the exceedingly rich bench-ends. These are designed with much playful fancy, and the scrolled tops are particularly interesting. The screen we have referred to, which crosses the entrance, and has a very pleasingly-designed arcading, open at the top, is quite Elizabethan in style. The west gallery supports, consisting of pilasters, seem to be in a similar style, but the carved pulpit is one of the choice things seen in the chapel. The ceiling, groined in plaster with ribs, is a meagre and poor specimen, and its cross-section or curve, a flat-pointed arch, is badly proportioned and unpleasing. The timber-roof, which is rather flat, is composed of principals tied by a collar just above the apex of the ceiling, and the lower angles are strengthened by pieces of timber bolted to the principals and collar to prevent spreading. This construction, as the reader will see, is very imperfect, and gives no direct tie, the cross angle-pieces being simply useful in carrying the ceiling-joists.

The alterations proposed, which are being carried out from the designs and under the supervision of Mr. S. Salter, architect, of Woburn-place, may be briefly described. The present east end, with its old staircase, is to be taken down and removed one bay further outwards, to lengthen the chapel. The plans show a new porch or entrance, with staircase to the chapel, which will form a projection from the end, and be finished with a flat under the old window. The details of this erection are designed in a Late Gothic style, preserving, as much as possible, the original character. There are two flanking pinnacles shown in the elevation for this end, which will rather emphasise the building. At the altar end the present railing is to be taken down and extended; but, we understand, the whole of the fittings of the old chapel will be re-used. The extension of one bay in length will, undoubtedly, add to the appearance of the interior; but of

the absolute necessity for enlargement the Benchers are the best judges. If, as one writer says, the chapel is more than large enough for the congregation which now worships within it, these alterations are a needless interference with at least an interesting relic of Old London, and the objections that have been raised have some reason. Although we do not agree with those who are led by the "craze" not to touch or improve a building, however much it may require it, we are bound to say a needless tampering is a kind of aggravated assault on a building of this description, which the benchers will be called upon to justify. We wish, however, to point out that the writers in our contemporary have interpreted in a wrong spirit that which has been done, and that their admiration for this work exceeds justification. Whatever may be the interest attaching to this chapel as the work of our greatest Italian revivalist, no one with any knowledge of Gothic architecture will pronounce it a work of art, or will say that its intrinsic merits deserve all the praise awarded to it by over-zealous antiquaries.

THE PROPOSED DEEP-WATER DOCK AT TILBURY.

A VERY considerable addition to the dock accommodation of London is in contemplation, which will overcome the tidal difficulties in the way of a speedy embarkation and disembarkation of large vessels of the ocean-carrying class. It is well known that the existing docks on the Thames are inaccessible at certain tides, and that ocean steamers, for example, the *Orient*, the *Austral*, and *City of Rome*, are increasing in dimensions every day. Such vessels require a large water area and greater depth than at present exist; and unless they can enter docks without delay, the greater speed they are made to attain is lost. Not only are the present docks inadequate, but the Thames above Gravesend is exceedingly shallow, and large steamers have now to anchor till the tide enables them to float to their destination. The river is also narrow and full of bends, so that a large vessel like the *City of Rome*, which measures 585ft. in length, cannot turn.

The proposal emanates from the directors of the East and West India Dock Company, who have under consideration a scheme which, if fully carried out, will make the Port of London independent of existing arrangements in providing for the large vessels engaged in Transatlantic passenger traffic. The directors have long been trying to increase their accommodation; they have found it impossible to cope with the growth of the steam-trade of the Port, and the rapid increase in the size and draught of vessels; and to enable them to retain the existing trade they have accepted and approved of a plan for the construction of a deep-water dock at Tilbury, opposite Gravesend, on about 450 acres of land or marshes, partly below water, between the London, Tilbury, and Southend Railway and the river. The situation offers facilities of the most unexceptional character; indeed, we do not think it possible to find in the course of the Thames a more eminently advantageous position, avoiding as it does the shallow reaches above Gravesend, and the narrow and tortuous bends of the river. It is well known by nautical men that the river is too shallow to allow of vessels of any great tonnage or size to lie in it higher up than the east end of Long Reach, partly owing to the gradual formation of mud-banks, which have been increasing since our sewage has been emptied down the river, and partly to the formation of the channel itself, its narrowness and tortuous course. The highest point of the river accessible to large vessels is Gravesend

Reach, at which point the new dock is intended, and here the width of the river is about half a mile, and the depth is greatest; that is to say, at the lowest possible tide—the lowest spring tide—the depth is, we find, 35ft. Such steamships for ocean-carrying trade as the *Oront*, and *City of Rome*, could not, under the existing state of the river, get higher than the point we have noticed, but the new deep-water dock will afford them an ample berth, and enable them to "swing" easily.

From an inspection of a large plan and model of the intended dock, we find it will occupy an area within the port of 62 acres of water, and that the conditions of the tide at this point will enable steamships of the vast dimensions and great draught engaged in the East India and Colonial trades to enter or leave the dock. If the plan as projected by Mr. A. Manning, the engineer to the company, and Mr. F. C. Ahlfeldt, the manager of the East and West India Dock railways, is realised, the port of London will be independent of tide, which now operates against other great ports, and will be placed in the unique position which the short passenger communication between London and the dock will give it. The directors in their report to the proprietors urge the advantages of the scheme without exaggeration. They point out the merits of the situation opposite Gravesend, the well-established point of arrival and departure of all vessels trading with London, within protection of the forts on the Thames, and at a position in the river up to which the largest vessels can navigate at all states of the tide, there being 35ft. of water at low-water spring tides; that vessels will thus be able to discharge at the docks at once, without the delay and expense of an anchoring at Gravesend to wait for the flood tide as they do now; that all river towage and pilotage and risk attending navigation above this reach will be saved, and that the present Tilbury Railway will allow goods and passengers to reach Fenchurch-street in less than forty minutes, thus bringing the dock into communication with all the great trunk lines of railway and the company's present warehouses.

These general views are borne out, we may add, by the actual facts, and we are indebted to the courtesy of Mr. Manning, the engineer, and also to the explanation of Mr. Ahlfeldt, the manager of the E. and W. India Dock railways, for much of the practical information we are now enabled to lay before our readers. First with respect to the position of the dock, which is between Tilbury and Grays. It is a matter of considerable moment that those gentlemen have hit upon a point on the river, really the entrance to the port of London, and within easy access of it under all conditions of the tide. The docks themselves have been planned to give every facility to large steamships entering; the main axis of the proposed dock bears a little in a north-westerly direction from the river, not at right angles to it, and thus avoids a fault in the plan of the contemplated dock at Dagenham. The plan of the deep water dock at Tilbury shows a main dock of 16 acres, about 1,500ft. long by 750ft. wide, and a uniform depth of 35ft. of water, with three parallel branch docks, each about 250ft. wide and about 1,500ft. long. The largest of the dry docks will have a total length of 825ft., and a sill 27ft. below high-water mark, thus enabling the largest type of vessel to enter. According to the synopsis of the scheme prepared by Mr. Ahlfeldt, "the quay berthing accommodation will comprise a length of 15,000ft., with a uniform depth of 35ft. of water, and thus there will be no necessity to remove a vessel of the greatest capacity and draught for the completion of her loading to the outer or tidal basin." The tidal basin has an area of

16 acres, and is 41ft. deep at high-water spring tides, and at the lowest tide there will be a depth of 26ft. It will give accommodation to the largest vessel afloat. One of the greatest difficulties, that of loading in dock, will be thus overcome. It is often necessary for a ship to finish loading in the tidal basin, which necessitates not only delay but expense in the removal of goods, as well as occupation of the basin. By the present scheme the tidal basin is in readiness at any moment for the entrance of large vessels. The tidal basin is of an irregular pentagonal shape, with an entrance from river of 200ft. wide, and is connected with the main dock by a lock 700ft. long, 80ft. wide, and a depth on the sill of 40ft. The area of the graving-dock, with caisson provision, is large enough to afford berth to a vessel of 825ft. in length, or to two of the ordinary dimensions of 400ft. The docks have ample warehouse provision along the quays in easy connection with the Southend and Tilbury railway, which will have a new station at the north-east corner of the dock, and a junction for goods from the railway sidings of the quays. Coaling berths, cattle lairage, shears, &c., are provided round the dock. With regard to the accommodation of the new dock, it is calculated that working berths for 30 large steamers, averaging 100ft. in length, will be given.

The inland railway traffic, especially grain, has been consulted in the plans of the new dock, and granaries and elevators with lines of railway have been proposed, so that cereals and food-stuffs from America can be dealt with in a manner equal to the requirements of the growing trade. Steamers will be coaled simultaneously from both sides by the arrangements. A powerful floating derrick and shears are to be erected, and the expeditious transit of goods and passengers will be aided by the railway route, the junctions near Barking, Bromley and Bow on the Tilbury line. The railway will traverse the landing-stages. We understand the estimated cost of these great undertakings, including purchase of land, which admits of easy extension of the dock to twice the present area on the west side, is £1,100,000, and the directors estimate a nett profit of more than 10 per cent. will be secured without depriving the existing docks of trade.

The Peninsular and Oriental Company are already making preparations for making the Gravesend tidal dock their port of departure and arrival, and other companies must follow, if the central position of Gravesend and time in transit count for anything. The new scheme will make the large trading and shipping companies independent at least of the natural advantages even of tidal harbours such as Southampton, one of the finest in the kingdom; and we may here refer to the peculiarities which have made that port what it is. A glance at the map will show that Southampton stands at the head of an inlet of the sea known as the Southampton water, and that at this point the estuaries of two rivers, the Test and the Itchen, enter it. This tidal estuary of the sea is about two miles in breadth and extends eight miles in a south-easterly direction to Calshot Castle, where it joins the Channel opposite Cowes roads. A rather singular thing in connection with this water is that there are four tides every 24 hours, a phenomenon due to the obstructive action of the Isle of Wight, which forms a natural breakwater, allowing only a small portion of the great tidal wave in its progress up Channel to flow up the Solent, causing the first tide. When this begins to ebb, the main body of the great tidal wave, which is now coming up by Spithead, another passage, drives the descending current back, and causes a second tide, about two hours later, which second rise is 6in.

higher than the first tide. This double tide is obviously of great practical value to the port, as large vessels have the advantage of two additional hours, and the captains of vessels experience no difficulty in the passage up and down the Solent and Southampton water at any time of the tide. A further advantage is that large steamers of 2,000 tons are navigated to and from the docks in perfect safety either night or day. There are no other natural ports with which we are acquainted which offer this advantage, while Liverpool and other great commercial ports suffer from approaches subject to tidal conditions, with shallow bars at their entrance, or their navigable channels are useless at low tide for vessels of large tonnage. Under these circumstances, the directors of the East and West India Dock Company are to be congratulated on a scheme which will enable them to retain the prestige they have so long enjoyed.

COMPETITION DRAWINGS FOR DAIRY HOMESTEADS.

THE designs for a dairy homestead submitted in competition for the prizes and medals offered by the British Dairy Farmers' Association have been on view at the Agricultural Hall, Islington. As on previous occasions, the contest has been chiefly between two or three well-known gentlemen who have been successful competitors in former years. The names of those whose designs were exhibited are: Mr. Richard Waite, Duffield, Derbyshire, architect; Mr. Thomas Potter, Alresford, Hants; Messrs. Addie and Sons, Preston; Mr. Gilbert Murray, Elvaston Estate Office, Derby; Mr. A. R. Cragg, Cadley, Preston, architect; and Mr. William Alford Ward, Bristol, land agent. On this occasion a dairy homestead for "40 cows in milk," also sheds for cows dried off for calving and fattening," was required. Each set of drawings was to include plans, sections, and isometrical view, the former drawn to a $\frac{1}{4}$ in. scale, with details $\frac{1}{16}$ in. Specifications and estimates were also required. The drawings submitted are hardly equal to previous exhibitions, though they evidently evince the work of practical men.

Mr. R. Waite, of Duffield, Derby, has been fortunate again in winning the first prize of £10 and the Silver Medal. Last year, Mr. Waite took the prize for a plan of a homestead of very similar arrangement, a bird's-eye view and plan of which will be found in Vol. XXXIX, page 491 (Dec. 17, 1880). The present design is for a homestead for forty cows in milk. The chief difference between the former plan and this arrangement is, that an open roadway separates the two double cow-houses in the present instance, so that each cow is kept perfectly isolated, and thus the risk of infection is diminished. The stalls are tie-up stalls. The roadway is 10ft. wide and affords both light and ventilation. The author shows a doorway from each cow-house opening into it, and the feeding passages, 5ft. 6in. wide, are arranged conveniently close to the mixing-room, one directly leading into it. The mixing-room is 30ft. by 18ft., and has a store for corn and cake, and the straw barn occupies an adjoining room of nearly equal size. The arrangements for feeding are rendered more perfect by the construction of the stall divisions adopted by the author. Thus the partitions dividing the cows, and also the gangways are formed by horizontal ash rails, instead of the usual dwarf wall, thereby promoting circulation of air in front of the cattle. The rails can be adjusted with ease, and the feeding operation is facilitated. The details of troughs, given by Mr. Waite, are sensible and cleanly. They are formed of blue bricks (vitrified) with a moulded capping or

torus at the top, each side being 11in. high, and a bottom slab 11in. by 2in. thick between. These are set in cement. The author makes the head and heel posts of his stalls of cast-iron, with flanges in the head-post, by which means the travis boards or rails, which are battens 7in. by 2 $\frac{1}{2}$ in., can be altered as necessary, for cleaning or ventilation, and no framing is required. Ventilation is assisted, also, by making the doors in two heights, hung to hook-stones. Four loose-boxes, 13ft. by 9ft. 6in., for a bull, young calves, cows, mare and foal, or for sick beast, are shown at the end of stalls, each has a door and window provided, also a communication with the inner feeding passage. A shed for fattening cows, with eight tie-up stalls separated from the milch cows, is shown on the east side. On the south side is a yard for young stock, partly covered, with gateway abutting on the roadway; there is a liquid tank at the end of roadway between the cow-houses, while on the north side, separated from the main block of buildings, and not too near the dairy, is a range of piggeries, each division having a covered sty and an open yard; besides a gig-house and implement shed to the north, near hay-barn. The piggeries are well provided with the necessary appliances for feeding. A roadway on the west side separates the dairy buildings and farmhouse from the homestead, and the author shows a well-arranged block of buildings, with a large kitchen, court, and a convenient house.

With regard to the construction of the buildings, we may add that the cow-houses have timber roofs of queen-post construction, with openings for ventilation on each side of the ridge, which can be economically made; the walls are of brickwork, with ventilators, and the floors are intended to be paved or concreted. The straw-barn is carried up two floors, and the food department is next the stackyard on the north side. The walls of the cheese-room and dairy are built hollow, thus avoiding the extremes of heat and cold. On the whole, economy of labour and compactness have been studied; the departments are near, the means of ingress and egress are good; and light and ventilation, those two fundamental requisites of a healthy farmstead, have been well considered in the plan and construction. The estimates furnished give the cost of homestead and piggeries at £1,200, and of the house and dairy, £800.

The second-prize design, which receives £5 and a bronze medal, with motto "Truth," is M-shaped in its general plan. The double "byre," or cow-house, forms a central building, projecting from the food-preparing range, so that it is near to the mixing-room and root-house. There is a 5ft. feeding-passage, and each cow-house has an entrance and exit to yard and roadway. The calf-house and two loose boxes are placed conveniently near the cow-house at the west side of cow-yard, and each box has its own separate yard. The extreme west wing of the block contains the piggeries, which are fed by the same feeding passage which traverses the calf boxes. On the east side of the cow-house, enclosed between it and the stables on the outer side, is a shed for store cattle, 49ft. by 25ft., and the author points out that only a roof is required, which can be carried by the side-walls of those buildings. The feeding-passage is continued round on all the three sides, and the stable range contains a loose box and a gig-house. A roadway surrounds the buildings on three sides, and the dairy and house are proposed to be placed on the south side of roadway. In the construction we find the roofs are of timber, with raised louver-board ventilators along the ridge of cow-house, &c. The author treats the elevations in a simple and inexpensive manner. The walls are proposed to be of red-brick, and the roadway side

forms a series of gables. A vigorously-coloured perspective view accompanies the set. Economical construction has been the aim of the author, and the estimate for the homestead is £1,567, and for the dairy and house £625, making a total of £2,192. The author is Mr. A. Richard Cragg, of Cadley, near Preston.

"Islington" is another able plan; we believe by Mr. Thomas Potter, of Alresford, Hants. The departments are well placed; there is a central cow-house, 89ft. long, at right angles to which, in the centre, on the north side runs a food-preparing house, connected by a tramway and turn-table with the cow-house. A large covered cow-yard opens on the south side of the latter, roofed in by an exceedingly wide-span flat roof of iron. The calf-house and infirmary are conveniently placed at the end of cow-house, also cow-boxes. A nag-stable and yard occupy the south-east corner and the piggeries the north-east corner of the steading, the implement-shed faces north, and cart-horse-stables and a horse-yard fill up the area on the west side of food-preparing house. The details are well considered, and the total estimated cost is from £3,250 to £3,750.

"Winton" is another design we believe by the same author, but the plan is far less economical. An open yard and covered shed are shown on the south side, the piggeries adjoining the food shed. There appears to be a considerable distance between the food-preparing house and the cow-house, which provides for 52 cows. There are calf-boxes at one end, and the dairy and house are placed on the east side.

"Agricola" is a plan which exhibits a practical knowledge of homestead arrangement, and the details are given with a fulness which other competitors have not thought worth while to follow. The distribution of the departments partakes in plan of the letter M. The cow-house occupies the centre, at the north end of which is the food house, the two being connected by a gangway. The west block or wing contains the piggeries and calf-boxes, between which runs the feeding passage. Between this block of building and the cow-house are sheds for fattening stock with a covered and open yard in front 68ft. by 58ft., covered by an iron roof in two spans. On the east side in a corresponding position is the barn with an open yard 60ft. by 58ft. also in front, while the eastern building is the stabling. The house and dairy are placed on the south side in a central position for supervision. Several drawings of details are exhibited, such as the bostings to shippin, the boarded framed partitions to stalls, the ironwork, tile trough, and details of iron roofing.

"Science and Practice" shows a large square open yard with a covered manure-pit in the centre; it is surrounded by buildings which form a quadrangle. The cow-house for 32 cows is on the north side, the stable and cart-shed on the west, and the piggeries and loose boxes on the east. The central manure pit measures 135ft. by 114ft. The chaff and mixing room divides the standing for cows, of which there are 16 in each; half of these are covered sheds for calves. The fault of this plan is the large area enclosed, and the want of economy in the labour of the stockman's supervision.

The committee have exercised some judgment in their choice; and the two designs to which they have awarded prizes are certainly the most economical. The area of ground occupied in both the successful designs is small compared with the others, and the whole homestead is comprised under continuous roofs, so that labour is saved and the inconvenience of separated departments avoided, with all the waste and discomfort attendant in open yards. It has been long ago recognised by farmers and

practical architects, especially in Scotland, that the covered yard not only improves the quality of the live stock but prevents deterioration and waste of food. An equable temperature is obtained, and the central position of the straw and root-houses affords easy feeding and littering. There are, we know, differences of opinion under this head; there are a few who contend for air and sunshine *ad libitum*. With that, it is said by some, the cattle become hardened to exposure and thrive better. Facts, however, have established the necessity of moderate temperature, and it is certain that cattle sooner fatten and require less food when they are protected. Many of the competitors have adopted the partially open yard, which seems to be in favour. In the erection of homesteads architectural considerations count for little. The principal thing is a good grouping of the buildings and roofs, and it is satisfactory to find plain brickwork without costly ornamentation has been aimed at in the premiated design. It must be allowed that the committee have made a good selection, though we should like to see the competition larger, made more worthy of professional ambition by higher prizes, and entered into with a greater sense of the importance and usefulness of this branch of practical architecture.

SOIL-PIPE DISCONNECTION AND SEWER-GAS.

IN our former article on "the Battle of the Traps" we pointed out the general bearings of the subject, and discussed briefly the principal facts upon which the advocates of the siphon or S-trap, and the U-trap base their claims for preference. The controversy has since then been continued in our columns with considerable spirit, though without the introduction of any material features of novelty. The dispute in question is one which can be settled satisfactorily only by practical trial, and in the present state of our knowledge it is a matter of regret that we possess no independent body or central authority competent to make a few simple experiments, which would decide once and for all the present controversy, and whose verdict would be accepted by all parties as conclusive. It is unsatisfactory to Mr. A. to learn that Mr. B. has made a careful model of his trap and finds it fails to accomplish all that Mr. A. has claimed for it; because Mr. A., after carefully testing Mr. B.'s trap, is similarly unable to make it answer under the very conditions for which it was designed, but under which it is rarely shown in operation. All the trials and tests hitherto recorded appear to have been made by those who are more or less of partisans; and, without in any way desiring to impute to these gentlemen a bias, it is impossible that their results can carry with them the weight that would attach to experiments conducted by an independent observer. The one fact that all makers of traps will agree to is, that the object to be attained is the exclusion of a subtle gas, unavoidably present in the soil-pipe, and, so to speak, laid on to every house. The time may, perhaps, come, when the real dangers of sewer-gas are better appreciated and understood, when we shall take some surer means to keep it out of our houses than the present clumsy device of a water-trap. Experience has taught us a far safer mode of dealing with coal-gas, and a good air-tight valve can readily be made and fixed; but anyone who proposed that each closet connection, or even each soil-pipe, should be provided with an air-tight valve, would be laughed at, and, in fact, after the best set of valves had been fixed, we should not do away with the danger; for gas would get through at each use of the closet, as it does now with the

best \square or ∞ -trap ever made. Of this there can be no doubt, however—that the soil-pipe should be made as free as possible from sewer-gas by disconnection at its foot, and by the continuation of it for the full diameter to above the eaves of the house.

While we in this country have been disputing about the best form of trap, a German medical man, Dr. Lissauer, of Dantzie, has been carrying out a series of most careful and comprehensive experiments on the siphon-trap, and the results of these experiments, published in the last number of the German *Quarterly Journal of Public Health*, will indicate, at any rate, the manner in which the question should be approached, and will certainly serve to determine many disputed points. He found that since the completion of the new sewerage works there were many cases of illness in the town, and he succeeded in tracing most of these to glaring defects in the house-connections and sanitary fittings. He determined, therefore, to undertake a practical examination of the manner in which sewer-gas may gain admission into dwellings, and to test thoroughly the efficacy of the water-seal in the siphon-trap in common use.

For the purpose of these tests the hoppers of the closets and the water-supply were removed, leaving exposed only the glazed stoneware siphon-trap, 11 centimetres in internal diameter, attached to the soil-pipe.* He first ascertained the exact water-content of the trap to the level of dip, which was 1,100 cubic centimetres, and then the further amount of water necessary to fill the bend of the siphon to the overflow level, an additional volume of 350cc., with a depth of 1½ centimetres, which represents, of course, the seal. He then emptied the trap completely, and placed at the bottom a lighted taper, immediately beneath the dip. From frequent observations of the air-currents, which he was thus enabled to study most perfectly, he ascertained that the general tendency of the drains was to suck air from the house at all periods of the day and night. In gusty, windy weather these conditions were sometimes momentarily reversed; but the flame was in nearly every other case drawn towards the soil-pipe. When water was poured down in the closets connected with the same soil-pipe on the upper floors (his experiments were conducted in this case on the ground-floor), there was such a violent outrush of air as sometimes to extinguish the taper. The banging of doors, and distant movements in the main drain, all influenced, for a moment, the flame of the taper.

Having thus studied the air-currents in the soil-pipe, he filled the trap, and noted the time required to destroy the seal by "waving-out" and "siphonage." In five days the 1½ centimetres of seal had been wholly lost, but in less than 10 hours the sewer-gas had forced the seal. To note the manner in which the water was blown out, he suspended strips of paper, and coloured the water black. He gives tables to show the time taken to reduce the trap to nil, and the daily loss. He next fitted up a much more complex apparatus to measure the fluctuations in pressure of the gases in the soil-pipe; and he ascertained that pouring down water in the upper part of the house had the effect of compressing the air in the soil-pipe to the equivalent of sustaining a column of water from 1·6 to 2·2 centimetres in height. A great many experiments were made to determine the varying pressure on the trap, and he devised a very simple and effectual apparatus, which he terms a "restitutor," to replace the water lost by waving out or siphonage, which apparatus was perfectly automatic in its action, and could be applied to any closet. He then made similar experiments with a

sink-trap of the ordinary form, and found that this took 52 days to become exhausted.

He next had a trap made with glass cheeks, and supplied with millimetre scales dipping into the fluid on each side of the seal, and noted the minute variations in the level of the water in each limb of the siphon, due to various causes. He also employed a soda solution in the trap, and suspended strips of turmeric paper to measure the height to which the pressure in the soil-pipe would force up the water in traps with seals of various depths. He was led from some of his experiments to think that the chemical condition of the water in the trap had something to do with the facility with which the gas passed through it, and he found that while pure spring-water in a trap, with a seal of 1½ centimetres, required 19 buckets of water thrown down in the upper closets to force it; when he used in the trap water saturated with carbonic acid-gas (the chief soluble constituent of sewer-gas) five buckets only were required to force it. From numerous experiments, he deduced the unvarying law that the resistance of the trap was inversely proportional to the facility with which the water it contained became saturated with the sewer-gas.

His investigations were conducted in different houses, but always with traps of the same form, and he was led from his experiments to conclude that for ordinary domestic use a seal of not less than 2·5 centimetres (6·98lin.) in depth should be insisted upon. His next observations were directed to the best means of ventilating the trap—i.e., of providing a mode of outlet for the confined gases, other than through the water-seal. After many trials he found that by making an orifice, not less than 3 centimetres in diameter, in the top of the bend of the trap, and continuing this into a ventilating-pipe having free communication with the atmosphere, both at the top and bottom, placed alongside of the soil-pipe, the most violent fluctuations in pressure only caused a variation in the water-level of the trap ranging between 1 and 2 millimetres (from 0·039in. to 0·078in.) The force of the compressed air was, in fact, expended through the ventilating-pipe, instead of through the water-seal. He found that ventilation into the soil-pipe by an ascending pipe gave very little relief as compared with that to be obtained by ventilation into a special pipe provided for the purpose, and his observations were so conclusive as to the benefits resulting from ventilation of the trap by a pipe of sufficient size that the authorities of Dantzie have made this plan compulsory in all new buildings. The pressure of the sewer-gases are by this means reduced to about one-tenth of that observed in unventilated traps. The restitutor, when in daily use in an ordinary dwelling-house, attached to a trap of the common pattern, showed an approximate waste of 500cc. (0·88 pint) per diem, as the volume lost by siphonage and waving-out. A trap containing 1,960cc. of water, with a seal 2·5 centimetres in depth in an unused closet, withstood the ordinary use of the soil-pipe in a dwellinghouse, where the remainder of the apparatus connected with the same soil-pipe was in heavy use, for five days and was only forced on the sixth day. The use of the upper closets in the ordinary way was found to be approximately equivalent to the pressure of a column of water 1 centimetre in height, while the violent discharge of a pail of water into the closets was equal to a similar pressure of 2 centimetres. A trap with a seal of 2·5 centimetres became so far siphoned out, after nine buckets of water had been thrown down in an upper closet, as to become useless; the trap was forced when the seal was reduced to 1·3 centimetres. Many other tests are recorded, all of them conducted in a most painstaking manner,

and furnishing us with a comprehensive record of the pneumatics of the soil-pipe, but the diagrams which accompany the essay are needed to make some of these experiments intelligible. One of the experiments appears to have had very remarkable results, for, under certain conditions, the whole of the water in a large trap, having a seal 40 centimetres (15·74in.) in depth was siphoned out in a few seconds.

The account of ten cases where sickness was directly traceable to defective closet-fittings is very instructive, but scarcely concerns our readers, as these cases have a medical rather than an engineering interest. The doctor concludes his observations with a few general remarks, among the chief of which is his firm belief that all the house-connections and sanitary appliances should be under the direct control of the local authorities. He points out that in a town like Dantzie, where the tendency of the sewers during the greatest part of the time is to suck in air from the houses, this very fact presents an element of safety (which appears to be absent in the English system of drainage), and renders an open-air disconnection at the foot of the soil-pipe of no advantage. He states that so much apathy and ignorance of the true nature of a sewer-trap prevails among all classes, and even among those whose business should lead them to master the subject, that domestic fittings should be inspected and passed by a competent sanitary authority before entering into use.

SHOP-WINDOWS.—No. I.

SHOP-windows, like the Stage, are a mirror of the times we live in. They shadow forth the state of art-manufacture, and are an index as to the extent of its appreciation by the public: at the same time they wield a most powerful reaction through their fascinations, and we unconsciously form many of our likes and dislikes from the constant sight of their contents. For there can be no question as to their attractiveness. If our country cousins come to pay us a visit in London, do they not devote their first morning to the shops in Regent-street in preference to the Royal Academy? To the idler, and the man of leisure, shop-windows are a never-failing source of amusement, while even the man of business is often beguiled into a glance at them as he hurries from one appointment to another. Suppose we run over to Paris—do we instantly send off for places at the Opéra or the "Comédie," or do we not rather stroll quietly along the boulevards during daylight, and invariably inspect the shops in the Palais Royal when lighted up? Even the magnificent Mosque of St. Sophia at Constantinople has to await a visit from most travellers till they have made at least a cursory acquaintance with the bazaars; while at Brighton, Scarborough, Interlaken, or Monaco, no small portion of the day is devoted to the shop-windows, and to the purchases of trinkets—useful or otherwise—hardly to be met with in the more prosaic establishments of large towns.

If, then, shop-windows do exercise so powerful an attraction on the community at large, it is worth while to consider their condition; and we propose, therefore, to notice a few of the more salient features that they present to us here in the metropolis of the world, together with the state of a few of the most important branches of art-manufacture as displayed in them.

The structural materials employed in our buildings, important as they are, come hardly within our scope in dealing with shop-windows; but the decorative materials undoubtedly do; and it is the more important to notice these, as from the arts cognate with architecture has undoubtedly emanated that extraordinary change in all matters of taste which the present aspect

* The closet apparatus was apparently a simple hopper-pen, with no valve or container.

of our shop-windows so strongly evince. Forty years ago taste in everything, except port-wine, was at its lowest bathos. Furniture, wall-papers, dress (male and female), plate, glass, and china, all vied with each other in hideousness; and it would puzzle many a sapient critic to say which of the lot bore off the palm for atrocity. Nowadays all this is changed; and though we may still find much that is susceptible of improvement, and may point to the alluring displays of specialities in other countries, still, when we consider the multitudinous products of the applied arts in which London deals, the shop-windows of the metropolis form an exhibition delightful to the cultivated eye, and, as a whole, one unrivalled in any other city in the world.

This improvement, as we have said, has been associated with, or rather has arisen out of, the gradual development of modern architecture; and affecting, in the first instance, the various matters connected with the embellishment and fitting-up of buildings, as they leave the architect's, or, at any rate, the builder's hands, has gradually influenced every kind of subsidiary art-produce. It may be traced back to about the time of the commencement of the Houses of Parliament, when the elder Pugin, as the apostle of the Gothic revival, published his "True Principles of Pointed Architecture," and threw down the gauntlet to the then-existing and so-called Classic school, with all its shams and abominations, and as Turner and, later-on, the Pre-Raphaelites did to the Academical School of Painting, and as Hahnemann did to the lancet and the pillbox. Pecksniff had, perforce, grumblingly and pugnaciously, to succumb, and a better state of things came gradually about. But architecture had an easier task in its reformation than the applied arts. Not only in our native land, but in nearly every civilised country of the globe, buildings exist—the purest of their several types—from which the principles of their design and construction can be and have been exhaustively studied, and either reproduced in modern work or developed and adapted to modern requirements, in accordance with engineering appliances and nineteenth-century inventions. Not so with the decorative arts. Although, as architecture progressed, the need of aid from subsidiary handicrafts was keenly felt; there were comparatively few specimens of art-wares that were readily accessible. Many of the processes employed in their manufacture (such as the production of the ruby glass in the old stained windows, and the tempering of the ancient Damascus sword-blades) had been lost, and an entirely new race of artisans had to be, as it were, created, and educated with the perceptive faculties and the deft execution necessary for the work. Furniture and Decoration were in a specially doleful plight. Mediæval customs and requirements were primitive; and the trestles, settles, bedsteads, and presses of those days, though frequently quaint and characteristic, were rude and cumbersome—rather, indeed, specimens of carpentering than anything else. They belonged, in fact, to what has been called "the packing-case school" of furniture; and it was not till a much later period that the methods of construction were developed which now obtain everywhere in the production of the best upholstery and cabinet-work. In decoration, carving probably played a more important part than painting: at any rate, few examples of the latter art remained. The wooden roofs—no doubt originally painted—had ever and anon perished from fire, and the walls had suffered but too ruthlessly at the hands of the Puritans. Such examples as still existed were chiefly archaically treated figure-subjects, with borders of rosettes or chevrons, diapers, and powderings of

stars or fleurs-de-lys. Even these were principally confined to the churches; in private dwellings, the walls, when not hung with textile fabrics, were usually lined out in red or black, into shapes of brick-work or masonry in the upper part, while the lower was painted in flat tints, to represent a curtain. This very effective method of treatment has of late years been used in many of the newly-decorated churches and cathedrals, both of this and other countries, and notably in Northampton Town Hall. Much was learnt and many hints were taken from the Great Exhibition of 1851, when our foreign rivals put us to shame in much that concerned aesthetics, and, touching the *amour propre* of our art-manufacturers, stimulated them to efforts at improvement in design which have since borne the richest fruits. Nor must the influence of South Kensington be overlooked. Though too untechnical in its teachings, the central school of art, with its ramifications throughout the country, has mostly trained the public taste, and so created a market for the improving products of the factories.

The study of the illuminated manuscripts of the Middle Ages, has, no doubt, been of great assistance to decoration, but it owed far more, in the early days of the Gothic revival, to the magnificent stained-glass windows which, happily, abound yet in England, France, Germany, and Italy, and constitute one of the first glories of Mediæval art. Not only has the old stained glass gradually exercised a powerful influence on decorative ornamentation, but it has brought about the resuscitation of its own long-forgotten production. It is a material not readily exhibited in shop-windows; but as we see it to-day in our churches and public buildings, and variously employed in many of our houses, it is one on which we may justly pride ourselves in this country as well as high rivalling in excellence its ancient prototypes. And it seems the more strange that the Bavarian glass-painters, with splendid specimens of the truest and finest treatment in their midst: such as the windows of Nuremberg and Ratisbon for instance, should still persist in a pictorial treatment of their windows entirely subversive of the lovely effect upon which stained glass depends when properly dealt with. Who, that has ever seen the nave of Cologne Cathedral, can forget the difference between the lightness, richness, brilliancy, and gem-like sparkle of the northern windows, filled with the ancient glass, and the ghastly transparencies of the Munich school on the south, false in colour, affected in the drawing, wrong in construction, deterrent of the light, and resembling diaphanous far more than glass? Happily the Munich school, as far as we have observed, has had few admirers among us: still, we are the reverse of grateful to Herr Mayer for opening an establishment in the middle of Bond-street for the display and sale of his windows and other articles of German "Gothic."

To no one individual, probably, does the present condition of our English glass-staining, as well as of internal decoration in general, owe more than to Mr. William Morris, the well-known poet, who, to his literary labours, has for many years added those of presiding over an unpretentious, but much-achieving "shop" in Queen's-square, Bloomsbury. We recollect a paper being once read on "Polychromy in Decoration" at the Institute of Architects, when, after the usual lengthy discussion by the learned pundits, the late Mr. Burges was asked to speak. Staring around him with a semi-comic smile, he said: "Mr. President and Gentlemen, I will not detain you with any lengthy remarks, as I think them uncalled for. I consider an eye for colour is the gift of a good God, and there's an end of it." Mr. Morris has not only the

most perfect eye for colour, but a delicate appreciation of forms quaint but not inelegant, and of that true spirit of conventionality which discards all realism, while it retains the life and essence of the thing depicted. We wish that we could say the same of the late and talented Mr. Owen Jones, who, at one time, exercised a most powerful, and to our mind a very baneful, influence on coloured decoration. His reign commenced with the Great Exhibition of 1851, and his power fully established itself at the opening of the Crystal Palace, the colouring of which he, in a great part, superintended, and the Alhambra Court of which was universally recognised as the most exquisite gem in decoration that had been seen in England for many a long year. But Mr. Jones was too wedded to the Moorish style, with its lifeless conventionalities and peculiar scheme of colouring. He adopted the axioms of M. Chevreuil, the French *savant*, which, valuable as they were as to the use of colour when first enunciated, and as they still continue to be for general guidance, aim, nevertheless, at substituting cut-and-dried rules as to harmonies of analogy or contrast, proportions of primary, secondary, and tertiary hues and tints, and what not, for Mr. Burges' "eye for colour," and thus reducing chromatic art to so many mathematical formulæ. The apostle of the Alhambra did, however, good service in compiling and publishing his "Grammar of Ornament" at a time when the various styles of Oriental, Classic, and Mediæval decoration were little known, or understood; and in this, as in the decoration of the Crystal Palace Courts, he was most ably assisted by Mr. (eventually Sir) Digby Wyatt, who, although less prominently before the general public, was by far the truer artist of the two. Until the Great Exhibition, and, indeed, long after, ordinary English wall-papers were too atrocious to think of, and Mr. Owen Jones produced a number of conventional designs which, though mostly Moresque in treatment, were executed in many good neutral colourings. As the "Gothic" papers consisted then of little else than gold stars or fleurs-de-lys upon a violent ground of ultramarine blue, these new productions greatly commended themselves to architects and amateurs, and paved the way for our present English school of paperstaining. But with the erection of St. James's Hall, the ceiling (but not the wall-surface) of which is one of this gentleman's most successful efforts, the Alhambra craze seemed to affect him with redoubled virulence; his colouring became more and more crude, until some dozen years ago we witnessed the sad spectacle of a new London mansion in the refined Barry school of Italian architecture, ruined internally by Mr. Jones's application of coarse quasi-Moorish ornament, stencilled in ultramarine, ochre, and vermilion, in immediate juxtaposition with the most artistic and delicately-modelled plasterwork. Meanwhile, however, a great change was steadily taking place, in which, as we have said, Mr. Morris has had no small share. As the real principles of real Gothic, as of all true living art, began to be understood, Mediæval forms were less insisted upon, even by their most enthusiastic admirers, except for church-work, and individuality was recognised as a better thing than mere servile copyism, so long only as it went hand-in-hand with truth, both of construction and design. The emancipation which architecture thus obtained necessarily extended itself to decoration, while the vast importation since 1858 of various Oriental wares, consequent on the abolition of the East India Company's trading monopoly, and still further through the recent opening up of Japan, has exercised an influence that

can now be seen in the free conventional treatment of nearly every object employed in English decorative design.

We have dwelt at some length on the progress of decoration, as exemplifying that of the applied arts generally, a right understanding of which is essential to those who take an intelligent interest in art manufactures. We now propose to glance briefly at some of the products both of English and foreign factories, as actually displayed in our shop-windows for public inspection and purchase.

Starting, then, with decorative materials, we find a most wonderful improvement within the last thirty, and especially within the last dozen, years. No doubt many of our readers will recollect the institution of the "Chamber of Horrors" at Marlborough House, when the present abode of the Her Apparent was still the forerunner of the South Kensington School of Art. They will call to mind the carpets of brown shaded roses on a crimson ground, the hearth rugs devoted to Newfoundland dogs, and the ill-drawn peonies and cacti that mendered idiotically amongst the most hideous and meaningless of scrolls upon the chair-coverings, curtains, and wall-papers. Let them now look carefully at the windows of the best upholsterers and decorators. They will find rugs and carpets not only from Turkey, India, and Persia, in countless variety, of moderate price, and exquisite loveliness, but those produced by ourselves at Glasgow, Halifax, Kidderminster, and Wilton, in which we have not only learnt from Eastern nations, but have turned the learning to good account in the production either of simple designs in quiet neutral colourings or of harmonious blendings of brilliant colours in small quantities, that equally produce the softness and repose essential to a floor-covering. The variety of upholstery fabrics is inexhaustible. Pure silk damasks and satins are now, perhaps, less used than formerly, but the staring blues, ponceaux, mauves, and magentas have given place to colours in which the old painters would have revelled; while for beauty of design, and durability, our best English silks, such as Walter's, and perhaps Fry's Irish poplins even rival, if they do not surpass, the products of the Lyons looms. "Waste silk" has of late years been extensively employed in the production of hangings which, although they rapidly soil and fade, have the great merits of being both cheap and artistic. To the thousand and one "tapestries," a woollen fabric of every conceivable name and texture, and of French as well as English make, which have replaced the rep curtain and inevitable "key" border, we can only direct the observer's attention, as being a treat to look upon, as he strolls from window to window. The most splendid and luxurious of the upholstery stuffs come to us from France. The stamped velvets are as remarkable for their soft rich colourings, as for their quaint simplicity of design; while the magnificent parti-coloured damasks, in velvet, satin, gold-threaded silk, and even real cloth of gold, might fitly have embellished the Venetian palaces in the palmiest days of the old Republic. "Muslin curtains," particularly the leno net, and Nottingham lace, and the so-called "Madras muslin," and "guipure," are in general as remarkable now for the delicacy of their geometric, or better still, their sprig-like design (which really thus affords some protection from too glaring a light) as they once were for their huge bouquets, and still huger plain spaces; but in the real hand-made Swiss lace there is often great room still for improvement. Chintzes have undergone a radical reform. The introduction of the French cretonne, in which the design was of a more Oriental type, and printed upon a stouter and unglazed cloth,

played dreadful havoc with the English chintz trade, until at last Messrs. Clarkson, the old-established printers, disinterred from their works at Preston and re-cut the blocks of some of the fine old Persian designs, which they now produce both as chintzes and cretonnes.

Of paperhangings we have already said a little. The English school has developed itself upon lines exclusively its own. Initiated with the neutral-coloured diapers and stiff conventional patterns that marked the reaction from the Chamber of Horrors epoch, it has received little foreign influence beyond the Japanese, which, particularly as filtered through the artistic mind of the author of "The Earthly Paradise," has resulted in that style in design of which Jeffery and Co., of Islington, produce the finest specimens. The house owes much to the taste and liberal energy of the present director (Mr. Warner), who has enlisted the talents of eminent architects and artists, and succeeded in bearing off prizes for the firm at Exhibitions galore. These papers—so absurdly christened "Early English," when they are more Oriental in feeling than anything else—are now not only seen in all the best decorative windows, and on many a wall throughout the country, but are largely exported to the colonies and the best American stores. There are two other forms of paper—essentially English—that deserve notice, viz., the highly-raised flock-papers for painting, made chiefly by the old Chelsea house of Scott and Cuthbertson, and the newly-invented material called "Lincrusta Walton." This last, indeed, is not, strictly speaking, a paper, but a kind of stamped linoleum: still it may fairly come within the category, and both these materials are eminently serviceable where richness of pattern is required to be combined with a quiet monotone in colour.

A striking contrast is afforded by the French paper-hangings, which were justly renowned for their beauty when ours were in the depths of ugliness. The "chintzes" of the old Maison Delicour, though artificial and Watteau-like in colouring, were yet singularly exquisite in their grace and softness, and we well remember some most lovely specimens in the Paris Exhibition of 1867. It has always been a mystery why these effects could not be produced in England, and the fact has been generally ascribed to atmospheric influence; for, many years ago, an enterprising English firm not only procured designs from the best French artists, but imported from Paris workmen, paper, size, and pigments, and yet was unable to attain the peculiar soft "texture" of the French production. With the waning of the taste for realistic design, these "chintzes" ceased to command a sale, and of late years the great house of Balin has been engaged, at an enormous outlay for machinery and skilled labour, in producing paper imitations of the finest old textile fabrics. Venetian, Genoese, and Early French damasks, tapestries, embroideries, velvets, and stamped leathers have been reproduced with a fidelity of effect which seems marvellous, when we consider the nature of the material employed. And although the high price of these goods, consequent on the cost of their production, necessarily restricts their use, and the purist may condemn them altogether as being a sham, still their great beauty attracts attention to many a shop-window that would otherwise be passed unheeded.

The progress and development of furniture production has not entirely coincided with that of decorative materials. The first revival of Gothic art consisted in a blind copying of its forms, without the slightest conception of their proper application; and even when Pugin (who had himself been one of the greatest of sinners in this respect)

enunciated in 1811 the "true principles," the Late Perpendicular period was still adopted as the great type and embodiment of Medieval architecture. Though less *bizarre* and impure than the corresponding period of Flamboyant that we meet with on the Continent, its decorative features are by no means to be taken as models; and over-elaboration of surface ornament, instead of the ornamental treatment of construction, will be found in even the best woodwork of thirty or forty years ago. As the great truths of architecture became more appreciated by the publication of Mr. Ruskin's "Seven Lamps," and "The Stones of Venice," and as the younger school of its practitioners "tried back" to the twelfth and thirteenth century work, so a ruder, though more truthful, style of make in furniture arose. But based upon carpentering and joinery more than anything else, it was heavy and ungraceful, and found little favour beyond a circle of extreme enthusiasts. As in decoration, so in furniture, Mr. W. Morris was a great pioneer in the adoption of forms in design and methods of workmanship such as characterised the best period of woodwork that this country has known—and this has been developed—the new "Queen Anne" school of furniture, which is peculiar to England at the present day. Its main features, as we now see it, are the extensive employment of turned work, and the restricted use of carving, the introduction into panels and plain services of decorative painting, stamped leather, and many other ornamental fabrics, and the adoption of a variety of woods that were almost unknown in cabinet-work a generation ago. In place of Spanish mahogany, wainscot, and rosewood, many of the most attractive articles of furniture are now made in American or Italian walnut, and ash, birch, beech, and pearwood (for ebonising), and polished or varnished pine. All these woods are both cheaper and easier to work than those formerly in demand; while the saving in material, due to truer construction and the proper use of the lathe and moulding-plane, allow of the expenditure of more upon design, and yet of a reduction in cost. As with decoration, so in furniture, no one can fail to observe the effect of Oriental importations, and Japanese cabinets and caskets have greatly moulded the best contemporary taste in these matters. While reverting to the practices of the early part of the last century, the Eastern spirit has given to the later Victorian furniture a special individuality of its own, which makes it quite a different thing from a mere reproduction of the true Queen Anne work.

But admirable as a great deal of our present furniture is, there are evident signs of an approaching change in style, and a return to more classical types. There is a fashion in tables, sideboards, and wardrobes, as in everything else; and as soon as any form of article—however good—becomes thoroughly hackneyed, the more proud and restless spirits chafe under imitation by their inferiors in the social scale, and crave for novelty and change. While, therefore, we find "Queen Anne" furniture of inferior make and finish turned out in vast profusion by the cheap advertising drapers, we notice among the best upholsterers a considerable introduction of Chippendale work—not only the old, of which large quantities exist, that are well worthy of cleaning and restoration, but new also, of excellent make and highly artistic design. In this, as in the Queen Anne style, although the forms are different, the same true principles of cabinet-work prevail; and it is upon the lines afforded by the eighteenth century, whether early or late, that our future school of furniture must in the main be formed.

Pages might be written upon chairs and sofas, did our space admit of it; but we must content ourselves with briefly remark-

ing that these necessary articles are now as commendable for their comfort as for their good taste. The "all-over stuffing," which came to us from abroad, was at one time the subject of the severest strictures from those who thought more of purism than of ease and luxury, but this has now accommodated itself to art principles, and leaves absolutely nothing to be desired.

Continental cabinet-work, the best of which is French, has very little in common with English, and is not much to be seen in London windows. Still, it is sometimes to be met with in the best shops, and a good deal of English work is made from French designs. There is one thing in which France has for ages differed from England—viz., in the possession of a traditional school in every field of art. Be it architecture, painting, or sculpture, music, literature, or the Stage, we find it the same; and partly owing to this fact and partly to the different genius of her people, she has always had a leaning to the Classic rather than Romantic. Hence she has been little affected—notwithstanding such men as M. Viollet le Duc—by the tide of Mediævalism that has done so much to revolutionise our own art-industries; and her best furniture is mainly a reproduction of the Renaissance, Louis XIV., Louis XV., and Louis XVI. periods, with the occasional use of the style of the First Empire. Their intuitive taste, and their feeling for arrangement and proportion, stand our excitable friends in good stead; and their furniture is often remarkable for its artistic excellence, to which the beauty and finish of the wood-carving contribute not a little.

One word more before we leave this subject—viz., on pianofortes. Why should these costly, but now indispensable, articles retain year after year their same deplorable form? The badly-carved "trusses" and "cabriole" legs, and those which leave the lathe with one part three times the diameter of another, have all been banished from the chairs and tables that are displayed in any decent window, but continue to offend us in instruments for which we have to pay 200 or 300 guineas, and many a well-arranged drawing-room is spoiled by the commonplace fretwork of the panels, and the gaudy, fluted silk behind it. No doubt the exigencies of piano construction are somewhat of a sealed book to designers in general; but there is no reason why this should be, if the makers would take the matter in hand themselves. A few attempts at originality we have seen, but they have rarely been successful. The English pianoforte-makers, however, are among the most conservative of mortals; and unless they bestir themselves, they will some day find they have to face as formidable a competition, from the more enterprising foreigner, in the appearances of the cases, as they have already to reckon with from the American "Steinways," and the "short iron grands" of Germany, in the matter of the instrument itself. Let them employ the talents of our best designers in conjunction with their own technical experience, and they will both deserve and earn the gratitude of those whose souls are attuned to "the concord of sweet sounds," but to whom also "a thing of beauty is a joy for ever."

J. G. LIBRA.

PAVING AND DRAINAGE OF STABLES.

THE St. Pancras Ironwork Co., of St. Pancras-road, have done good service in the improvement of stables and their fittings, and we have some satisfaction in calling the attention of our readers to a means for rendering stables and cow-houses less unpleasant and more sanitary. A small pamphlet, under the above title, discusses the subject in a reasonable manner. The writer recounts only what many have heard, that the effluvium of an old-fashioned stable is

wholesome, if not pleasant; that it keeps the horses in better health than a new one fitted with the latest improvements, and this notion largely prevails in country districts. It is almost unnecessary to say that such opinions are the growth of prejudice and ignorance, and the author shows that, why horses sometimes suffer in health in newly-fitted stables is, not because they are clean, but because the walls and plaster are damp. The old method of paving stables was by setting flint pebbles in sand. The joints soon became sodden with manure and urine, and the stable in time suffered from continual effluvia, from the saturation of the soil beneath. Every sanitary stable-builder knows the importance of a hard impervious paving that shall convey away urine as soon as possible, and the knowledge of this fact has led to numerous kinds of paving. The recommendations of the author are sound. A layer of concrete 6in. thick of lime or better of Portland cement is necessary for old and new stables; the sodden soil in the first case ought to be removed and the new earth well rammed before the concrete is laid. It is very necessary to give proper falls in the stalls and loose-boxes. The paving ought to be non-absorbent, yet not slippery, and the writer glances at various materials used for the purpose. Asphalt is slippery, however otherwise suited, and it is thought doubtful if its advantage over cement is worth the additional expense. Cement is clean, non-absorbent, and cheap; it must be laid carefully and with the best of materials, for it is apt to crack or break up. Wood blocks are porous, and found to be slippery; iron blocks are chilly to the feet; flagstones are liable to faulty joints, as is granite; and with respect to well-burnt bricks, such as Dutch clinkers, and the Adamantine clinker, the objections are that the chamfers and numerous joints impede the removal of liquids. With respect to the blue Staffordshire pavior, a similar objection is made: the cross-grooves check the flow of the drainage, and one set of grooves retains the dirt. The St. Pancras Company have brought out a brick pretty well known, which obviates the objections to clinker and pavior. The brick has one longitudinal groove only in the centre, and when these bricks are laid, a series of parallel grooves is formed, which requires only one direction of fall. The paving is easily swept in consequence, for there are no cross channels, and drainage is facilitated. At the end of grooves a gutter is placed, which leads to a drain-pot. As the grooves are made to run across the stall to a centre gutter, or diagonally, a good foothold is obtained, and for loose-boxes the gutters may be placed diagonally with a drain-pot in the centre, with intermediate ridges or water-sheds. To avoid cutting these bricks to any bevel they are made to any angle, and extra expense is avoided, and the grooves are round-shaped, not V-shaped, which holds the dirt. The Company have also considered the colour of these bricks, and they now supply a brick made from a clay which burns like terra-cotta, and is also gritty, of an orange or pink colour. Its size is 9in. by 4½in., and the flat surfaces are both scored by grooves, so that either side can be placed uppermost, or the paving reversed when worn on one side; the bricks are bonded together by stubs and corresponding grooves, while the price, we find, is the same as that of the blue-black Staffordshire pavior. The same company's open wrought-iron gutter, and their gutters with movable ribbed cover, with a cast-iron channel for drainage, together with the improved form of siphon drain-pot, are improvements in a sanitary direction leaving little to be desired.

ON THE EFFECT OF PROLONGED STRESS UPON THE STRENGTH AND ELASTICITY OF PINE TIMBER.*

By Prof. R. H. THURSTON.

IN papers read before the American Society of Civil Engineers at various dates,† the writer has given the results of investigations made to determine the behaviour of metals under loads of varying magnitude and under intermittent stresses, and to ascertain in what cases and under what conditions the variation, with period

of stress, of the normal line of elastic limits, discovered and announced by him in the year 1873, occurs in practice.

Experiments made by Mr. Herman Haupt,* forty years ago, revealed a fact not even now generally understood and appreciated—that timber may be injured by a prolonged stress far within that which leaves the material unimpaired when the test is made in the usual way and occupies a few minutes only.

Thus, using pieces 60 × 3 × 1 inches (152.4 × 7.62 × 2.54cm.) set as cantilevers with a breaking moment due the load, of $P l = 48 P$ inch-pounds (122P_m kilog.-metres) he obtained for the value of $R = \frac{6 w l}{b d^2}$ the

following figures:

Kind of Wood	R.	Time.	Remark.
White pine,	2272	10 minutes.	Injured.
"	1548	16 days.	"
Hemlock,	2824	5 minutes.	"
"	1629	16 days.	"
Yellow pine,	2848	5 minutes.	"
"	1800	16 days.	"
Locust,	5504	2 minutes.	Not injured.
"	3600	3½ days.	Injured.
"	2304	16 days.	"
White oak,	4248	15 minutes.	Not injured.
"	7200	15 minutes.	Injured.
"	3648	40 hours.	Not injured.
"	4088	48 hours.	Injured.

All samples tested were consisted good selected timber.

An extended series of experiments made intermittently in the mechanical laboratory of the Stevens Institute of Technology, Department of Engineering, during some years past,† had included an examination of this subject, and the result has confirmed Haupt's earlier work and has given a tolerably good idea of the effect of prolonged stress in modifying the primitive relation of stress and strain where the wood is good southern yellow pine.

A selected yellow pine plank was obtained for test, the history of which was known. The stick was cut at Jacksonville, Florida, in October, 1879, was received early in the following year and was piled in the yard, air-seasoning, until taken for test in the spring of 1880. The plank measured 4in. × 12in. × 24ft. (10.16 × 30.48 × 731.52cm.). When tested, it had been seasoning six months, the latter part of the time indoors.

From the middle of this plank a stick was first cut 3in. × 3in. × 2ft. (7.62 × 7.62 × 731.5cm.) and from this was cut a set of ten pieces from 40in. to 54in. long (101.6 to 137.2cm.) and from 1½in. to 3in. square in cross section (3.16 to 7.62cm.) square. These latter pieces were tested on various conditions, as then reported,‡ to determine the values of their moduli of elasticity and of rupture.

The moduli of rupture were usually 11,000 to 12,000 for the expression $R = \frac{3 P l}{2 b d^2}$ (in metric measure, 773.3 to 843.6) and the moduli of elasticity ranged from two to two and a quarter millions (in metric measure, 10⁶ × 1406 to 1581.75 × 10⁶). In specific gravity the wood ranged from 0.75 to 1.00, usually about 0.85. When kiln-dried to a moderate extent, the density was but little altered, if at all; but the modulus of elasticity rose to two and a half millions (1737.5 × 10⁶) and the modulus of rupture was increased about 20 per cent.

From the previously unused part of the plank a set of three test pieces was cut about 1in. (2.54cm.) square in section and tested on supports 40in. (101.6cm.) apart, to determine their breaking loads. The result is shown in detail in the appended table. In these specimens the annual rings were in the cross section of each piece, indicated by lines making angles of 45° with the edges. These pieces broke at 345,380 and 410 pounds respectively. The weakest piece broke by splintering, and had it been as sound as the others would probably also have sustained a somewhat heavier load. As will be seen by comparison with the other and with subsequent tests, the deflection of the strongest piece in the set is exceptionally small and the piece probably exceptionally strong and stiff. We may, therefore, take 375 pounds (170 kilog.), or a trifle over, as a good average for loads breaking pieces of this size.

Nine other pieces were cut and dressed to the same size and were mounted on supports

* Presented to the American Association for Advancement of Science, Cincinnati Meeting, August, 1881.

† Trans. Am. Soc. C.E., 1873-83; Journ. Franklin Inst., &c., &c.

* Haupt on Bridge Construction.

† Trans. Am. Assoc. for Advancement of Science, 1879-1880; Journal Franklin Inst., Oct., 1879, Sept., 1880.

‡ Trans. Am. Assoc., 1880; Journal Franklin Inst., 1880.

alternate weeks. These men work from 5.30 a.m. to 7 p.m. at the interior fittings, and clean dressings and pointing both inside and outside. During this time all the exterior gunmetal door frames and doors, window-frames and sashes, and window-shutters have been fixed, the external work being performed from cradles swung from the gallery at the summit. These are all of the most solid description; e.g., the entrance-door and frame, surrounded by the arms of the Trinity Corporation, weighs over a ton (2,382lb.), and the two doors of the storeroom—east and west, to be used according to the weather—with their frames weigh upwards of a ton and a half (3,682lb.), while the total weight of all the exterior doors, frames, sashes, and shutters is 5 tons 4 cwt. These are now all in position, being let into the solid masonry, bedded in red and white lead and oil, and secured by gunmetal plugs and countersunk screws. The whole is rendered watertight by all surfaces which meet being planed and polished. Considerable progress, too, has been made with the lightning-conductor, which consists of a copper band $1\frac{1}{2}$ inches in diameter and half-round. It is carried from the pedestal of the lantern, to which it is connected, to the entrance-door inside the tower. Between these two points it is let into the walls flush, all joints being lapped and screwed. To it are to be connected the gallery-rails, the metal floor of the lantern, the window-frames and shutters, the metal doors, iron partitions, tanks, ladders, lead pipes, crane, stove and stove-pipe, &c. From the entrance-door it will be continued down the face of the tower in connection with the metal steps to the rock below, and to low water to a distance of 12 feet from the face of the building, being let into and securely bolted to the rock itself. In case it should not be possible to effect a landing on the eastern side, a second series of metal steps will be placed on the western side of the cylindrical base of the tower. These have likewise to be connected by a separate conductor of the same size as that above described. The utmost precaution has been taken against the necessary ironwork being subject to rust. No galvanised iron is used, but all wrought and cast-iron of best quality is first thoroughly cleansed. In this state it is slightly and uniformly heated, and while hot well coated with boiled oil, and after being cooled and the coat hardened, painted. The lantern is the largest in the world, and of itself is half the height of the old tower. It is surrounded outside by a gallery 4 feet wide, formed by the last, the 89th course of stones, which are about the biggest in the building, being each about three and a half tons in weight. To this gallery are fixed the two cast-iron bell brackets, which are secured by means of "Muntz" metal bolts. These bolts have their two ends slit to the extent of about four or five inches, into which are placed the thin ends of metal wedges of corresponding length. The bolt is inserted into holes above and below just large enough at the entrance to admit it, but which increase in size inwards to an extent corresponding with the base of the wedge. When "driven home" the wedges penetrate the slits and expand the ends of the bolt, so holding the brackets firmly to the gallery course. There are six of these bolts to each bracket. Holes being filled in with cement for the stone and red lead for the brackets. These brackets are each a ton weight and seven feet in length, overhanging the gallery by three feet. It is to the extremities of these projecting portions that the fog-bells have been suspended. They weigh each over two tons—the western 4,480lb., and the eastern 4,627lb., they stand 4ft. 6in. high, and are 5ft. 1½in. wide at the mouth; and to lift them off the gallery, pass them out beyond the ends of the brackets, drop them down and hold them underneath the brackets while they were being fixed at a height of 130ft. above high water was a work which required care and ingenuity. It was successfully completed on Wednesday week, Mr. Elmond himself screwing the central bolt to each bell. The lantern is in the hands of men sent from Birmingham by Messrs. Chance, who have the contract for erecting it and fitting the lighting apparatus complete. The window-panes are diamond-shaped, 5ft. long by 2ft. 6in. wide, and the glass will be ¾in. thick. This is also the thickness of all the glass used in the upper part of the tower, while that in the two lowest rooms will be 1in. thick. It is all of polished plate-glass, bedded in white and red-lead putty. The lantern frame

is composed of steel diamonds, 3in. deep and ¾in. thick. The panes of glass are fixed from the outside by means of gunmetal strips, which are screwed to the outside of the steel frame. In case of breakage the strips holding any particular pane can be easily taken off and a new pane inserted, a supply of which will always be among the stores in stock. The egee iron rafters for the roof of the lantern are already fixed, and only await the arrival of the steel roofing-plates to complete the exterior of the building. It is fully expected that the exterior of the lantern will be practically completed by Thursday, October 6th. The total height of the vane upon the bell-shaped cap is 150ft. over the platform. Now that the cement has been cleaned off the external face of tower, it is seen that seven courses near the base of the tower are of Aberdeen granite readily discernible by their bluish grey colour, amongst the light grey of the Cornish granite used for the other parts of the work. A movement is on foot for utilising the new lighthouse as a station for signalling passing ships.

THE SAVOY THEATRE.

THIS theatre, which we have already illustrated, and which is advertised to open on Monday, Oct. 3rd, has been erected for Mr. D'Ojly Carte, from the designs and under the direction of Mr. C. J. Phipps, F.S.A., architect of the Gaiety, the Haymarket, Princess's, and other theatres.

It is situated on the west side of Beaufort-buildings, Strand, and occupies a site absolutely isolated on all four sides, thus affording free and expeditious entrance and exit for all classes of the public. The entrances are thus distributed, and are arranged so as to utilise the peculiar levels of the site: For the stalls and dress-circle, and all persons coming in carriages, the entrances are in Somerset-street, just off the Victoria Embankment. The pit is also entered here, and there is an entrance to the upper circle; the audience for both these latter parts can come direct from the Strand by a short flight of steps adjoining Beaufort House. In Beaufort-buildings also is an entrance to, and on a level with, the upper-circle. The entrances before referred to, from the Embankment, are on a level with the dress-circle, and a few steps lead down to the stalls and pit.

The gallery is entered in Carting-lane, a street in a direct line from the Embankment to the Strand. The royal entrance is at the angle of Somerset-street and Carting-lane. The stage entrance is in Herbert's-passageway. The box-office, for booking seats during the day, is situate close to the Strand, at the angle of the Beaufort-buildings frontage. The manager's offices are also entered from Beaufort-buildings.

The theatre is approached from Somerset-street, through a semicircular vestibule, paved with black and white marble, in which are the offices for booking and obtaining seats in the evening. Doorways immediately opposite the entrances lead to the dress-circle corridor, out of which wide staircases will be found on both sides of the theatre leading to the stalls. From this vestibule are also means of communicating by an ascending staircase with the upper-circle, and by pass-doors to the pit staircase. All the entrances, passages, staircases, are of fire-resisting materials; the flights of stairs are supported at each end by solid brick walls, and each staircase has a handrail on either side. There is no part of the theatre that has not two means of both ingress and egress, and the stage is separated from the auditorium by a solid brick wall, taken up completely through the roof. Water laid on from the high-pressure mains are in several parts of the theatre, and every possible means has been taken to insure both comfort and safety to the audience.

On the floor below the vestibule is a large refreshment saloon for the pit, and contiguous to it a smoking-room, opening out of the stalls corridor, with a separate boudoir lounge for ladies. There are also refreshment saloons on the upper floor of the theatre for both the upper circle and the gallery, with all necessary retiring and cloakrooms. The auditorium is thus arranged: On either side of the stage opening (which is 3½ft. wide by 32ft. high) are three private boxes on each of the three levels: these are divided by partitions and ornamental pillars, and are surmounted by an arch spanning the

whole width of the proscenium, springing from a cornice on a level with the gallery front. These boxes are richly upholstered in hangings of gold-coloured embossed satin. The orchestra is in front of the stage, and is of sufficient capacity for a full band of musicians. There are nine rows of stalls, on the level of the orchestra, seated to hold 150 persons in arm-chairs, with ample space allowed for passing between the several rows, and wide, unimpeded gangways on either side to the entrance-passages. Behind the stalls are six rows of pit seats, calculated to seat 250 persons, with a spacious open corridor behind for standing and promenading. Above the pit, but at sufficient height to allow of persons at the very back seeing the full height of the scenery, is the dress-circle, of six rows of seats, with armchairs for 160 persons; there are no pillars of any kind in the dress-circle, so a clear, unobstructed view of the stage is obtained from every seat. Above the dress-circle, but receding some 9ft. back from it, is the upper circle, seated to accommodate 160 persons in five rows. The amphitheatre and gallery recede 5ft. behind the upper circle, and will seat 400 to 500 persons in eight rows. In each tier the balcony front takes the form of a horse-hoe, that being the best adapted for perfect sight of the stage.

The ornamentation of these several balcony fronts is Renaissance in character, and is elaborately moulded and enriched with the figures and foliage peculiar to the Italian phrase of the style, and gilded. The ceiling over the auditorium takes the form of an extended fan, from the arch spanning the proscenium, and is divided into a series of geometric panels, richly modelled in Renaissance ornament in relief, of the same character as the boxfronts. Colour is sparingly used in the ceiling, the background of the ornament only being painted a pale yellow. The proscenium arch is divided by ribs into a series of panels, with gilded ornament over the proscenium; in the tympanum of the arch is a bass-relievo of figures and ornament upon a gold ground. The walls of the auditorium are hung with a rich embossed paper, in two tones of deep Venetian red. The seats are covered in peacock blue, plush being used for the stalls, and stamped velvet for the dress-circle. A gold-coloured satin curtain takes the place of the usual painted act-drop.

The stage, which is laid with all the latest improvements in mechanical contrivances, is 60ft. wide, by a depth from the footlights to the back wall of 52ft. There is a clear height above the stage of 56ft. for the working of the scenery, and a sink below of 15ft. Behind the stage, and occupying the whole wing of the building in Herbert's-passageway, are the dressing-rooms and offices of the management.

The theatre is fitted with a complete system of gas-lighting, but this is only for use in case of emergency: the whole of the illumination for all parts of the establishment being by means of electricity. This has been undertaken by Messrs. Siemens and Co., and the lights adopted are those introduced by Swan, of Newcastle, and known as the "Swan incandescent light," the power necessary to generate the electric current for so many lights being supplied by powerful steam-engines placed in a separate building, on the vacant land adjoining the theatre. These "Swan" lights are of a beautiful colour, and in no way impair the atmosphere of the theatre, and emit no heat: they are not of the piercing brightness of the electric light as seen in the streets and elsewhere, and therefore not unpleasant to the eyes. This is the first instance of a public building being lighted permanently in all its departments by the electric light.

The exterior façade of the theatre is in Somerset-street, facing the Victoria Embankment, and both this and the Beaufort-buildings frontages are built of red brick, with Portland stone for all moulded parts, and are Italian in style.

The contractors who have been engaged on the works are as follows:—Messrs. Patman and Fotheringham, for the whole of the builders' work, including stage; Messrs. Collinson and Lock have arranged the scheme of colour for the interior, and have executed the papering, painting, and gilding, and have supplied the upholstery and carpets; they have also modelled and executed the plaster ornamentation, in conjunction with Messrs. Geo. Jackson and Sons; Messrs. C. Drake and Co. have executed the concrete floors and staircases; Messrs. Faraday

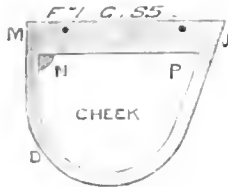
and Son have made the internal fittings in connection with electric lighting; Messrs. Clarke, Bennett, and Co. have constructed the revolving iron shutters and blinds at entrances. Mr. J. E. Walker has been the architect's clerk of works.

PRACTICAL NOTES ON PLUMBING.— XIV.

By P. J. DAVIES, H.M.A.S.P., &c.

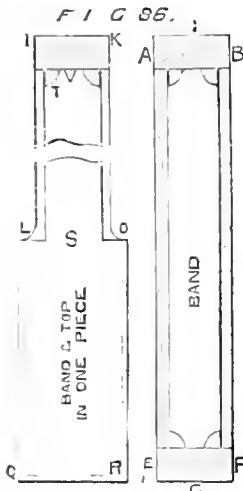
MAKING UP \square -TRAPS (Fig. 85).

IN the last chapter I have described the planning and cutting of good, reliable,



self-cleansing \square -traps; the following is a brief description of making them up:—

Having cut out the cheeks and band to the proper size, take the dresser and flatten the lead quite smooth; then place the cheeks and rasp the rounded edges true on to the other in order to have them the same size and square to each other, next soil them all over inside and outside as shown at M D H J N, Fig. 85; the soiling at H should be 2½ in., and at D from ½ in. to ¾ in., with the angles N P rounded. Next take a gauge-hook and shave round the inside lin. from M to D and from D to J, tone the shaving over, and do the other cheek. Now take the band, Fig. 86: this is the exact length round



the cheek, and the width of a 4 in. dip-pipe drawn to 2½ in. scale. First plane up the edges A E B F to the desired width and parallel. Soil all over the inside, then the outside, as marked out, then take the gauge and shave the inside of the band to the same width as you did the inside of the cheek, but on both sides. You now want a "trap-block," which is a piece of 3 in. deal, say 18 in. long by 11 in. wide, planed up smooth. It must, moreover, have something to keep it from warping. A good plan is to put two pieces of iron barrel through the centre of the stuff, and near to each end. Next lay the cheek inside uppermost upon this block, and, with two small clout nails, fix it there by driving the nails through just where the shaving will come when soldering on the top, as at the dots near H, Fig. 85. Take the prepared band and place the end (which, of course, should be square to the sides) to the heel of the cheek at M, and with a 2 in. wrought-iron clout or clout nail just driven nearly upright into the block, say, ½ in., to hold it in position; that is to say, the edge of the band up to the heel of the cheek. Now bend the band truly up round to the edge of the cheek, and fix it there by driving a few more nails into the block. Place a piece of board across the top of the band,

and a small weight to keep it there, and then solder up the trap, which is done as follows:—First splash on the solder round the joint, and then, with an iron (or if you are quick at soldering you can do without the iron), warm it up by working the point or ball into the solder from heel to out-go of the trap-cheek, then take a small "branch cloth," say, 2½ in. by 2 in. (see cloth table, Chap. 2), and wipe from right to left or left to right, as you choose, but do it at one quick sweep. Some plumbers wipe from about the centre or bottom of the cheek, and do it at twice. So may you; but the former is the quicker, and, as quickness is the principal part in wiping, it must be the best. Having one cheek soldered on, do the other in a similar manner.

Be careful that the heel of the trap is square with the band, and quite true or level; next, shave all round the outside of the top or body at H, Fig. 85, or L, 79, say, ¾ in. wide, and bore a small hole, ¼ th of an inch, as an air-hole, at just about J, or where the out-go will be; this is to allow the air to get into the trap. When it is cooling down after soldering up, this small hole is important, or the sides would be pressed in with the extra pressure of the atmosphere, owing to the interior air condensing as it cools. Now, having the body of the trap all ready for soldering to the top, prepare the top as follows. Take a piece of lead well flattened out, soil over the inside part and edges, also about three-quarters of an inch round the under-side of the edges, which, when soldered on the body, will be the top side. This prevents the solder uniting to this part of the lead while being soldered on. Place the body of the trap on the top, taking care that it is properly fitted, and, with the compasses, scribe all round the top, and ½ of an inch farther out, for the solder, as at K M, Fig. 87. Then remove the body, and shave this ready for soldering on. First look after the air-hole, then place the top on the block (which is all the better for being warmed), and splash on the solder. If you are quick you can splash on all round, and get up a good heat and wipe without an iron; but if you cannot do all at once, splash all round and warm up with the iron, and wipe off from right to left, commencing at the out-go corner. If you cannot manage to wipe it quickly enough this way, splash half at a time and wipe, but leave sufficient solder unwiped to begin again with when replashing, and keep this point in a fluid state; then warm up again with the iron, and finish, taking care to well warm up the solder where you commenced to wipe, so that it will not look rough at this point. Having wiped all round, trim the spare lead off the top, which would be all the better if you have an inch or so; but at any rate, trim it off square and true, or plane it off.

Next is the dip-pipe; this can be put in in one piece, or if you prefer it, in two pieces, by flanging the part that enters the trap, so that it will rest on the top, and make the other to go into this; in fact, make a flange-joint of it, as shown in section at E, Fig. 34. When soldering it in this way, it is necessary to paste some brown paper over the solder below, to keep it from falling off.

PLUMBERS.

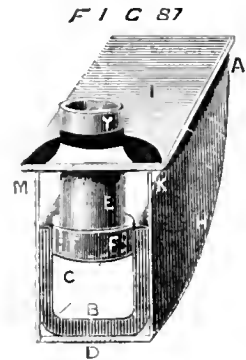
The proper way to make plumber's paste is by mixing a spoonful of flour in cold water, and boiling it in a clean ladle until it is thick; cut the paper in long strips about two inches wide, and soak it before pasting.

PUTTING THE DIP IN \square -TRAP BEFORE SOLDERING ON THE TOP.

This method of soldering on the dip first is far the best plan, if you have a proper trap-block for the purpose, which is nothing more than having a hole cut in it to allow the dip-pipe to drop through; and if you arrange it properly for one trap, you can make the block the correct height for gauging the right depth of the dip that is to say, for 9 in. traps, the top of the block should be 5½ in. high—here you may put in the dip-pipe in one piece, or, if you like, you can solder on the dip-pipe from the underside of your top, which will allow the boards to go down with equal thickness over joists, but the evil attached to it is that this solder comes in the way when soldering on the top, and does not look so well.

BADLY CONSTRUCTED \square -TRAPS.

Fig. 87 shows the \square -trap not properly made for self-cleansing purposes. You will observe that the dip-pipe is away from the side, and consequently gives room for the fur to collect.



The bottom of the dip at F is also furred over; the principal cause of this is the urine. Even with the best-made traps this is likely to take place. I have an \square -trap quite full of this matter; but when plenty of water can be used, and the trap properly constructed, this formation of fur is greatly retarded.

(To be continued.)

PRESSURE OF WIND ON PLANE SURFACES.

MR. THOMAS HAWKSLEY, the past president of the Institution of Civil Engineers, has published some remarks on the pressure of wind upon a fixed plane surface, which have a more than direct application to the lamentable failure of the Tay Bridge. The author of the paper adopts a wind-pressure of 40 lb. per square foot, notwithstanding some reported results of anemometry. He says, "With regard to these observations, that the instruments in use are little better than philosophical toys, and that in general they afford no direct comparable or reliable indications of either velocities or pressures, and that they are often injudiciously placed as in some instance to record the effects of combined and therefore locally accelerated currents; whilst in other instances they record only the effects of obstructed and therefore locally retarded currents." We believe this opinion is well-founded, and that engineers have been misled by taking results which, do not at all represent the actual conditions of wind-pressure on a fixed structure of a certain height and position. Indeed, the allowance of a wind-pressure of 40 lb. on the square foot is, as the author observes, unknown in these islands, for this pressure would have overthrown many of the existing factory chimneys, as well as all the slightly-built erections on domestic buildings which have weathered many a storm. With regard to whirlwinds, tornadoes, &c., these phenomena cannot be measured, and therefore no engineer or architect could consider them in calculations of the strength of structures. Mr. Hawksley gives the general formula for the solution of the problem, and a table of pressures

is deduced from it. This formula is $p = \left(\frac{v}{20}\right)^2$ very nearly; p being the pressure of a fluid striking a plane perpendicularly, and then escaping at right angles to its original path, and v , the velocity of the current in feet per second. We may give a few of the figures in the table published by Mr. Hawksley. Thus, for example, a velocity of 20 ft. per second, or 13.6 miles per hour, gives a pressure of 1.00 lb. per square foot; 40 ft. per second, or 27.2 miles per hour, a pressure of 4.00 lb. per foot; 60 ft. per second, or 40.8 miles per hour, a pressure of 9.00 lb.; 80 ft. per second, or 51.4 miles per hour, 16 lb. per foot; 100 ft. per second, or 68 miles per hour, a pressure of 25 lb. per square foot. It is when the velocities exceed this that the wind-pressure becomes such a dangerous force; 120 ft. per second gives a pressure in lbs. per square foot equal to 36, a force sufficient to throw down many lofty erections with flat sides; while 130 ft. per second gives a pressure of 42.25 per square

foot, a gale which has very seldom swept over the British Isles, and which would carry destruction and havoc of a kind fearful to contemplate. Of course these pressures are assumed to be those against a fixed plane surface, and do not apply to inclined surfaces, such as roofs present. In this case the effect is diminished in proportion to the angle of the obliquity of the roof, and the pressure-formula above is modified, multiplying it by the sine of the internal angle made by the surface of roof and the direction of the wind.

Those engaged in the erection of lofty shafts, or towers with flat surfaces, and of extensive surfaces of wall, and girder bridges of considerable height, as well as the more modest erections exposed to the wind, will do well to consult Mr. Hawksley's paper, so as to give to their structures the necessary width of base or "moment of resistance." It is well to remember that the pressure acts at the centre of magnitude of the impeding surface in the case of flat walls, and it is to this point the maximum pressure must be applied in calculating for the required stability.

ACOUSTICS IN ARCHITECTURE.

"ACOUSTICS in Architecture" is the title of an exhaustive article written for Van Nostrand's *Engineering Magazine* by Mr. A. F. Oakey, in which the author broaches a theory based upon the acoustic properties of musical instruments, especially the violin, acknowledged to be the most perfect. The theory is not novel, though the author has applied the physiological principles of the subject, as laid down by Helmholtz and others, to modern buildings. We are now chiefly concerned with the results of the theory. Mr. Oakey very truly says, speaking of the principles of violin construction, we want the air in our halls, theatres, and churches, to vibrate in the same way; and that "hearing correctly is simply the movement of the air, in force and rapidity, being exactly the same when it strikes the drum of the ear, as it was when it received its first impetus." One of the first difficulties to be met is that of making a room or hall of harmonic proportions. A speaker can be heard at a greater distance in front of him than on either side, behind him, or vertically. Thus if 90ft. is the distance in front, 75ft. that on either side, 30ft. behind, and 45ft. vertically, any three of these dimensions constitute a harmonic proportion. Thus 6 : 2 : 3 is harmonic, being the ratios of the length and height, and the same may be said of any three of these numbers. A hall of harmonic proportion allows the sounds to be appreciated at all the points, and the author next considers how the opposite wall and its echoes must be dealt with to lessen the disturbing elements. The angles of the walls and ceiling and wall are particularly objectionable features, and must be avoided. Semicircular ends and coved cornices, or elliptical plans and ceilings like that of the Albert Hall, do not help sound, but produce reflections. In the last case, these occur at either focus of the ellipse; but if, instead of these curves, we suppose our room to have the wall opposite the orchestra curved to a gradual parabola, so that the focus is near the wall, and the cornice and wall be vertically half this same parabola, the result will be more satisfactory, for the curves will be analogous to those of a violin, and the reflections thus will be parallel to the axis. With regard to the tendency of sound to rise and the absorbing effect of the clothing of an audience, much can be done to overcome these difficulties by regulating ventilation, so that the currents of air should be towards the audience, and by finishing the walls and ceilings with a material to assist resonance or otherwise. The author thinks there should not be less than 6in. and if possible 9in. difference in the levels of the seats, so that they may rise in a gradual line, as in the lecture-hall of the University of London, where it has proved successful. With respect to resonance, it has been found that where the cubic feet of space for each person exceeds a certain proportion (195ft. is given by the author,) a resonant material becomes necessary, such as sounding boards of pine; when the proportion of space is less, hard surface like plaster is desirable, or in extreme cases stone.

The examples furnished by the author throw

little new light on this vexed question, and we think it is doubtful whether the most acoustically-defective room or building can be remedied by the adoption of the principles discussed. It is not always so easy to increase or diminish one or two dimensions of a room as the author thinks. If two dimensions are fixed, say, the length and height, the architect is often led by some other requirement than that of sound to fix upon a width; but in altering old buildings the difficulty is much increased. It is more practicable to lower a ceiling, if the other dimensions approximate, to the required ratio, and the proportions of 3 : 4 : 5 give a result in harmony with the theory. We may here give an experiment made by the author, in his own words:—

I remember doctoring a church in which the pulpit was placed at one side, so that the speaker threw his voice directly against a hard-finished wall opposite, and the ceiling was wagon-headed, that is, rising from the wall at an obtuse angle and forming another angle at half its distance from the centre, so that there were two rows of panels either side of the centre forming the ceiling and forming angles with each other and with the walls; these surfaces were also plastered in hard finish, and, consequently, the sounds were reflected from the wall, and again from the ceiling in a most complicated way, causing three distinct echoes at certain intervals that interfered with and rendered the exhortations of the preacher more or less ambiguous to those within certain distances, while those who sat at either end of the church heard a great deal going on without being able to distinguish anything. The organ was placed in a gallery at one end, and found great reinforcement from the wagon-headed ceiling. On measuring this church I found that it would only be necessary to lower the ceiling 2ft., alter the panelling to three panels on either side of the centre, finish them in hard wood, and make them form angles with the walls and with each other, so that their surfaces were tangent to the parabola I had used as a basis. Then to move the pulpit to the end opposite the gallery, make the pews face the pulpit, and the thing was done. Since this alteration one clergyman has preached to the congregation, who before were never satisfied with anyone for more than a few months.

The transmission of sound can always be checked by simple and inexpensive means. How often a house is rendered untenable by the noise of a school, or a strumming musician next door. The party-wall is generally plastered, and rarely more than a brick or a brick and a half thick. By nailing battens over the surface, and then lathing and plastering, the vibration of sound is checked by the air-space, for air is the best non-conductor of sound. Such "furring" on both sides would give two air-spaces besides the brick, lath, and plaster, and the space occupied is small. Of course floor-joists should never be allowed to bear on the walls, but be supported by sleeper walls or corbelling.

Turning to the illustrations of buildings given by the author, the original theatre at Lyons, built by Sulliot, in 1754, is mentioned as supporting the theory; its proportions were in the harmonic proportions of 4 : 4 : 3. The present theatre is said to be bad acoustically, and alterations of plan were made in it. Every one knows what an acoustic failure the Albert Hall at Kensington is; how draperies have been hung to prevent echo. No doubt the author is right in saying its defects result from the elliptical form there adopted. Its dimensions are 219ft. long, 185ft. wide, and 136ft. high; dimensions not in harmony with the numbers we have cited. Among successful buildings in England, the writer mentions the Free Trade Hall, Manchester, its dimensions being 130ft. by 78ft., and 52ft. in height, or with a unit of measurement of 26ft.—expressed by the proportion 5 : 3 : 2. The floor rises from the platform to the opposite wall, which is a flat curve, not circular. The angles of wall and ceiling are joined by a flat curve also, and a shallow gallery exists on three sides. Mr. Oakey cites the Boston Music-hall, by Mr. Geo. Snell, as the best example in America: the proportions are harmonic; and the Cincinnati Music-hall, from the author's designs, is also acknowledged to be perfect, acoustically. Its length is 200ft., height 80ft., and width 120ft., or 2 : 3 : 5. As this building exemplifies the author's theories, we may describe its plan. The shape of the hall, as built, is a spheroid with the stage projecting as a rectangle, and the seats are all arranged on curves. In the first design for the hall the shape is rectangular, but the choruses are placed within curved sounding-boards with the organ in the centre, the opposite wall is curved to a flattish sweep, and the seats are arranged in curved lines. Among other illustrations is the lecture-room of the University of London, in which the seats are planned

in a semicircle inclosed in a rectangular room, the proportion of which is 78 to 52. The tiers of benches rise, and the height is the same as the distance from front to back, or 52ft. This gives a ratio of 2 : 2 : 3. Her Majesty's Theatre in the Haymarket is instanced as a bad example: its plan, like that of other theatres, is a horseshoe (67ft. by 56ft.), the curve is circular, and there is no commensurate ratio discoverable. As we have hinted, the views, of which we have given the gist, are not broached for the first time, but the author has taken pains to put in a practical form the best theory we have. The subject is admittedly a difficult one, but he has endeavoured to present it in an intelligible manner.

CHIPS.

The style displayed in the distempers representing the Last Judgment, recently discovered in the Cathedral of Ulm, is said to be severe and characteristic of German art during the 15th century; they bear the date 1470.

The new buildings of Queen Elizabeth's Grammar-school, Alford, Lincolnshire, were opened on Tuesday week.

New schools have just been erected at Whitehall for the school board for St. George's, near Bristol. Mr. Stuart Colman, of the latter city, was the architect, and Mr. Bevan the builder.

Mr. Syme, of Watford and St. Alban's, has been selected as architect for a Baptist chapel and schools, about to be erected on Chalk-hill, Bushey, Herts.

A fine art exhibition is to be held in Inverness, opening on the 7th, and continuing over four weeks.

The Church College at Petersfield, which has been erected at a cost of over £13,000, was opened on Thursday, the 15th inst.

The success of the fine art exhibition at Cardiff is far greater than was expected, and it is now anticipated that after paying expenses £3,000 will remain to the credit of the free library.

New schools accommodating 360 children were opened on Wednesday week at Wribbenhall, near Bewdley. Mr. Robinson, of Darlington, was the architect, and Mr. Price, of Kidderminster, the builder.

While making improvements in the churchyard at Greenlow, N.B., the old market-cross has been discovered in the under part of the church-tower, which formerly constituted a part of the old county prison. The shaft and capital were entire, but the lion rampant, bearing the coat armorial of the Earl of Marchmont, with which it had formerly been surmounted, was absent. The cross has now been set up at the west side of the church-tower. It formerly stood in the centre of the market-green, but was taken down in the year 1829 to make way for the building of the present County Hall, and had since been lost sight of. It is supposed to have been first erected by the Earl of Marchmont in the year 1696.

The officers of the 2nd Queen's will place a stained-glass window in the east end of Stoke Church, Guildford, in memory of the late Sir G. P. Cooley, who was slain in the battle at Majuba Hill, South Africa.

The Sheffield town council have appointed a committee of inquiry to consider the advisability of purchasing the waterworks supplying the town.

The dissolution of partnership between Messrs. Bleakley and Murray, architects, of Birkenhead, and between Messrs. Lean and Hooley, architects and surveyors, Neath, Glamorganshire, is gazetted.

The Glasgow Archaeological Society last week visited Dumfries. The members who were able to join the party were received by the local Natural History and Antiquarian Society. After inspecting the "Siller-Gruu," the old bridge built by Devorgilla, the site of the monastery where Bruce killed the Red Comyn, and other places of interest, the party drove to Caclaverock Castle, eight miles distant, visiting on the way the grave of Paterson, the "Old Mortality" of Sir Walter Scott. A paper was read at Caclaverock on the family history of its proprietors.

The committee for the restoration of Tamworth parish-church, have accepted Messrs. Clarkson and Son's tender, £184, for the north chancel windows, and Messrs. Mitchell's tender of £255 6s. for the six north nave clerestory windows. They have decided to request Mr. Champneys, the architect, to make plans and specifications for the south window of the south transept, and directed that the necessary repairs to the sliding window be put in the hands of one of the builders engaged in the restoration.

CONTENTS.

Lincoln's Inn Chapel	381
The Proposed Deep-Water Dock at Tilbury	381
Competition Drawings for Dairy Homesteads	382
End-Pipe Connections in Sewerage	383
Shops-Windows. No. 1.	384
Paving and Drainage. (1881)	387
On the Effect of Frictional Stress upon the Strength and Elasticity of Fine Timber	387
The New Lighthouse at Loughs	388
The Savoy Theatre	389
Practical Notes on Paving. XIV.	390
Pressure of Wind on Plane Surfaces	390
Acoustics in Architecture	391
Claps	391
Our Lithographic Illustrations	392
The "Building News" Designing Club	392
Ways to Niles in the West	393
The Retail Shop in Westminster Abbey	393
Building Intelligence	393
Architectural	393
Competition	393
Schools of Art	393
To Correspondents	393
Correspondence	393
Intercommunication	393
Local Intelligence	393
Water Supply and Sanitary Matters	393
Statues, Memorials, &c.	393
Stained Glass	393
Our Office Table	393
Tenders	393

ILLUSTRATIONS.

NEW CHURCH OF THE SACRED HEART, EXETER. E. H. HEDDING-
TON ARCHT. WORKS IN PROGRESS.—SKETCHES FROM CAR-
LISSE.—HAZLEHURST, ORE, HASTINGS.—DOCK MASTERS'
HOUSES, ROYAL ALBERT DOCK.

OUR LITHOGRAPHIC ILLUSTRATIONS.

CHURCH OF THE SACRED HEART, EXETER.

We illustrate this week the west front of a new Catholic church, about to be erected in South-street, Exeter. Owing to the rapid fall of the ground, a narthex inclosing a short flight of steps was found to be the most desirable form of entrance. A lofty tower at the west-end of north aisle forms a baptistery, and is crowned by an octagonal lantern, which is to be constructed of stone, with a framed wooden roof, carried well down inside the octagon, and covered with lead, laid diagonally on small rolls. It is proposed to build the walls throughout of Poconestone, faced externally with grey limestone. The open-timber roof to nave is to be constructed with arched principals, framed into short hammer-beams, and carried down to springing of clerestory windows. The chancel, with its apse, has a groined ceiling, formed of oak-ribs and boarding. The arrangement of the chancel arch and narrow-side arches results from the chancel being planned narrower than the nave and this, with the side-chapels, which are separated from the chancel by a double arcade, will form a prominent feature in the interior. A gallery for the organ is provided in the south transept, reached by a staircase, leading from a lobby which forms an exit from the church in case of fire—this being a requirement of the local authorities. Mr. Charles E. Ware, Mem. Inst. C.E., and Mr. Leonard Stokes are the joint architects for the work. The drawing by Mr. Stokes, from which our illustration is taken, was hung in the late exhibition of the Royal Academy, and has already been noticed by us.

BUILDING NEWS, WESTMINSTER.

In our descriptive account of the Architectural Association excursion to Worcestershire last month we published some particulars of the Court House at Huddington, and at the same time gave a general view of the building as seen from the west, looking over the moat. Today we are enabled to give further drawings, illustrating the interior of the large room on the first floor known as the "Gallery," but now divided into two apartments and used as bedrooms, the building being in the occupation of a farmer. The west end of the multiphase, double-arched window, as well as the wall-painting here shown, have been recently removed by the Earl of Shrewsbury, and, we understand, are to be preserved in one of his own residences. These sketches, therefore, which Mr. W. N. P. Smith has given special value to, are of great interest to the building and

unrestored example of old English woodwork in situ, which has now passed away beyond recall. The other illustrations include a view of the Court House, taken from the garden in the rear, and some further details sketched by Mr. Maurice B. Adams. The main entrance occupies a central position on the north front, which is unbroken by any projection beyond the porch here shown.

SKETCHES FROM CARLISLE CATHEDRAL.

The history of this Cathedral, as is usually the case, reveals a long list of changes and rebuildings, and of injuries suffered at various times from war, fire, and religious bigotry. It furnishes, therefore, an excellent storehouse of the work of different periods. The sketches illustrated scarcely stand in need of any description. The newel, in the turret stair on the north side of the tower, is remarkable because of the way in which it has been cut in order to obtain a symmetrical vault at the landing where the varying widths of the staircase had flung it out of the centre. The outer section of the tracery of the circular window-lights I could not measure on account of its inaccessible position.—W. CANNING.

HAZLEHURST, ORE, HASTINGS.

This house, as it now stands, is the combined production of five or six architects, the original building having been added to at various times. Our illustration is taken from a drawing in this year's Royal Academy, and is intended to show the latest addition, that of a new drawing room and school-room, the one at either end of the building, with bedrooms over; besides these there have been various alterations in the internal arrangements of the house. The architect is Mr. W. Hay Murray, of Hastings, and the builder is Mr. James Stubberfield, of Ore.

DOCK MASTERS' HOUSES, ROYAL ALBERT DOCK.

Our illustration, taken from the drawing in the last Royal Academy Exhibition, shows the houses now being completed for the London and St. Katherine Dock Company, near the entrance from the Thames to the Royal Albert Dock. The walls above the base-course are of wood-framing, with plastered panels. The plain and ornamental tiles on gables are red, and the roof covered with Broseley tiles. The building has been carried out by Messrs. Perry and Co., Bow, under the superintendence of Messrs. Vigers and Wagstaffe, architects.

The death is announced of Col. Thomas George Glover, late of the Royal Engineers, Bengal, who for many years was engaged in the superintendence of public engineering works in India. In 1849 he was appointed an assistant executive engineer in the Public Works Department of the Punjab Circle. Soon after the pacification of the Punjab he was appointed officiating Garrison Engineer at Lahore, and at the outbreak of the Indian mutiny he was executive engineer at Bhirpore, to which office he was gazetted on the 6th of February, 1857. He succeeded in escaping to Agra, then the seat of Government in the north-west provinces, and in 1859, was appointed superintendent of the Western Jumna Canals, Punjab, with the rank of a first-class executive engineer, and was engaged in the construction of those great works of irrigation which have tended to the development and fertilisation of the northern provinces of our Indian empire. Eight years later Col. Glover was appointed a superintending engineer of the first class in the Department of Public Works, and retired some years since.

An accident occurred on Saturday week at the new deep dock now being constructed at Galway. The coffer-dam to keep out the tide from the site of the new dock had just been completed, and Mr. Prie, the principal engineer, was present, along with harbour commissioners and other members of the board, inspecting the work. Shortly after the labourers who had been working at the excavation inside the dock had left off, the tide swept away about 20 yards of the centre of the coffer-dam, and rushed in with a rapidity which would have caused great loss of life had the accident occurred half an hour sooner. As it is, the damage is considerable—amounting to about £2,000. The dock-work being carried out is estimated to cost £25,000.

A new schoolroom, 55ft. by 26ft., and 21ft. high, and several classrooms have been added to the Primitive Methodist chapel in St. Owen-street, Liverpool, and were opened on Monday week. Mr. Thos. Davies, of Herculaneum, was the architect, and Mr. Powell, of Egn-street, in the same city, was the builder. The cost was about £150.

THE "BUILDING NEWS" DESIGNING CLUB.

WE now have the pleasure of publishing our award for the past year, and we take first the names of those members who we think are entitled to receive the three prizes offered.

1st prize, £10 10s., "Jack" (J. Holdgate, Hillingham-road, Leigate, Surrey).
2nd prize, £5 5s., "Black and White" (Henry R. Goodsham, Bishop's-road, Victoria Park).

3rd prize, £3 3s., "Veronese" (W. B. Marsden, Promenade, Southport).

We highly commend the following competitors:—

"Popil J." (James B. Hkens, 30, Newstead-road, Liverpool).

"Cui Bono."

"Per" (Frank Bindloss, Cross-street, Manchester).

"Beta" (Christopher Clift, Woodbine-street, S. Shields).

"Nemo."

"Bonus Hominus" (J. H. Goodman, Bath-road, Tilthurst, near Reading).

The following are the names of six other competitors whose persistent efforts call for recognition:—

"Walter" (Walter A. Catlow, Humberstone-gate, Leicester).

"In Hoc Signo Vincas."

"Fidelis."

"Ephraim" (J. G. Sankey, Blackley, near Manchester).

"Yarra Yarra" (W. Lucas, St. James's-square, Cheltenham).

"En Avant" (Arthur L. Bradbeer, Worthing).

CHIPS.

On Saturday the memorial-stones were laid of a new schoolroom, which is being erected in connection with the Methodist Free Church at Redfield, St. George's, near Bristol. The plans were prepared by Mr. Wm. Thompson, of St. George's, and the building contract has been intrusted to Messrs. Williams and Peacock, who will complete it about January. The building, which is to be of a similar style with the chapel—Pennant stone with freestone dressings—is estimated to cost £1,000. On the ground-floor there will be one large schoolroom and a vestry, and above this there will be five classrooms, providing accommodation altogether for about 800 children.

The handsome house in Castle-street, Warwick, occupied by Thomas Oken, merchant, in the reign of Queen Elizabeth, and now known by his name, has just been restored and renovated. The work was carried out by Messrs. Dean and Son, of Warwick, under the supervision of the surveyor to the trustees.

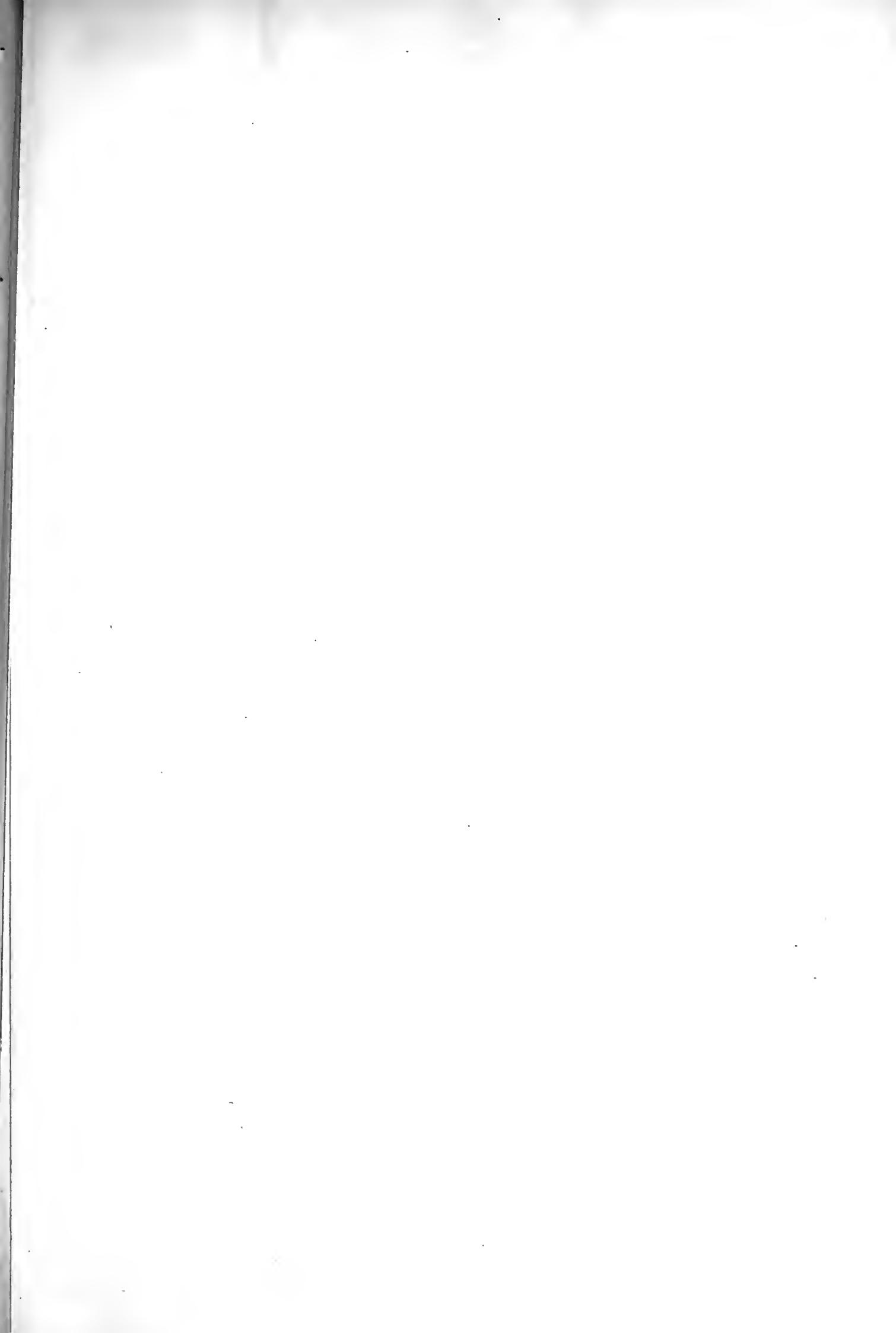
Extensive works for the improvement of Coleraine harbour are being carried out under contract from the plans of Sir John Coode. The works include a new mole on the east side of the river, to form which, the commissioners have purchased quarries at Liffock, affording from 60,000 to 80,000 tons of stone.

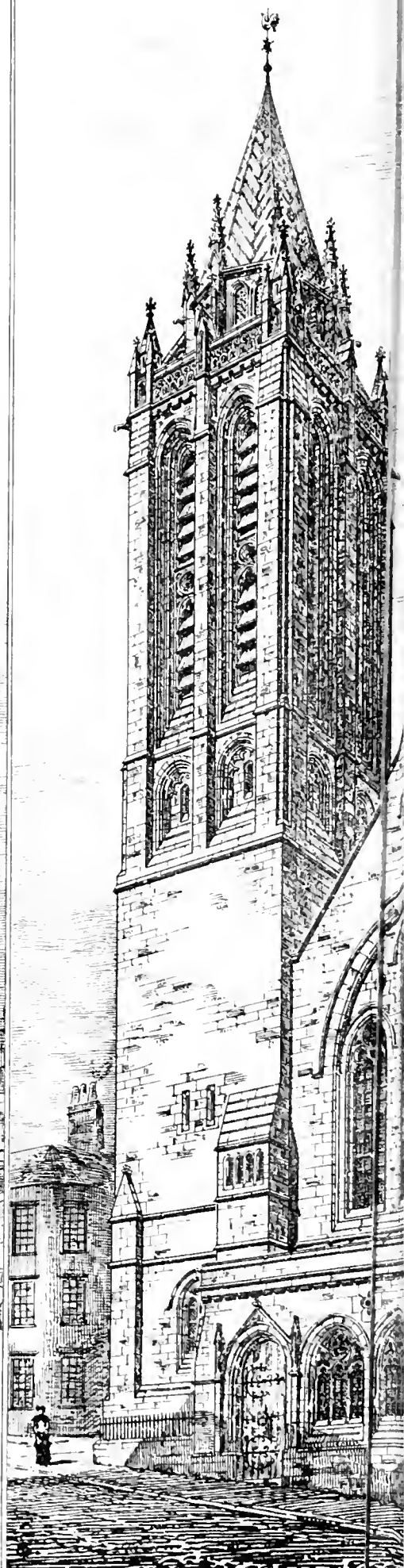
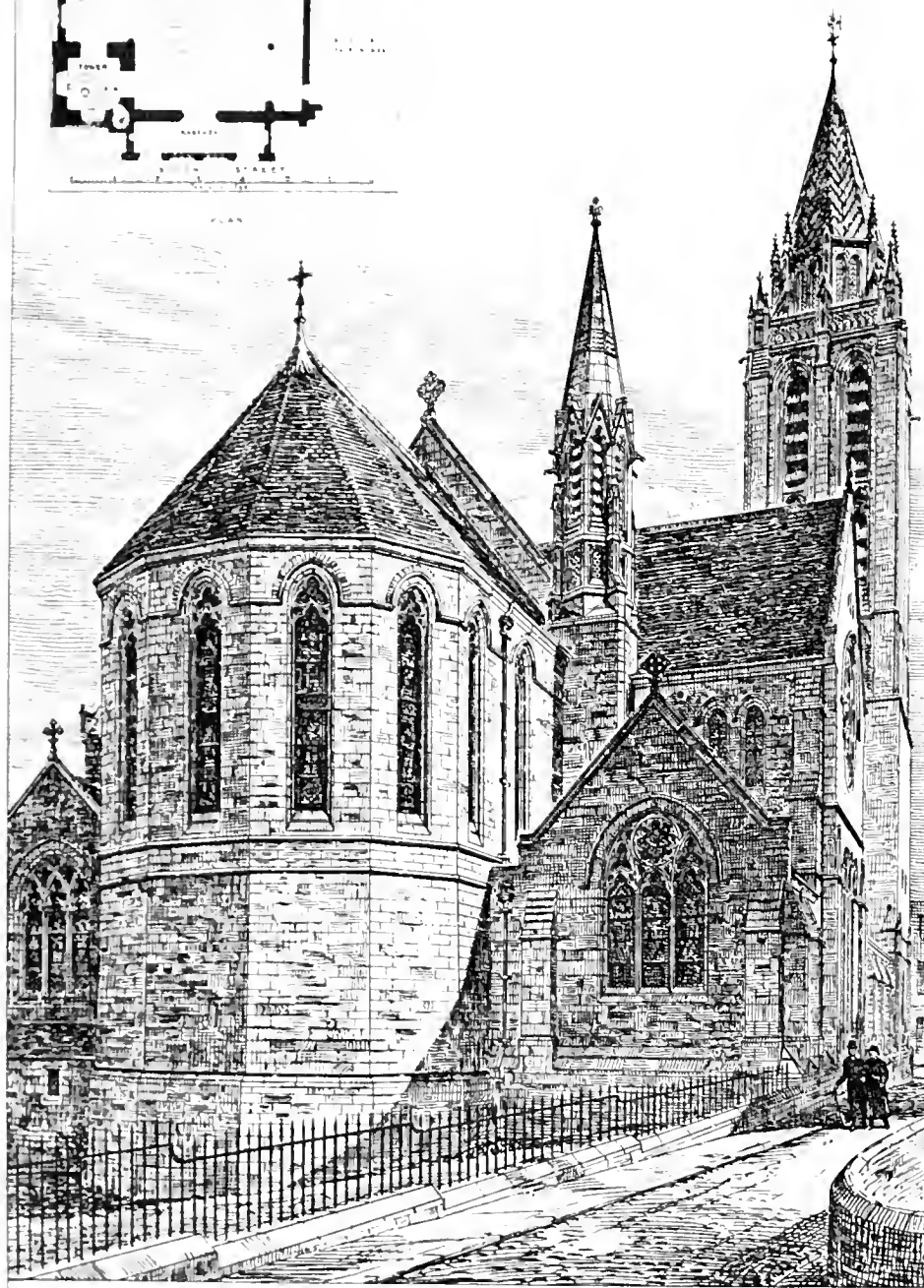
The police commissioners of the burgh of Alva, N.B., have purchased the works and undertaking of the local gas-company for the sum of £7,000, under the provisions of the Burgh's (Scotland) Gas Supply Act.

The charity governors of High Wycombe have accepted the tender of Mr. W. R. Loosley, of Wycombe, amounting to £1,350, for the erection of the new grammar-school buildings, this being the lowest but one of twelve tenders received, which ranged from £5,667 to £1,197 10s. The architect is Mr. Arthur Vernon, of Westminster and High Wycombe.

The North-Eastern Railway Company have decided to construct a railway from Alwrick via Wooler to Cornhill, provided the land-owners in Central Northumberland agree to provide the land on the route of the proposed line on satisfactory terms. The line will be about 30 miles in length, and will connect the Alwrick and Kelso branches of the North-Eastern system. The same company is surveying the land for a proposed junction line from the terminus of the Tees Valley system at Middleton in Teesdale to that of another branch at Alston, a connection which would open up High Force and Cauldron Snout to tourists as well as a lead-mining district.

At a meeting held at Greenwich on Friday, it was decided to endeavour to raise £10,000 as a memorial to Canon Miller, and to erect with it a hospital in the rear of the Greenwich dispensary.

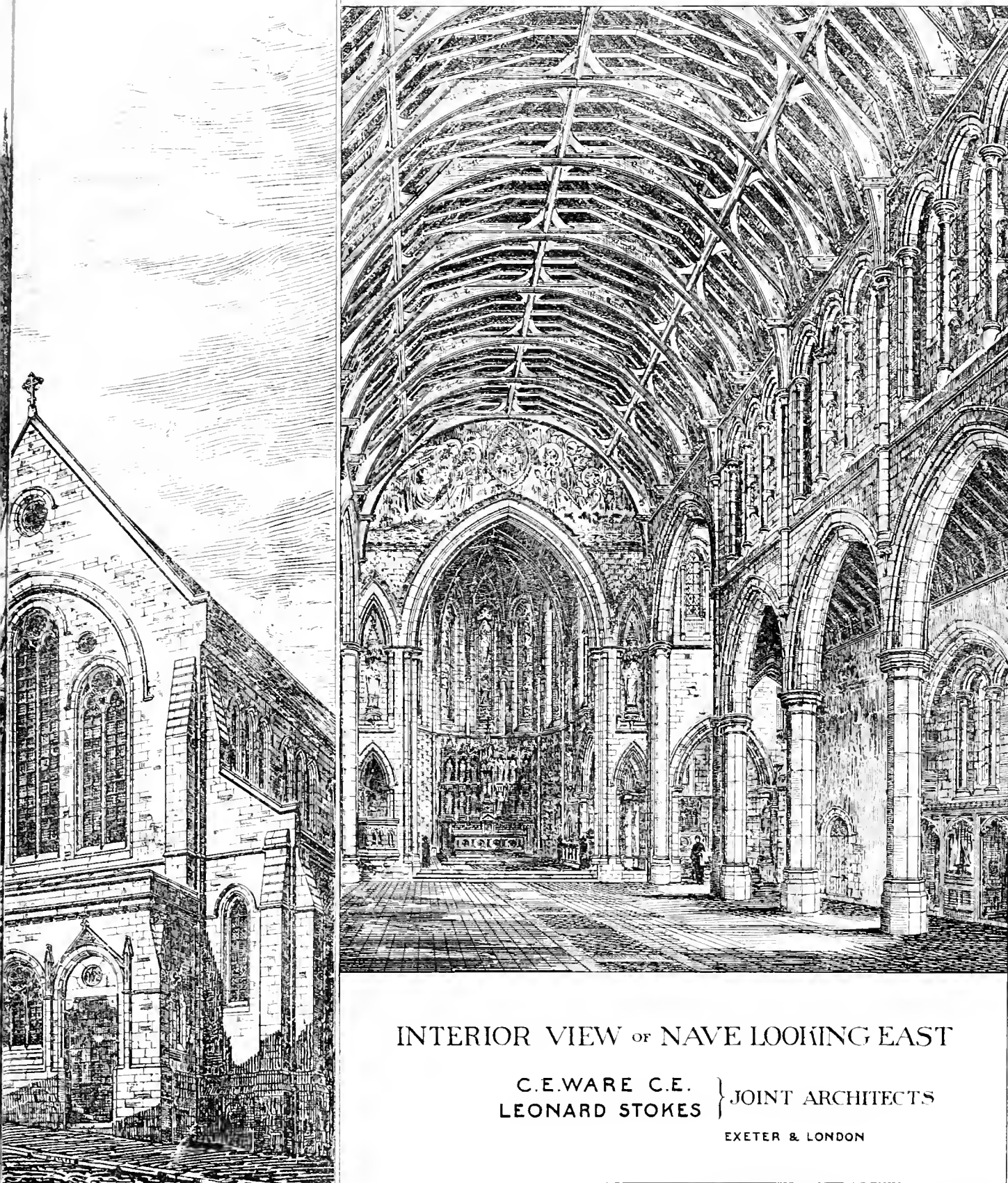




EXTERIOR · VIEW · LOOKING · EAST ·
PLAN · AND
VIEW · OF · SOUTH · STREET · FRONT ·

New Church of the SACRED HEART.

EXETER



INTERIOR VIEW OF NAVE LOOKING EAST

C.E. WARE C.E. } JOINT ARCHITECTS
LEONARD STOKES }

EXETER & LONDON



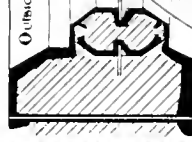


Sketches from Carlisle Cathedral

By W. Canning



Outside not measured



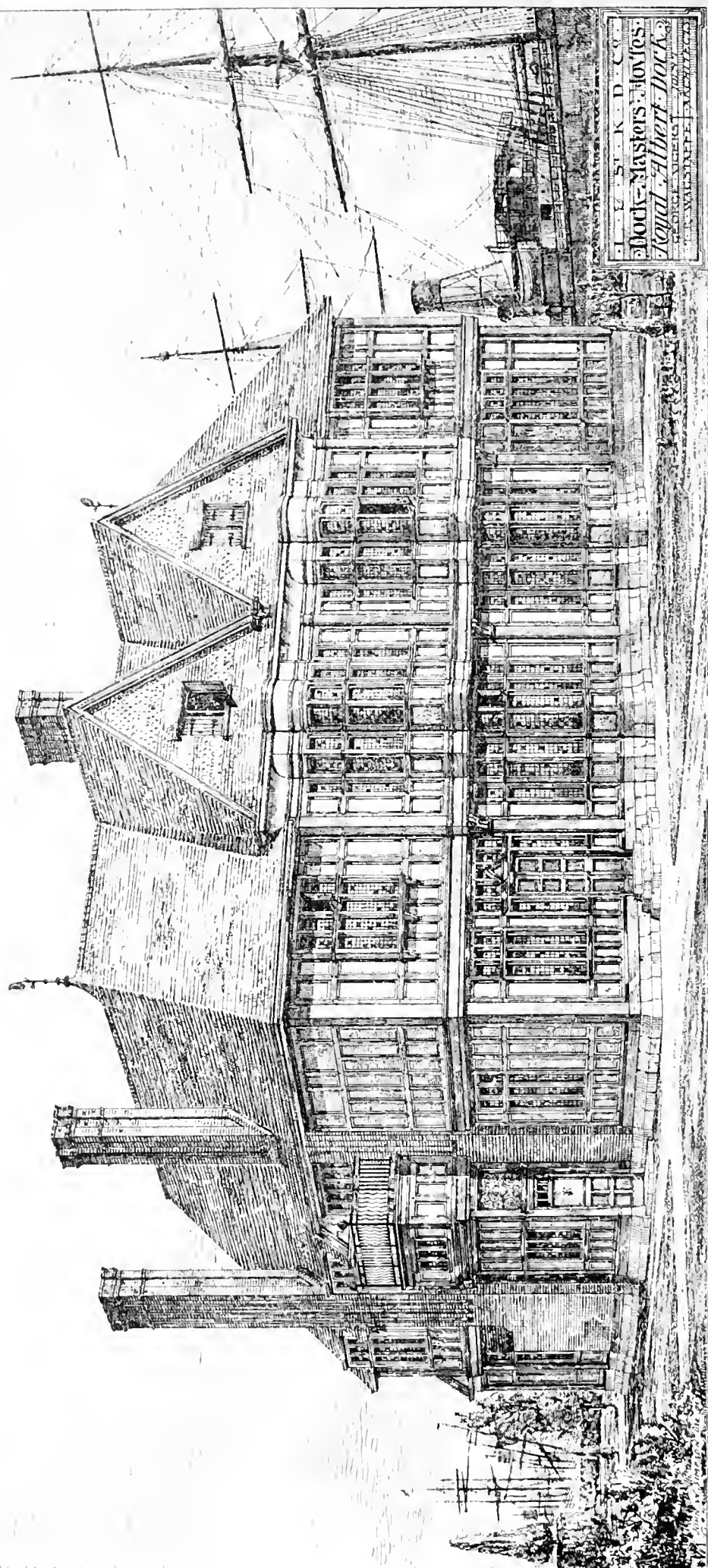
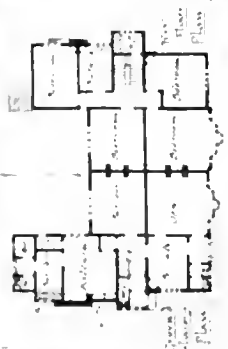
Section

Stair to Clear-story at North-East Angle

Newel in Staircase to Tower

Window to Passage of Clear-story Stair Inside Elevation

The BUILDING DEPT. SEP 28, 1871



L. V. ST. K. D. CO.
 Book-Binders & Printers
 Royal Albert Dock
 GEORGE STREET
 LONDON E.C. 4
 JOHN WILKINSON & CO. LTD.
 10, ABchurch Lane, E.C. 4

Photo Lithographed & Printed by James Alderman 6, Queen's Square, W.C.

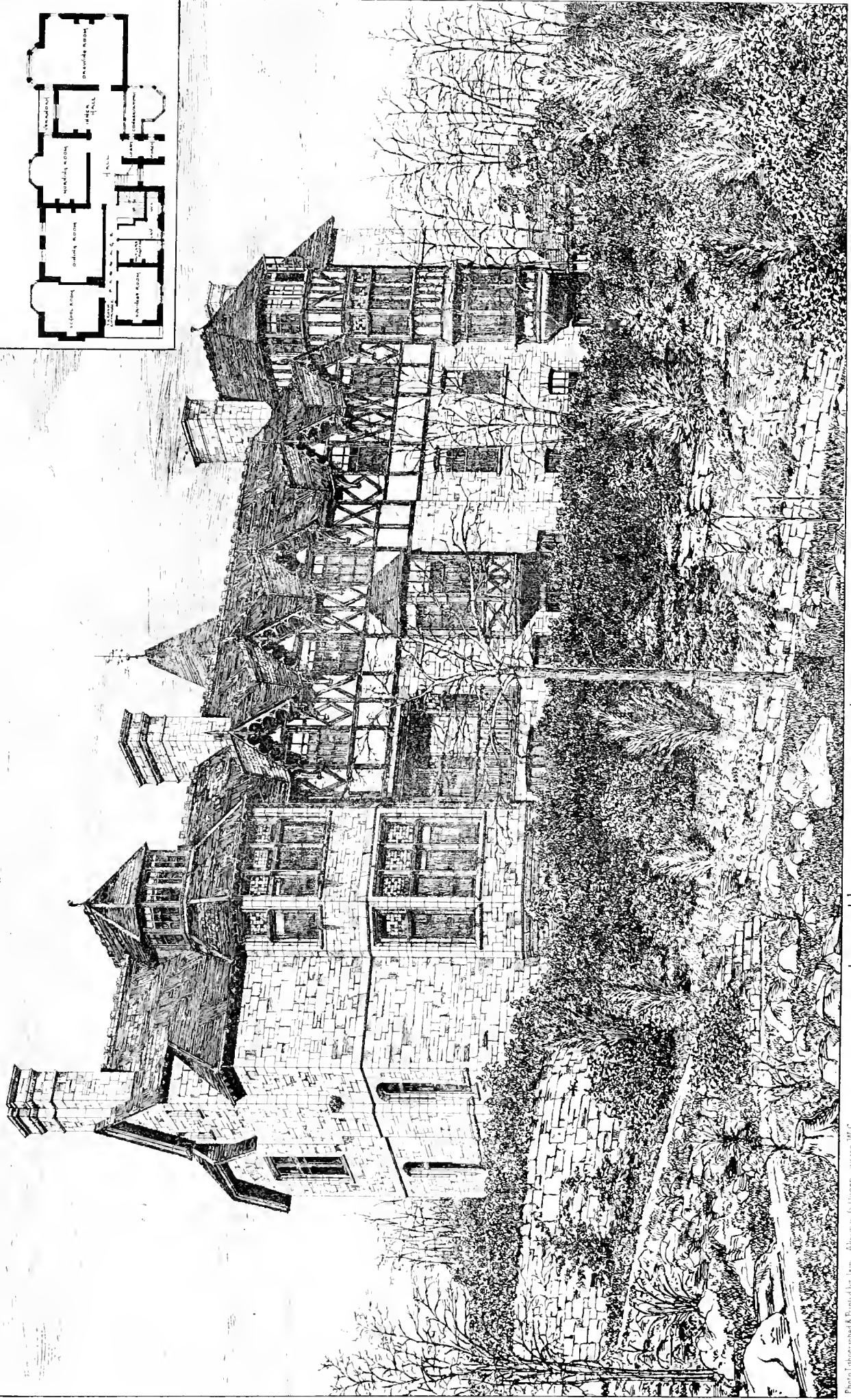
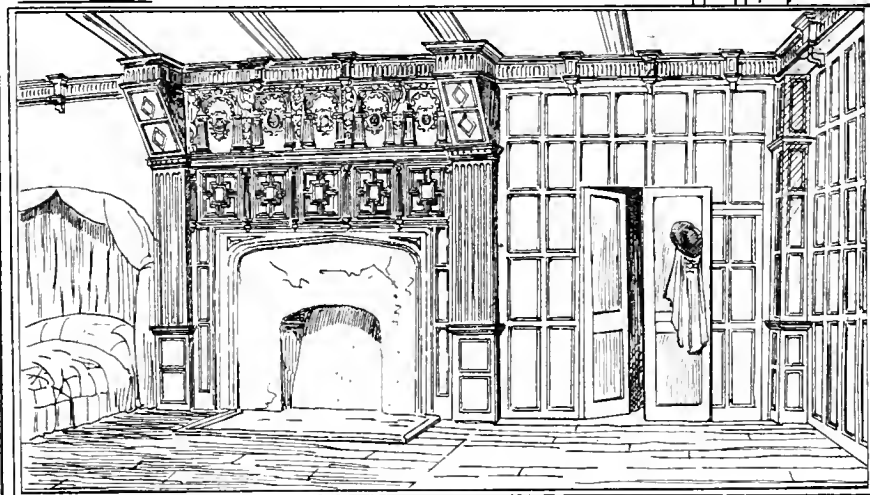
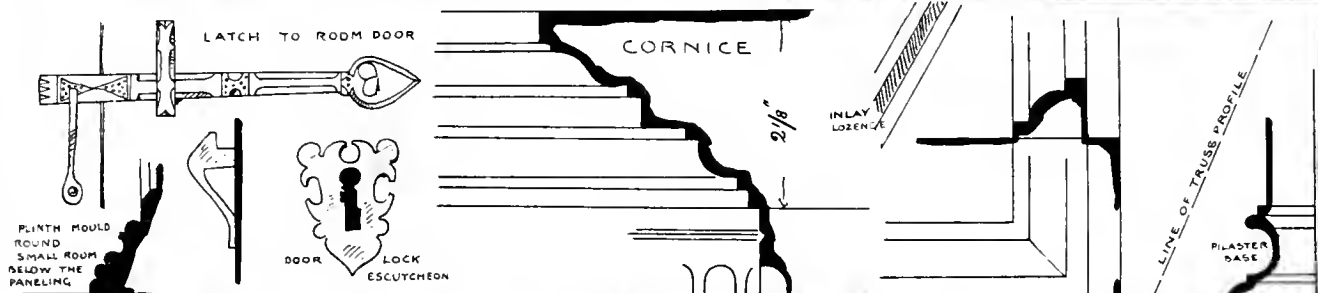
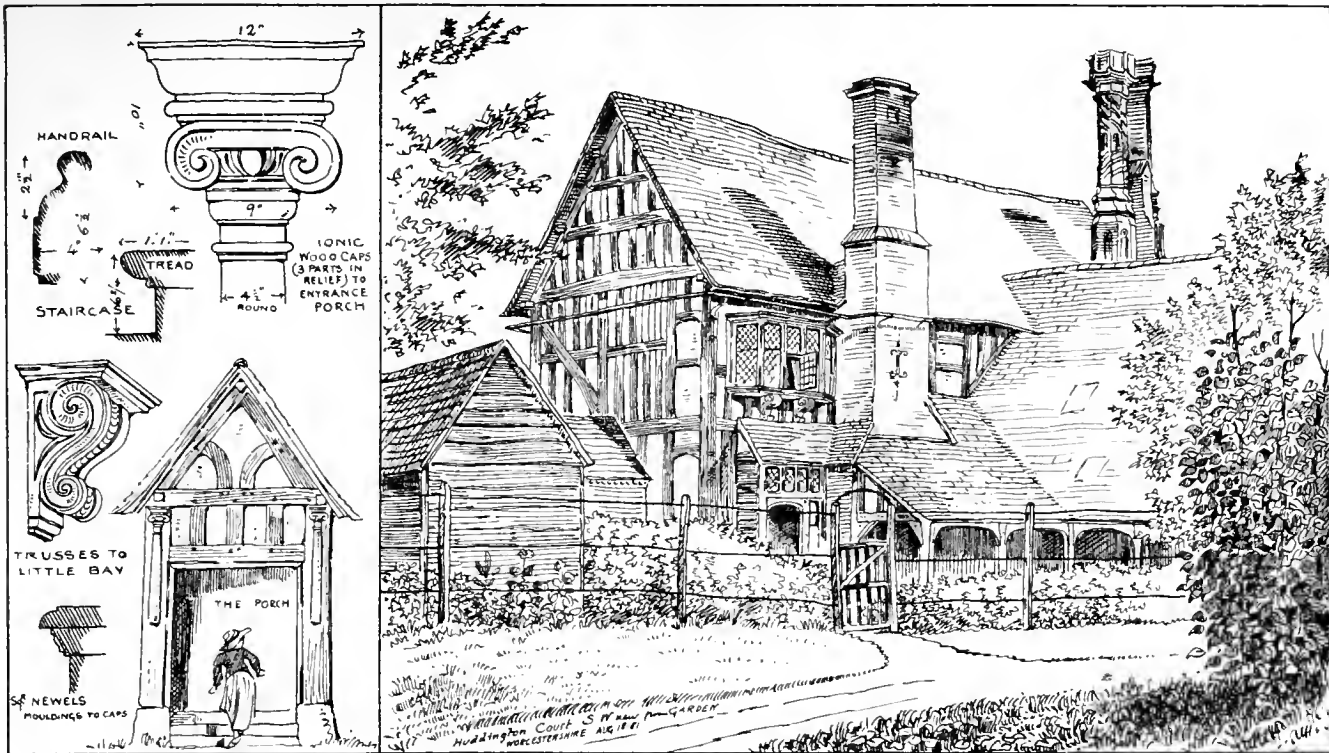


Photo. Lithograph & Engraving by Geo. Allison & Co., Queen, Queen, W.C.

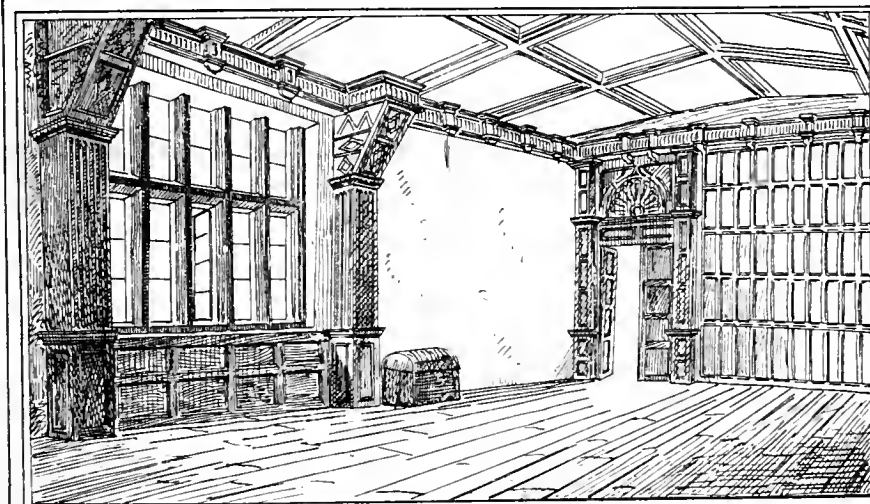
"HAZELHURST", ORE, HASTINGS. THE RESIDENCE OF H.S. MARRIOTTESQUE

W. HAY MURRAY ARCHITECT

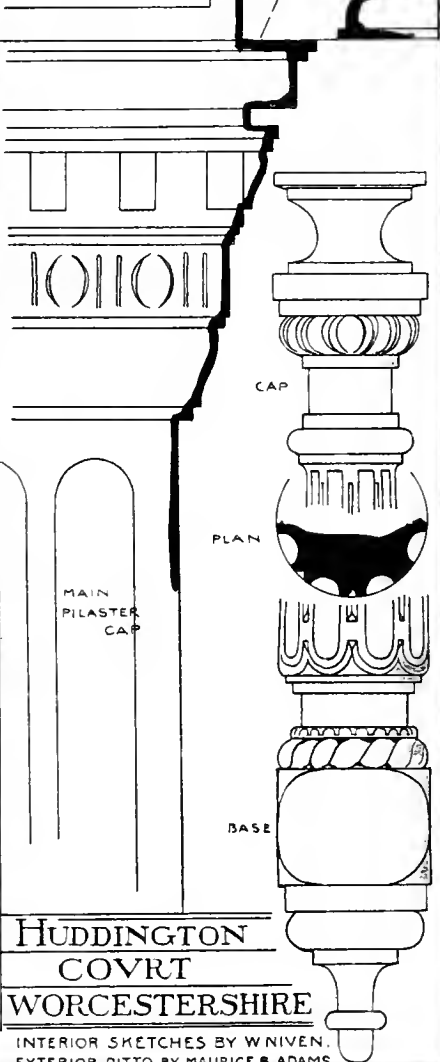




VIEW OF GALLERY FIRE-PLACE &c NOW REMOVED



VIEW OF GALLERY WINDOW FITTINGS NOW REMOVED



HUDDINGTON
 COVRT
 WORCESTERSHIRE

INTERIOR SKETCHES BY W NIVEN.
EXTERIOR DITTO BY MAURICE B ADAMS

WAYSIDE NOTES IN THE WEST.

I HAVE just returned from a sketching excursion over ground traversed by me previously many years since in the counties of Gloucester, Monmouth, and Somerset: the following notes may be useful possibly to others on the same beat.

At Gloucester Cathedral, since my former visit, the two most noticeable changes are the chapel decorations by Mr. Gambier Parry, and the new pavement in choir. The first is as good as good can be, the latter as positively bad, a glaring mass of yellow glazed tile, the which, so to speak, rises and knocks one in the face. Yet so proud are the cathedral authorities of this gaudy, vulgar tiling, that it is not allowed to be walked on. So the interesting wooden effigy of the Crusader cannot go back to its right position in the centre of choir, and the public are obliged to content themselves with seeing the back of the tomb of Edward III. On Communion Sundays, I was informed, mats had to be laid down. To put a pavement too good to be trod upon is assuredly a gross absurdity; but in this case the folly is at a climax, inasmuch as the pavement is not good, would not suffer by being walked on, and if scratched and worn would look all the better for it. Whilst this pavement is so tenderly considered, the painting I have referred to receives no care or protection, though a work of great beauty. A slight barrier should certainly be fixed round it, to protect against the carelessness or mischievousness of the gaping crowd who, ignorant and unappreciative, press into the confined space.*

The very interesting church of St. Mary de Crypt is in the builders' hands. I hope there is but little money to spend.

Mr. Gambier Parry's celebrated decorations at Highnam Church have been for some time at a standstill. A great pity; but if he continues the work I would strongly urge the necessity of having less-glaring glass in the windows. Their high colouring shuts out the light required, and must of necessity make the mural decoration look weak and poor; from an art-point of view, too, the windows must be condemned, not being in good style. The glass most fitted to accompany wall-decoration is that of the windows of Merton College, Oxford. Glass-painters, I would remark, after groping about in the dark for the last fifty years, begin now to see the need, not of displaying ultra-extravagance of colour, but of strictly subordinating it, introducing a large amount of white glass. It is never too late to mend, but it is extraordinary how slow people are in learning.

One can never see Chepstow Church without bitter regret at the stupid alterations which, under the name of restoration (hateful word), took place about forty years ago. I think it a pity architects should be paid for Church restoration. Certain it is that the 5 per cent. system is a bad one. There are few architects but will make work for themselves under the temptation of this inducement, and so our ancient relics are sacrificed. In the castle I found that the beautiful little 14th-century chimney-head, shown in Parker's "Glossary," no longer exists. It had been, I was told, blown down, and no remains preserved. The original stone seat of the Gardirobe, I found, had been forced out of its place and broken—a most unwarrantable act of violence. These who are answerable for it should be made reinstatement. No danger of sewage-gas or typhoid-fever with such arrangements as this—projecting over the river at a height of a hundred feet.

The Post-Office, Chepstow.—The architectural visitor will be gratified to find that this best of modern institutions is situated in a large vaulted apartment of Edwardian date, it being

the undercroft of a Mediaeval merchant's house, a singular conjunction of two widely different phases of civilisation.

At the churches of Tidenham and Llancaut, both in the immediate neighbourhood of Chepstow, may be seen lead fonts of very ornamental character, of, probably, 12th century date, and apparently from same mould. These are the only lead fonts I have met with.

Tintern Abbey I found in anything but an improved state. The pretty mountain ash which, with its graceful foliage and scarlet berries, used to be at this time of year such an ornamental object, screening the blank wall of north aisle, has been cut down—a foolish and unnecessary act, as also the stripping off the west gable of the beautiful mantle of ivy with which it had been so long adorned. The worst thing done, however, is the removal of the lower part of rood-screen, situated in the nave, a bay westward of the Crux. This was one of the marked features of the interior. This was swept away. I was told, "in order to have a smooth uninterrupted walk," and that "the effect was a great improvement!" Benighted ignorance! The field on the south side is now shut up, so that students of the beautiful can no longer inspect the exterior, south or east. The remains of the rood-screen, if in existence, should be replaced without delay. Such destruction is a mischievous falsification of history, wanton and inexcusable. Remains of a fine plastering (it might be whitewash) seemed to have covered the whole of interior. I remember when there was much of it; now there is scarce a vestige, and with it has gone the remains of mural painting, which was observable over altar in south transept.*

The railway has quite spoilt the place in my estimation. The *genius loci* must see with affright the turbulent, noisy crowd of cheap trippers which troop through the place. The railway company last week set themselves to make a profit out of poetic sentiment, by tempting excursionists to a night visit to see the Abbey by moonlight! The previous night being beautifully fine, many persons went. However, the genius of the place had revenge on those who thus rudely profaned her haunts. The moon hid herself in clouds, and heavy rain sent away the foolish crowd in a drenched condition to their distant homes.

The two 13th-century chapels at Tintern have been both restored, but not satisfactorily. An ivied ruin by the roadside has, I find, been pulled down—a pity. About five miles from Tintern, on the Monmouth road, is the little-visited village of Trellic. It is worthy of notice, possessing Druidical stones, an earthen fortress, an interesting 13th-century church, with cross in churchyard, and at its base two early tombs—the only early monuments I have met with in a churchyard. The clerestory of church, since my former visit, has been rebuilt in part, leaving out the lancet windows though they are gone. The church is in a very neglected state, and no funds forthcoming for repairs. The great farm of the place, upon which I suppose the rate would be levied, has been, I was told, vacant for years! Local tradition says this place once possessed seven churches, and that a wayside cross, now half a mile from the village, was at one time a boundary mark. About a mile nearer Monmouth, alongside road are other Druidical stones, or, what seem to me such—but I have seen no reference to them in books. Of Monmouth Castle but little remains. I had hoped to have seen here the cradle of Henry V., figured in Liborte's "Arts of the Middle Ages." I was told it had been sold to a gentleman near Bristol. The interest of the cradle to me is this, that so far as I know, it is the only specimen of English Gothic domestic furniture in existence. A strange fact. I exclude chairs which are preserved in churches, as not being domestic. What purports to be Mediaeval furniture is, none of it, older than Elizabeth. Mr. Street is engaged at Monmouth in transmogrifying a Classical church into a Gothic one. The other church has been restored in the Norman style, most horribly. The old bridge with its gateway is a delightful bit.

All architects and artists should see stately Raglan. In picturesque beauty it is unrivalled. A pity that the commercial spirit is so dominant

* This church has a fine lofty proportion. The preference shown for arches with centres below springing is remarkable. The solid stone screen which shut off the aisles is noteworthy.

with the custodian, giving the place the character of tavern and tea-garden. The modern slate roof at the side is a sad blemish to the landscape. Newport Castle will, I hope, be looked after by local friends. Though humbled to the uses of a brewery, the remains are worth preservation. St. Woolas Church, Newport, is an enigma. The west wall, with its remarkable doorway, is probably early 11th-century. Westward of this was built, in the 13th century, a chamber, say, 60ft. by 20ft.; and again, west of this, stands the tower, of Perpendicular date. Now, what was the intention of this singular building? It is now called a Lady-chapel, but chapel it was not, for there is no sign of altar, the west doorway of church occupying the altar place. I suppose it was for sepulchre, as there are recesses in side walls. The thing is, however, unique. The floor of this chamber slopes down eastwards.

The Roman city, now Caerleon, is very disappointing. It was a place of importance, but little vestige remains. From the rarity of Roman architectural remains in this country, the Doric columns in museum here are, therefore, proportionately interesting. The person in charge, however, insisted upon these being Norman!

Caerwent, about five miles off, also Roman, has much of its city wall left. The south side is said to have been washed by the Dristol Channel, now some miles distant. The retreat of the waters probably accounts for Newport and its name, from Caerleon being the old port. The same cause in modern times has resulted in the necessity for the Gloucester canal.

A singular thing has happened in respect of this wall at Caerwent. A block of it in solid mass, about 15ft. square, has been thrust cut of position and thrown over. I could not hear how or when this happened, nor can I form any probable theory on the subject. Respecting a Roman pavement lately discovered, I, on inquiry, found it to be in a cottager's garden. The space uncovered is about a fourth of a design formed of a circle in a square, with lesser panels of hexagon shape, with figures of fishes, &c. This piece is about 6ft. square, of fine design and workmanship. The cottager did not, she said, intend to uncover more, as potatoes were of more consequence than pavements. Her aunt, I found, had also a pavement in her garden now covered with a potato-crop, so I could not see it. As the latest discovery was being trodden to pieces, I recommended it being covered forthwith. It was only a few inches under surface, and I wonder it had not been destroyed by digging over it long since. A couple of "flower pots," as they were called, had lately been unearthed in another place. These being left about, were broken. I could only see the upper part of one, a double-lipped Roman vase of black clay. Many pavements and curiosities have been found here and sent to Caerleon Museum, re-covered, or destroyed. Considering these works of art have been so well preserved for some sixteen centuries, it is sad that now they should be so little appreciated. There is probably much here that is interesting, but the natives care nothing for such things.

Caldicot Castle I did not find altered. In the keep Mr. Parker thinks that the hole in recess gives access to the dungeons. It appears to me to be clearly the well, which was a necessary adjunct to the keep; without it, the keep would not be long kept. The well was commonly in a wall. In the centre compartment, south front, there appears to have been, in a singular manner, a sort of canopy head to the upper windows, but the projecting part is in no instance remaining. I do not know what this could have been. Mr. Parker thinks that the interior buildings were constructed of wood; but there are visible in the turf plain indications of wall-footings, and where stone was at hand, it is not likely wood would be used in preference. The parish-church is good, of 13th, 14th, and 15th centuries. The west window of tower is decorated, and of singular shape; there is no arch to head, but the jamb follows the shape of the tracery. Another instance of this exists at Tidenham, probably by the same designer.

Berkeley Church is a charming 13th-century example, with interesting Perpendicular chapel of the Fitzhardinges attached. It has happily escaped mutilation. The belfry is detached—a Perpendicular tower at extremity of churchyard—probably for the reason that if connected to church it would, in possession of an enemy, be

* Gloucester Cathedral, though it passed through the hands of Sir Gilbert Scott, has happily retained its choir screen with organ over. Though people blame the destructive acts of Wyatt, at Salisbury, in making the Cathedral interior open, regular, and uniform, his mistaken ideas are very generally held. Pictorially our Cathedrals are much injured by the removal of the rood screens and organs, concerning which Sir Gilbert was right. In respect of the organ, it was the early position or it, and the best place for being heard, and its generally good outline made it, with the screen, an important and artistic break in the general view. In a clear open space is the essence of beauty, why not build a simple parallel? It is the numerous breaks, divisions, and subdivisions by aisle, arcades, screens, &c., which make a Gothic church so interesting. Remove these and the interest fades away. I hope Gloucester will long remain in the restorer's and improver's clutches.

dangerous to cast it, over which it would look.* The Castle is surprisingly perfect. The Norman keep incloses a large piece of ground. The Decorated hall is still daily honoured by its lord dining there. This is probably the only instance of such permanency, the owner being a lineal descendant of its first builders. But few of our nobility are of families old enough to have halls, and those which possess them now got them sideways. It is a pity the old style in this case is not perfectly kept up—the dais is not used. There a late fireplace commands the situation. Originally, no doubt, the fire was in centre of floor. In the death-chamber of Edward II. is a bedstead, said to be his. This is one of the common blunders previously referred to. It is of Elizabethan date. The chapel is perfect and remarkable, and is also in use. The Chinese bell in fore-court is a large and astonishingly fine casting. It is covered on exterior with small characters. With all our advantages in this country, it would be impossible, I am sure, to produce anything like this. There are some interesting old houses in the town. The eccentric arch to doorway of porch reminds one of something similar at Bristol Cathedral and St. Mary Redcliff. It is an arch and not an arch. The head is formed of five pieces of stone, the top and bottom sides being parallel.

Thornbury Castle has been made habitable, and is, therefore, not as accessible as heretofore. The beautiful brick chimneys are remarkable in a stone district. They could not have been made anywhere near. At Hampton Court was building the same time as Thornbury Castle, it is not unlikely the Duke of Buckingham would get the idea and the chimneys there.† The eccentricity-planned projecting windows of the hall show how the Mediaeval designers could play with their work—making difficulties for the pleasure of meeting them.

When before at the church here, I sketched some good old bench ends. All are gone, now replaced by new seating with *mouth-bags tongue*—a wretched, modern trick, as hateful as the silly V-jointing which some ignorant people are so fond of.

The moroseness of its proprietor prevented my inspecting remains of Bristol Castle. I was, however, much pleased with the excellent condition of Norton's house in Peter-street, and the civility with which my wishes were there acceded to. I was glad to see the remains of Norman House so well preserved at the Guildhall.

St. Mark's Church, otherwise the Mayor's Chapel, was *restored*, after a fashion, some 50 years ago. It is a pity a discriminating and wise re-restoration is not entered on now. The Early English work is of fine quality. The singularly high situation of windows points to roofs of other buildings below them. Now that the City School is demolished, which shut in one side, it is to be hoped care will be taken that the side be not either covered up or permitted to suffer from wanton violence. Local architects should look out for vestiges of the old hospital. This is the only church I have met with standing north and south. The beautiful little chapel now used as vestry should be better cared for. Its tiled floor is most singular. A notably fine E. E. bracket stands against south-east pier. The two altar-pieces here, with large side niches and panel in centre, were a favourite composition. The same may be seen at Wrington Church, and several others in the neighbourhood.

At Berkeley Castle I and my companion were charged half-a-crown for admission. I much dislike the enforced payment now getting general. The supposition that the proprietors pocket this money is not complimentary to them; and the mischief is that the servants all look hungrily for fees just the same. For a visit to Cobham I was lately charged eight shillings at the shop in Rochester for myself, wife, and two children, and then felt bound to fee the house-keeper. As I was the only one of the party who felt interested in the place, this outrageous charge, with other expenses, heavily handicapped my pleasure. This is a matter the *nobility* of England should amend. M.

* The ground on which the castle has suffered greatly from damp. I would advise the use of the silver water-colours for such purposes.

† These are the only chimneys in the country which are a modern article, and which put to a whole class of them.

THE RETABULUM IN WESTMINSTER ABBEY.

IN a letter to *Notes and Queries*, "H.P." raises the question, Who was the first discoverer of the retabulum which is now exhibited at the back of the sedilia in Westminster Abbey? He says—"I have access to Mr. Willement's copy of J. P. Neale's 'Abbey Church of St. Peter,' in the fly-leaves of the first volume of which the excellent antiquary and herald has inserted, first, a sketch of the gravestone of William de Valence, which was found under the step of the tomb of King Henry V. and in the floor at the east end of the shrine of the Confessor. This is dated 1551. Secondly, a list of three children of King Henry III., and of nine children of King Edward I., copied from Sandford, all of whom, dying young, were buried in the Abbey. And thirdly, a slip of the leaf of an archaeological work, with an extract stating that 'Mr. Blore, surveyor of Westminster Abbey, on his survey found that the roof of the case in which the wax figures of Queen Anne, the Earl of Chatham, and what is commonly called the ragged regiment, were placed, bore marks of ancient ornament. Having it removed, his surprise was only equalled by his joy at finding it one of the most curious specimens of ancient art at present in existence. With that zeal for the preservation and repair of his church which so distinguishes the learned Dean, this curious remain has been removed to the Deanery till it can be restored to the Abbey.' It was about 1851 that this discovery was made, and I think it highly probable that the paper was written by Mr. Willement himself. I read also in one of the late Mr. Burges's valuable contributions to Sir Gilbert Scott's 'Gleanings from Westminster Abbey,' 1863, as follows:—Some twenty years ago Mr. Blore, who was the architect of the Abbey, had the good fortune to discover, on the top of the waxwork cases in the upper chapel of Abbot Islip, the very beautiful specimen of 13th-century decoration which is now placed at the back of the sedilia over King Sebert's tomb. Moreover, I have lately come across a paper dated July 10th, 1817, by Mr. John Carter, F.S.A. After commending the waxen portrait and dress of King Charles II.'s effigy, he says—'In a box inclosing other royal wax figures in Islip's chantry, has been substituted, by way of covering, some compartmented work of small mosaic ornamental carvings and paintings of figures, of a design so delicate, an execution so exquisite, that an absolute view alone of the same, and that with the utmost attention, can give the least idea thereof. No hesitation need be made, when it is affirmed, that it must have been a small portion of the highly estimated shrines that once rendered the scenic display of the interior of the pile so shining and glorious.' It must be a matter of astonishment that four such men as Blore, Willement, Scott, and Burges should have been unaware of this early discovery made by John Carter, one of the worthiest and most renowned of their predecessors. But it is not even now too late to 'give honour to whom honour is due'; and the writer hopes that this now historical fact will not again be entirely ignored."

CHIPS.

A system of tramways is being laid throughout the town of Warwick, and is now almost complete. The space between rails in the centre of the town is laid with Woodward's molten iron stone blocks, and that beyond with macadam. Mr. Fell is the contractor.

A new porch is being erected at Lutterworth parish-church, from designs prepared by the late Sir Gilbert Scott. The builders are Messrs. Lane and King.

As an experiment Mr. Rex, the post-office surveyor for the Eastern Counties district, has caused the apertures of the wall-boxes in the neighbourhood of Cambridge to be encircled with luminous paint.

A new Congregational chapel was opened at Sulhamstead, near Reading, on Tuesday week. It is built of red brickwork, seats 130 persons, and cost £750. Mr. W. Ravenscroft, of Reading, was the architect.

At Langton-on-Swale, near Northallerton, a chancel, tower and vestry, just added to the church built in 1877, were opened on Thursday in last week. The work has been carried out by Mr. Place, of Langton.

Building Intelligence.

BLOOMSBURY.—A new middle-class school for 200 girls was opened last week in Chenies-street, Tottenham Court-road. The new school and its playground occupy a corner site about 70ft. square, of which about one-half is built upon, the remainder being an open playground. The building is, inclusive of the basement, five stories high. The teaching department is entirely on the ground and first floors, and consists of five classrooms, each holding 40 children. Three adjoining classrooms on the first floor have been so constructed with movable partitions that they can be thrown into a single apartment about 66ft. by 22ft. Each separating partition consists of three widths, the two side widths being large doors, folding back against the walls, the central width a thick sound-proof revolving wood shutter, sliding up and down in grooves on the edges of the closed doors. On the first floor there are three sound-proof music practising rooms with double doors; and on the basement, level with the playground, are luncheon-rooms for pupils and teachers, cloakroom, and lavatories, &c., and kitchen and living-rooms for the caretaker. The second floor is devoted to the head-mistress, and the third floor, in the roof, forms a large winter or wet-day playground, which will be fitted with suitable gymnastic apparatus. The exterior of the building, which is faced with red bricks and red Mansfield stone dressings, is an adaptation of the French Early Renaissance style, the high-pitched slated roof containing the second and third-floor stories. The architects are Messrs. Davis and Emanuel.

BRIGHTON.—A new vicarage has just been completed in connection with St. Mary's Church, Brighton. It has a fine site immediately adjoining the church, at the corner of Upper Rock-gardens, and is built in red brick with white moulded brick strings and panels (from Mr. Jas. Brown's works, Braintree), the upper story being hung with ornamented tiles and the roof covered with dark brown tiles. It has very full interior accommodation, and has cost about £3,000 (exclusive of site), the contract having been efficiently carried out by Messrs. Lynn, of Marlboro'-street, Brighton, under the direction of the architect, Mr. Spencer W. Grant, A.R.I.B.A., of 63, Finsbury-pavement, E.C.

COWFOLD.—Some ten years ago a community of Carthusian monks arrived from France and settled at Cowfold, Sussex, on a spot which, by a happy change of the original name of the estate, they called Parkminster. They shortly afterwards began to build a new monastery—the first Carthusian monastery erected in England for 300 years—which is now nearly completed. Erected in a somewhat severe style of Norman architecture, it has, the *Tablet* says, the merit of solid massiveness and grandeur. It is entered by a gateway leading into a quadrangle, in the centre of which is the church, an imposing structure, with a tower and spire at the east end, 200ft. high, and two turrets at the entrance 110ft. high. Its dimensions are 150ft. by 20ft. The height to the ridge of the roof is 80ft. It is divided by a stone screen into two equal parts, one for the choir monks, the other for the lay brothers. Besides the church there are a large chapel of the relics, chapter-room, and twelve small inclosed chapels. The two sacristies are panelled in pine, and contain presses for the vestments and other fittings. There is accommodation for thirty-six monks, each having sitting and bedroom and two other rooms, in which they can exercise themselves in any manual labour, such as carpentry, carving, &c., and a small garden is attached to each of the cells for out-door exercise. The proportions of the quadrangles (of which there are four) are immense, the largest being 410ft. by 370ft., being larger than the quadrangle of Christ Church, Oxford (261ft. by 261ft.), or of Trinity, Cambridge (314ft. by 325ft.) hitherto considered the largest in England. One of the corridors of this quadrangle extends to 600ft. The whole exterior being now finished, and the interior fittings being already proceeded with, it is probable that St. Hugh's Monastery will be solemnly consecrated next year. The work has been carried out under the supervision of M. Norman, a French architect.

DELABOLE.—A new church has been built

adjacent to the celebrated slate-quarries of Delabole, Cornwall. Early in character, it consists of nave, south aisle and chancel. The walling is of local slate, with granite dressings; the roofs are covered with Delabole slates also, and the same material is used for paving the aisles. The chancel-floor is tiled. The roofs are of open timber; that of the chancel is ornamented by carved angels. There is an oak lectern and chancel-stalls, &c., of the same material. The font is of Beer stone. It is by Mr. Harry Hems, of Exeter, who also did the general carving, and supplied some of the chancel fittings. The glazing is of cathedral glass. Designed by Messrs. Hine and Odgers, architects, of Plymouth, the contract has been carried out by Messrs. Westlake and Cann, of Camelford.

HEREFORD.—The new Dispensary in Union-street was opened on Tuesday week. It has been erected from the joint designs of Mr. Lewis Powell and Mr. Thomas Davies, and the style is Classical Italian; the street elevation is designed in two orders, the lower part being the Roman Doric, and the upper part the Ionic. The pilasters and dressings are in Beer stone; the friezes and entablature in red Worcestershire (Hoverley) stone; and portions of the pilasters are of the same material. The walls are of the local stone from the Three Elms quarry. Right and left of the entrance are the consulting rooms, and the end of the vestibule opens into a large waiting-room furnished with seats, having at one end the dispensary, and at the rear are closets and other conveniences. In the upper story is a large board-room and a smaller one. Underneath the ground-floor are spacious cellars for storage, which are fitted with hot-water apparatus. The sole contractor is Mr. W. Bowers, builder, &c., Bath-street. The cost of building and furnishing has been £1,000, exclusive of site.

KNUTSFORD.—The new church of St. Cross, Knutsford, was consecrated on Wednesday week. It replaces the church built on the same site as lately as the year 1855, but which fell two years since into a dangerous condition, owing to the breaking of the roof and the consequent outward thrust of both side walls. The designs of the edifice just erected were prepared by Messrs. Paley and Austen, architects, Lancaster, and the contractor was Mr. Hamilton, of Altrincham. The cost is £4,000. The church is of brick and terra-cotta, supplied by the Knutsford Brick and Tile Company, and consists of nave, transepts, chancel, tower, vestries, and porch. Its total length is 120 ft. The width of the nave is 23 ft., of the transepts across nave 52 ft., and of the chancel 24 ft. The tower, 81 ft. in height, is fitted to carry a full peal of bells. The building is seated for 315 persons, with pitch-pine benches. The roof is half-ceilied. The walls are coloured to dado height, and above that are of red brick. The chancel is separated from nave by a metal screen with gates. Eastward of the chancel is the sacarium, with sedilia, credence table, and the altar, standing under a five-light tracery window, filled in with stained glass, illustrative of incidents in the life of Christ. The window was furnished by Mr. Forrest, of Liverpool. The alabaster font was made by Roddis, of Birmingham. The central part of the reredos is chiefly of wood, carved by Mr. F. Armitage, of Bowdon. The side portions are formed of panels, with raised margins of sage-green plush, and compartments embellished with handsome crewl work.

MANNAMÉAD, PLYMOUTH.—The church (of which the nave and aisles were erected 11 years ago) has just had a fine chancel and transepts, with organ-chamber and vestry added, from the design of Messrs. Hine and Odgers, architects, of Plymouth. Of Late Decorated style, the new work blends well with the earlier portion, and a dignified church is the result, the effect of which will be greatly enhanced when the proposed south-west spire becomes an actuality. This spire will be 150 feet high, and will cost £1,700. Lofty in design, the new chancel is built of blue limestone, with dressings of Portland and Bath. The roofs are of steep pitch, covered with slate. The crosses are prominent features, and of wrought iron. The east window is kept well up, and is a five-light one. Mr. W. Morris, of London, is at present painting the glass for this window. The other windows all display flowing tracery heads, and are filled with Geometrical cathedral tinted glass. There is an entrance in the south transept. The open-

timbered roofs are of pitch-pine. That of the chancel springs from 14 large sculptured stone corbels. These represent angels in adoration and with musical instruments. The church contains other figure-carving in stone, and the blocks left at the time when the first section was built have been carved during the present works. This work has been executed by Mr. Harry Hems, of Exeter, and his staff. The internal walls are stuccoed; they have a pitch-pine dado round them the height of the seating. This latter is generally of pitch-pine, but the stalls and the pulpit are of carved oak. The avenues and chancel-floor are laid with encaustic tiles, the chancel rising three steps above the nave. The lectern is of brass, and there are brass standards for the gas. These gas-fittings are by Messrs. Hart, Son, and Peard. The church is heated by hot water. Mr. Blowey, of Buckland, was the contractor.

NORTHAMPTON.—A new chapel at the Convent of Notre Dame, in Abingdon-street, Northampton, was opened on Wednesday week. It forms the end of a quadrangle approached from the street through a passage, and is built of white pressed bricks, with Bath-stone dressings, thus presenting a striking contrast to the red-bricked buildings on either side. It is in the Decorated Gothic style. The gabled front is approached by two flights of thirteen steps. The entrance is through a porch having at the apex a figure of the patron saint to whom the chapel is dedicated—St. Joseph. The projecting porch forms part of an outer vestibule extending across the front of the chapel, and communicating on each side, by means of passages, which will be covered in, with the main building. In the front of the chapel proper is a large window of five lights, the upper part being filled with rich circular tracery, having in the centre a quatrefoil filled with stained glass, representing the Agony in the Garden, and presented by the workmen as a memorial of the good-feeling that existed between themselves and the Sisterhood. The gable has buttresses on each side, with octagonal turrets, and the apex in the centre being surmounted by a Maltese cross. Within, a gallery for organ and choir extends across the chapel. The front of the gallery is of pitch-pine. The floor of area is of polished pitch-pine, and the passages of oak parquetry, while the benches are of plain deal with trefoiled heads. The nave is 50 ft. by 28 ft., and the sanctuary 20 ft. wide, terminating apsidally. The apse is lighted by thirteen lancet windows divided by columns, with carved capitals, from which spring the ribs that support a domed roof, these converging to a centre, with a carved boss. The roof is coloured pale blue, with gold stars and an aureole in the midst. Eleven of the windows are filled with stained-glass representations of St. Thomas, of Canterbury, St. Mary Magdalene, St. Helena, St. Aloysius, Our Lady, the Sacred Heart, St. Joseph, St. Francis, St. Clare, St. Teresa, and St. Ethelreda. On the right, a doorway leading to the sacristies 17 ft. 4 in. by 12 ft., and 12 ft. by 12 ft. The sacarium has a polished mosaic floor, inlaid with figures around the margin. On each side, fronting the nave, are figures of St. Mary and St. Joseph let into niches, with crocketed canopies and carved brackets. To the left there is a small Lady-chapel, which is not yet furnished. The nave is lighted by five lancet windows on each side. Between the windows are shafts, which support the hammer-beam roof. The architect was Mr. W. Hull, of Northampton, the contractor Mr. Richard Dunkley, his foreman being Mr. W. Brown, and the general manager Mr. J. Brown. The carving was done by Mr. P. Horsman, of London, and Mr. Phillips, of Northampton. The cost will not be less than £4,000, exclusive of the buildings of the new wing of the convent, for which another £1,000 may be added.

SALFORD.—The memorial-stone of a school in Trafford-road, which is being erected by the Salford School Board, was laid on Saturday afternoon. The main building, fronting Robert Hall-street, is two stories high. The girls' department is on the ground-floor, which contains a room 50 ft. long by 32 ft. wide, and two classrooms. Adjoining the entrance is a cloakroom. The upper floor is for the boys. It has similar accommodation to that provided for the girls, and is entered from West Worley-street by an easy and well-lighted staircase. At

the rear of the main building is the infants' department, one story high, with a large classroom for junior infants. Spacious playgrounds are provided, a considerable portion of which will be covered in. The buildings are in the Gothic style. The fronts are being faced with selected common bricks, broad masses of stock bricks adorn the bands and gables, and the dressings are generally in terra-cotta. The schools will provide accommodation for 600 children. The contract for the work is £4,750, and is being carried out by Mr. J. L. Ward, Manchester, from the designs of Mr. H. Lord, architect, John Dalton-street.

SEATFORD-ON-AVON.—The new cemetery was consecrated on Thursday, the 15th inst., by the Bishop of Worcester. The cemetery is situated on the Evesham-road, close to the town, and has an area of six acres. It has been laid out and planted under the superintendence of Messrs. Wood and Kendrick, architects, West Bromwich, by Mr. L. Kirshaw, of Brighouse. The curator's lodge, chapel, mortuary, and boundary wall are being carried out from the designs of Mr. T. T. Allen, architect and surveyor, Stratford, by Messrs. H. and C. Burden, of Chipping Norton, the contractors. Their contract for the work was £1,380. The style adopted is the Early Pointed Gothic. The external walls are built with blue lias stone (cased internally with brick-work, built hollow) and have Box-ground stone quoins and dressings throughout, including copings to the gables. The chapel and mortuary are being built about 100 yards from the entrance, and opposite the central walk. The chapel on the westward side is 32 ft. by 20 ft., with chancel 15 ft. by 6 ft. Adjoining the chapel, and between that building and the mortuary (which is 14 ft. by 14 ft., with apsidal end), will be the entrance porch and tower, the porch being 8 ft. square internally. The apex of the roof of the tower will be 50 ft. from the floor of the chapel. Seats will be provided in the chapel for about 60 persons. The floor under that part is to be boarded; and the whole of the other part of the floor of the chapel, including chancel, mortuary, and porch, will be laid with tiles and quarries of various patterns in concrete. The roofs of chapel and mortuary will be boarded under rafters with white deal; all the other roof-timbers will be red deal, stained dark, and the whole (including boarding) varnished. The entrance-gates for the carriage road and the railing on boundary wall have been supplied by Messrs. Macfarlane and Co., of Glasgow.

WITTINGTON.—New public offices for the Local Board of Wittington, near Manchester, have just been completed. The style is Queen Anne, worked out in a somewhat original manner, the body of the building being faced with buff bricks, and the dressings being of red terra cotta and stock bricks. On the ground-floor offices are provided for the clerk, surveyor, collector, and inspector, with a large drawing-office in connection with the surveyor's department. Committee-rooms, caretaker's residence, &c., are also provided. On the first floor there is a large room 50 ft. long by 25 ft. wide, suitable for public meetings, concerts, &c. The building has been erected by Messrs. R. Neill and Sons.

CHIPS.

At the meeting of the Staffordshire Agricultural Society held at Stafford last week, Mr. W. A. Keates, land agent, &c., of Newcastle, Staffordshire, was awarded a silver medal for designs for dairy-farm homesteads.

The memorial-stone of the new U.P. church in Loughborough-road, Sinclair-town, Glasgow, was laid on Monday. The new church, which is now almost completed, is in the Gothic style, and is seated to accommodate 800 persons. It is provided with front and side galleries, and the seats in the area of the church are all arranged in circles so that the sitters face the minister. The building is situated on a commanding site, and has a spire rising to a height of 115 ft. The architect is Mr. Baldie, Bath-street, Glasgow. The cost of the building is £5,000, exclusive of site.

It has been decided at once to proceed with the Maidstone and Ashford Railway, in connection with the London, Chatham, and Dover Company. Mr. Hopkins is the engineer, and will personally superintend the construction of the works.

During the past week the land has been surveyed for an extension of the Isle of Wight railway system from Newport to Yarmouth and Freshwater.

ARCHÆOLOGICAL.

ARCHAIC POTTERY AT HAMPTON WICK.—An interesting find of archaic pottery has been brought to light in excavating the foundations for a new wing about to be added to Chesfield, Lower Teddington-road, Hampton Wick, the residence of Mr. H. L. Tatham. At a depth of from 18 in. to 2 ft. the workmen came upon a number of earthen vessels, which their pickaxes unfortunately reduced to potsherds. Only one was secured in an almost perfect condition. This was the smallest of all, being but 6 in. in diameter at the bulging central portion, whence it tapered upwards and downwards. It may stand 8 in. or 9 in. high, and is furnished with a pair of well-proportioned handles. Two other vessels, cylindrical in shape, are without handles, and are about a foot in width and altitude. To the same type as these two belongs another, which was broken to pieces, all the fragments, however, having been gathered and preserved. The whole of the vases present the appearance of cinerary urns, and this identification is confirmed by their contents, which in every instance turn out to be charred bones. No portion of these ceramic remains bears a trace of the potter's wheel, and the whole have been sun-dried, not fired in a kiln. Among the detached potsherds are found portions of a chain-shaped ornament, which seems to have traversed the bulging body of an urn. Similar pottery is said to have been found at Hampton Court or its neighbourhood. No metal, glass, or amber, nor a single flint implement, has been discovered in association with the Hampton Wick urns, whence Mr. Tatham infers that these urns must be referred to a very remote period.

NORTH HANTS ARCHÆOLOGICAL SOCIETY.—The members of this society recently visited Salisbury and Stonehenge, under the guidance of Dr. Millard, their president, and Mr. Cooksey, hon. sec. On arriving at Salisbury the party spent some time in inspecting the Blackmore Museum collection, after which they went to the cathedral. The company shortly afterwards proceeded in brakes to Stonehenge, passing on their way the ruins of Old Sarum. Some explanation of the different theories as to the exact origin of the stones was afforded by members of the party, after which they returned to Salisbury through the fine scenery of the Avon valley.

COMPETITIONS.

COACHMAKERS' AND COACH HARNESS-MAKERS' COMPANY.—This company, as on previous occasions, has offered a number of prizes for competition among persons engaged in the trade of coachmaking—clerks, foremen, workmen, or apprentices who have been actually employed and resident in the United Kingdom and British subjects being eligible. Prizes consisting of silver and bronze medals, and sums varying from £2 to £10, are offered for free-hand drawings of foliage or ornaments from nature or in relief in pencil, ink, or crayon in outline, and not shaded; for working drawings of a canoe-shaped luncheon, and for full-sized working drawings on canvas-backed paper of a Victoria on elliptic springs. Each of the prizes will be accompanied with the certificate of the company.

DUBLIN SCIENCE AND ART MUSEUM.—Competitors for the above will have noticed that the Irish Commissioners of Public Works prescribe in the conditions clause 15, that the construction of the museum is to be fireproof throughout, and will do well to avail themselves of Messrs. Bennett and Ingle's offer made elsewhere, to supply particulars and estimates of their excellent and well-tried system.

LONDON. The competition amongst architects for laying out ground under the Leith Improvement Act Scheme, and for designing working men's dwellings, has been decided as follows:—First premium of £100 awarded to Mr. G. Wilson, of 19, Walk-terrace, Edinburgh; second premium of £50 to Mr. W. L. Bennett, of 15, North-street, Edinburgh; third premium of £25 to Mr. J. Hutton, of Commercial-street, Dundee.

The grand stand at Harefield has been partially rebuilt and decorated with colour for the proprietors; the contractor was Mr. Barber, of Bridge-street, Harefield.

SCHOOLS OF ART.

NEWCASTLE-ON-TYNE.—The annual distribution of prizes in connection with the Bath-lane School of Art was made on Tuesday evening by Earl Percy, M.P. The report showed that the school had been increasingly successful each year since its foundation. In the first year after the inauguration of the school in 1878, in the science department alone 53 prizes were given and 129 certificates; in 1879, 86 prizes and 163 certificates; in 1880, 135 prizes and 127 certificates; and in 1881, 186 prizes and 227 certificates.

CHIPS.

Last week we noticed, on p. 375, a tract addressed "To Builders' Men," by the Rev. J. W. Horsley, Miss A. Jefferies, of Church-street, Stoke Newington, informs us that it is but one of a series of quarterly letters to bricklayers, carpenters, painters, &c., written by the Rev. Gordon Calthrop, the Rev. Canon Ellison, Mrs. Wightman, and others, freely distributed to these men during working hours.

A new water-closet and bidet bowl has been patented by Mr. John Flanagan, of Newburg, N.Y. The invention consists in making a water-closet and bidet bowl with recesses in its rim to allow the hand to be introduced for bidet purposes; also in constructing the trunk or pot with embossments upon the opposite sides of the lower and upper parts to receive inlet and outlet air-pipes for ventilating the trunk.

At a special meeting of the Oxford Local Board on Monday, it was, after a long and animated discussion, unanimously resolved to appoint a committee to confer with the delegates of the University on the lodging-house plans submitted to the board, by Mr. Griffiths, C.E.

A memorial fountain to Sir William Collins, ex-provost of Glasgow, has been erected on Glasgow green, and is having a few final touches put to it preparatory to a formal opening next week. Mr. Mossman is the sculptor.

The Commissioners of Prisons have reported against the retention of Newgate, and it now only remains with the home secretary to indorse their decision. There has been a prison of Newgate for about six centuries and a half; the present building was erected between 1770 and 1782, from the designs of George Dance, R.A. Attached to it, a correspondent remarks, are the most inconvenient offices and halls for the transaction of the principal criminal business of the country that could be erected by the ingenuity of man.

A new Free Church in Westbourne-terrace, Hillhead, Glasgow, was opened for public worship on Sunday. Designed by Mr. J. Honeyman, architect, the building is in the Italian style, and will accommodate 750 sitters. The church is provided with several session halls.

The sluicing arrangements made by Mr. Lyster, engineer of the Mersey Docks and Harbour Board, rid the landing-stage of the inconvenience caused to by the tail of the Pluckington Bank appear likely to prove successful. For the purpose of experiment one of the number of pipes laid for the sluicing was one day last week opened for eight minutes, with the result that a channel 20 ft. in length (right to the edge of the water), 20 ft. broad, and 10 ft. deep was made. Preliminary operations against the Bank were commenced in earnest on Wednesday. At low tide in the morning seven of the sluices at the south end of the stage were opened, and the same number again at low tide in the afternoon. The water is led from the George's dock by a large culvert, and its admission to the row of sluices is regulated by a "clough," which is worked by a winch above. This clough was opened to the extent of only a few inches, though it can be raised to the height of 9 ft. The rush of water from the seven sluices was very strong, the water all round was churned up into a muddy foam, and it could be seen that the substance of the bank was being driven under the stage and out into the main current of the river. The flow of water was maintained for about an hour, and was suspended shortly after the tide began to flow in. The Dock Board will make their full efforts to get rid of the bank at the spring tide in next month, and it is hoped that they will be successful in sweeping away the troublesome sand-bank from the neighbourhood of the landing-stage, where it has not only interfered with traffic, but also threatened serious injury to the stage itself.

The parish-church of Hayland, near Sheffield, is undergoing internal restoration, including the replacement of the present high-backed pews with open seats, and the substitution of hot-water for hot-air apparatus. Mr. W. H. Sykes, of Hayland, is the architect, and the contract has been let to Messrs. T. and J. Hawley, of Penistone.

"To a practical man with a taste for mechanics, and the bumps of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *Anglo-Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Two-pence of all newsmen, or post free 2½d.—31, Tavistock street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31 TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 35f. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL., Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—H. H.—R. C. R. of I.—J. G. S.—J. S.—J. P. P.—W. M.—H. B.—J. A. M. of A.—B. R. B. E.

BOYCOTTED. (Probably the secretary is away. If in a week or two you receive no reply, repeat your query.) —A COWLEY-SHAW. (B. T. Batford, 52, High Holborn, W.C.) —SUBSCRIBER. (Anybody may use the initials.) —H. C. "Contract Criticities" (The statement made at the end of the above article was founded on the decision of the case of Lidlav v. the Hastings Pier Company.)

Correspondence.

ROCKING MOTION IN SIPHON-TRAPS.

To the Editor of the BUILDING NEWS.

SIR,—On page 376 Mr. Davies, in describing the working of the S-trap, says: "The wind, on blowing up the soil-pipe, or down the ventilating-pipe, plays on the water, causing it to rock rapidly, owing to the shape of the trap. This rocking motion of the water causes it to ebb out through the out-go of the trap; thus, the so-called S-trap ceases to be a trap, and becomes only a snare."

Now, it would be interesting if Mr. Davies would give us the particulars of any arrangement which has come under his personal inspection, in which a siphon-trap became unsealed in this way. I once had, myself, doubts as to the safety of siphon-traps when exposed to the effects of strong winds, and, to satisfy myself, I tried the following: In an exposed position at Margate, I had the following arrangement—viz., S-siphon, 1½ in. s.d., into a tin soil-pipe, carried up full bore, with large open trumpet mouth on top, the trap having a 2 in. vent into the head-vent.

During several very heavy gales I watched the seal of this trap, and found that the effect of the wind was to send out about ½ in. or just sufficient to make room for it to sway. I once locked the door for 6½ hours, and then found seal perfectly safe, only ½ in. having gone. I

have also made observations in two other cases with the σ -trap, with a similar result. Has Mr. Davies ever tried this effect on the seal of a σ -trap?—I am, &c.,

DANIEL EMPTAGE, S.E.
Dane Hill Sanitary Works, Margate.
Sept. 19.

DAVIES' σ -TRAP.

SIR,—A correspondent signing himself "D. Emptage," complains that, having made a trap according to my plan, finds it will not act. In his letter he gives some of the measurements of his workmanship, and, unfortunately for him, these measurements prove that his trap is not according to my model. If he will study my plan and work to it, he will find the result satisfactory. It is simply preposterous to deny the effectiveness of my model, when it has been shown working successfully to about 500 of the principal members of the trade, at the late discussion at the Society of Arts rooms.

Mr. E. must not forget that it requires a practical plumber to make models properly. I am quite prepared to admit that there are very many men in the trade who are not practical; and whether or not the plumber (?) who has been trying to work to my plan is competent it is impossible for me to say.

By the bye, speaking of practical plumbers, I notice you have a correspondent signing himself by that nom-de-plume. He ridicules the idea of our models, as being toy-work. Does he know that one of the finest buildings, by one of the finest architects England is able to boast of, was first made in model for approbation? I fear not. I allude to St. Paul's Cathedral, by Sir Christopher Wren. Then again, the models of Watt, the great engineer, as also Wren's, are still on exhibition.

I cannot understand how I am insulting common sense by showing incompetent people the proper way to do their work, and seeing that the models in question were made at the request of and especially for the satisfaction of the Board of Health, "P. P." is placing a very low estimate on the intellectual capacities of that very important body.—I am, &c.,

P. J. DAVIES.

EXAMPLES OF DOMESTIC ARCHITECTURE.

SIR,—I should like to explain, for the information of your readers, what are the rules which I believe to be unknown to the profession.

They consist in tables of simple numbers by which, when one side of any of the harmonic triangles is known, the others are readily found. It has long been known that $7:22$ and $113:355$ give closely approximating proportions between the diameter and circumference of the circle. There are other equally simple relative numbers which give as close approximations to every other geometric proportion derived from the regular polygons.

Whether the originator of the $7:22$ formula for calculating the circumference from the diameter of a circle was braided as a charlatan I cannot say; all I know is that posterity make general use of his rule.

I am prepared to prove that the tables of numbers which I use give more correct results than can be obtained by the older and more lengthy methods of calculation.

That the ordinary empirical formula can be made to yield more satisfactory results is no argument against the theory, as it would be found upon examination that all good designs really contain the harmonic proportions, whether their authors are conscious of it or not.

I have not attained perfection in the application of the theory, and do not regard my productions as works of high art; all I contend for is that a design, in which the polygonal proportions are present, gives a better result for the same expenditure than a similar design in which they are not found.—I am, &c.,

THOMAS HARTAS.

King's Chambers, King-street,
Manchester, Sept. 20.

P.S.—I notice a misprint in your article. "D. R. Kay" should be "D. R. Hay." It is Mr. Hay who traced the connection between the musical notes and the polygonal angles, on which point I simply accept his conclusions.

A museum in the new free library buildings at Wolverhampton was opened to the public last week.

Intercommunication.

QUESTIONS.

[6666.]—**Painting.**—Will any one be so good as to state how water-colour painting on satin or silk is done, and what medium or special preparation of colour is used, and oblige?—AMATEUR.

[6667.]—**Religious Houses of the Middle Ages.**—What are the best books on the religious houses of the middle ages, their history, manners and customs, dress, &c. I do not so much want an exhaustive treatise as a book of reference.—ESQUIRE.

[6668.]—**Involution.**—How do I raise any number to the 3/5 or the 1/6 power? Arithmetics only deal with the case when the index is a whole number.—MANCHESTER.

[6669.]—**Lighting Cellar.**—Can any of your subscribers say which is the best method for lighting that portion of a cellar which comes immediately below a shop-door? Isn't a combination of wood and glass better than one of iron and glass?—J. H. A.

[6670.]—**Enamelled Iron Tiles.**—Does the enamelled iron now being used instead of tiles keep its shape, or is it, after a time, liable to warp or bulge?—LIVERPOOL.

[6671.]—**Rights of Light.**—(1) For how long after an adjoining owner, A., has put glazed openings and glazed lights overlooking his neighbour's, B., can the latter block them up, i.e., block up the view? Is it within 20 years? (2) Where the objectionable lights are inserted, exactly in the boundary line, if B were to brick up on his side excluding light and air, after having allowed the objection for 12 months, would his action be legal? (3) Where positive deterioration occurs in the value of B's property by A's building and lights, can compensation be legally enforced? (4) Should any one kindly answer these queries, may I ask in addition for (if convenient) the reference to the Act of Parliament confirming the replies?—F. T.

[6672.]—**Interior Perspective.**—It is so many years since I practised the art of drawing perspective that I have forgotten one important matter relative to the subject, and shall be greatly obliged if any one of your practical readers will inform me, 1st, In drawing a full-length interior perspective of a church, what is the best position for the station point in relation to the position of the western wall? 2nd, Is there any other reason against placing the station point in a line with the western wall than that the result will be very "sharp" perspective? Even if so, would it not be truthful?—A. B.

[6673.]—**Water Colour Painting.**—Will any one kindly recommend me a book on water-colour painting, suitable to one who has not the advantage of a master?—ARTIST.

[6674.]—**Roof Strains.**—Will any of your readers kindly give the formula for taking out the strains of the struts for an iron roof? Hurst's formula is too protracted for practical purposes.—ENGINEER.

[6675.]—**Mounting Lecture Illustrations.**—I propose to illustrate a paper on an architectural subject by diagrams, plans, engravings and photographs. Of the latter, some are mounted on cardboard and some unmounted. I shall feel obliged if any correspondent will say which is the better ground for displaying these, brown, white, or cartridge-paper, and whether paste, starch, or gum is preferable for fastening the photos to this backing, as I want to remove them from it unimpaired after the lecture?—EAST ANGLIAN.

[6676.]—**School-Rooms.**—I notice a query in last week's BUILDING NEWS about school space. Will any correspondent kindly state what should be the width of a school-room? This, I conclude, not a variable size. Which is the best way to seat boys in 4 rows deep? If so, what should be the width of each row, and then what should be the width of space in which the teacher can demonstrate his lecture between last row of boys and the wall? What number of lineal feet should be allowed for 250 boys? Should the desks be in tiers on raised dais, or all on same level? What height between floor of lowest wall, and sill of window is best for teacher's eyes?—S. J. C.

[6677.]—**Cemetery Lodge.**—I shall be greatly obliged if some kind correspondent will advise me on the following:—In a design for a caretaker's lodge to a cemetery of three and a half acres, for a population of five thousand, a lych-gate is introduced under the same roof as the lodge, and is sit. N. high. Exception is taken to the height, saying it should admit a hearse or carriage. By increasing the height to that extent the bedroom over would be sacrificed, and extensive roads would have to be made where walks would be sufficient, and would have to be wider and permanently made. It is not intended to have a mortuary chapel, but to read that portion of the service under the lych-gate, which, it raised to, say, 11 ft, would lose in shelter. At one of the most important cemeteries in Ireland no hearse or carriage is allowed to enter, but for those who do not wish to carry the coffin, it is laid on a small carriage, like a gun-carriage, and may be drawn either by men or by a horse.—D. M. J.

[6678.]— **σ -Traps.**—I have taken great interest in this controversy. Its outcome will undoubtedly tend to the beneficial advancement of hygiene and improvements in sanitary appliances with more care being paid to their manufacture. There is one form of trap I have not seen mentioned in your columns; I refer to the σ -trap. I feel sure it would be interesting to your readers to have the valued and practical opinion of Mr. Davies and your other correspondents upon this form of trap, as it is well known that much reliance cannot be placed upon theoretical descriptions in circulars and testimonials, which are very often interested. Of course, these are only general remarks, and have no direct reference to the appliance in question. The principal feature is the trough or channel being carried to end of trap, and the contents are emptied over both of its sides. If any of your readers can tell me where one is fixed I should much like to see it.—INQUIRER.

REPLIES.

[6624.]—**Disinfecting Stoves.**—Send to Leoni and Co. for their catalogue of gas apparatus, including large gas disinfecting stoves, as satisfactorily worked for bedding and clothing at the London Hospital, the disinfecting house of the Litchhouse District Board of Works, and other places.—H.

[6649.]—**Roof.**—The sketch of roof shown by "Dennis" is not a very good one, as the effect of the load and wind-pressure would be to strain the cross-braces or ties of the main principals. I have an objection, based on some experience with roofs of this kind, to the small horizontal tie shown between the chief braces; it tends to produce an injurious cross strain upon the braces. The lower struts down the wall help to neutralise this strain; but they have also the disadvantage of indirectly weakening the braces. A better mode of tying is to carry on the horizontal tie to the principals if it is of iron, and to avoid the lower struts unless they can be made to continue to the principals. The mechanical stresses to which such a roof is subjected may be approximately conceived by supposing the cross-braces together with the main rafters formed two overlapping triangles. With regard to the thrust, no theoretical calculation could be safely relied on, as in a roof of this sort the perfection of the joints is everything. The slightest play in the iron straps connecting the principals with the cross braces would make all the difference between a thrust which would be nil and one exercising the force of untied rafters at this angle. Supposing the joints are perfect, the thrust might be too trilling to be regarded as injurious to good walls well buttressed, though a 40 ft. span roof, of the angle shown in the sketch, without a direct tie, would be constantly exercising a thrust that would in time impair the verticality of the walls. It would be impossible to say how much a laminated rib of this span made in the manner described would expand, but if the thicknesses of deal are well put together, the expansion would be trilling compared with the former. I would sooner construct a semicircular laminated roof for security, but 6 in. deep is too little; it ought to be at least 9 in. If the springings of the ribs are brought down nearly to the ground, this mode of construction would be far safer than a braced roof of the kind shown.—G. H. G.

[6650.]—**Ventilation of Soil-pipe.**—There are two points to be considered. First the w.c. apparatus. The pan closet is a bad system, and if the one mentioned is at all old, it is probably half-filled with putrid matter, and this being on the inner side of the trap, whilst the ventilating pipe is on the outer, the foul gases would of necessity escape into the room itself. Therefore take out the pan closet and remove by a flush or wash-out closet with siphon trap and which can be obtained from Doulton, Buchanan, and other makers; the most important improvement being found in several of the best. Second, the ventilating pipe; has this an intercepting trap open to the air at the ground level? I suspect not, and if so how can any ventilation be expected to take place when there is no inlet to the pipe? It is always necessary that there be two openings to the air, one as an inlet and the other as an outlet; one opening is sufficient only when its size is very large, as for instance an open window, where air will enter at one part of the opening and make its exit at another, but a ventilating pipe could not have sufficient diameter for this purpose, it would have to be feet instead of inches, proportionately to its length. Disconnecting or intercepting traps of stoneware with gratings for purposes of cleaning can now be had of all the best stoneware manufacturers or sanitary engineers. Where so many are good, I care not to give names.—HUGH McLAUGHLIN.

[6650.]—**Ventilation of Soil-pipe.**—The ventilating pipe should be the full size of soil pipe. I have used all the cowl in the market, and for the above purpose consider them useless. There should be an inlet for fresh air at the foot of soil pipe, or, say, at the nearest point to main drain. Trap on house side.—In several cases I have taken away the bell traps in a eas and simply placed an iron grating to answer as inlet, and in no case have I had the least complaint.—WILLIAM H. BUTCHER.

[6650.]—**Ventilation of Soil-pipe.**—The fault is not in the open end of the pipe. No cowl, however "excellent," will "cure" a 2 in. ventilating pipe. It is too small in diameter. It should be not less than 4 in. or 4 in. It should be, indeed, the same size as the soil pipe. The apparatus, being a pan-closet, is not of good form; but the best way of proceeding, with as little alteration as possible, is to take down the 2 in. ventilating pipe and put up a 4 in. or larger pipe in its stead, for this is necessary in any case. There should be an opening into the drain near its outlet at the sewer or cesspool, to admit fresh air to the drain and soil pipe.—C. S.

[6650.]—**Ventilation of Soil-pipe.**—The ventilating pipe is not large enough in the case mentioned by "T. P. F." It should have been at least 3 in., or the same diameter as the soil pipe, and have had a suctional cowl, as that made by Messrs. Boyle or Banner, at the top of it. At present, no doubt, the pipe acts as a down cast, and the sewer gases are forced in through the traps, thus making matters worse than they were before. If there had been no pipe as a ventilator, but instead, there had been left an outside opening level with the trap for ventilation, the gas would have been constantly escaping without the inconvenience. The objection to tall ventilating pipes, I find, is that they impede the escape of the gas through them, and often operate in a reverse way to that intended. One of Ewart and Co.'s cowls would no doubt answer the purpose of "T. P. F."—G. H. G.

[6651.]—**Wood Block Flooring.**—I have never heard of or found any objection to the use of wood blocks if properly laid. They should be laid on a bed of concrete properly floated or asphalted. For schools this flooring is less noisy and more durable than floorboards.—G. H. G.

[6651.]—**Wood Block Flooring.**—I have often seen the wood-block paving laid in Board schools, Mission churches, coach-houses, &c., in the following manner:—The blocks are cut from deals 9 in. by 3 in. by 2 in., laid herring-bone-wise, or in other patterns, rough planed on top, the undersides being in tar before laying on 6 in. of concrete, carefully levelled to an even surface.

The floor is scattered over with sand, and well brushed between joints. However, in coach-houses and positions of the washed down, grouting with cement is preferable. Any block wearing out of level can be easily replaced. They are better with out any joining together on this account. The cost is, I believe, a trifle over ordinary wood flooring.—J. H.

[6651]—**Wood Block Flooring.**—This makes a capital floor for schools, but requires to be laid in quite a different way to that mentioned by "Providence." If he will communicate with me, I will put him in the way to get what he wants.—R. WALKER, Kent.

[6654]—**Dimensions of School.**—If your correspondent "Alpha" will refer to Messrs. Hudsons and Kearn's "St. Southwark Street, S. L." "Reference book," price five shillings, on page 134 he will find the rules laid down by authority of the Committee of Council on Education for the Building and fitting up of S. schools, to be all that he requires.—THOS. G. CARLWORTH.

[6654]—**Dimensions of School.**—The length of a schoolroom is best determined by the groups of benches and desks. An allowance of 18in. is given for junior pupils by the Council on Education and 22in. for senior pupils. Thus a group 6ft. long would accommodate 4 children in a row, and for a senior pupil 7ft. 6in. long will be required for the same number. If there are 4 groups, a room 26ft. by 18 to 20ft. suffice for 48 children. Three rows of benches and desks are considered sufficient for a group. According to the School Board regulations, the principal schoolroom should provide 80 cubic feet of space per child.—G. H. G.

[6654]—**Dimensions of School.**—"Alpha" does not mention the class of school he requires to design, whether for boys and girls or infants. The accommodation for children above seven years old is calculated by the space at the desks, viz. 18in. for junior classes and 22in. for senior classes "per child." For infants below the above an allowance of 8 square feet per child is made, and the width of school in both cases would be from 16 to 20ft., according to length. The above rules are in conformity with the requirements of the Educational Department.—I. J. THOMAS.

[6656]—**Round Timber.**—The only books I am acquainted with are Hutton's and Hopps's, the former 3s. and the latter 1s. 6d. I believe they may be obtained from Batford.—JAMES F. BELL, Bolton.

[6657]—**Architects' Prospects in Australia.**—"N. Y. Z." will find similar questions to those he asks on p. 456 of the BUILDING NEWS of this year (April 15). No. of question 456, and the replies on p. 435 (April 15th).—F. T.

[6658]—**Ventilation.**—The simplest plan of ventilating the billiard room would be to place a ventilating shaft in the centre of roof and fix on it an exhaust cowl ventilator. For the admission of fresh air, upright tubes, about two or three on each side of room, with a valve to regulate the air, ought to be introduced leading to the outside. Boyle's ventilating tubes and air-pump ventilators might be used. If the lofty building at the side interferes with the action of the cowl or exhaust ventilator, the tube may be carried up the wall and have an exhaust or Verity's air propeller at the top. Ventilating gas pendants, such as Faraday and Son's, ought to be used, or Verity's ventilating sunlights.—G. H. G.

[6659]—**Plasterers' Work.**—Measure the length of cornice from centre of projection on each side of room. Cut same from ceiling line to wall line or from the running mould. Charge extra for each angle exceeding 45in. each room.—JAMES F. BELL, Bolton.

[6661]—**Science and Art Exam. in Architecture.**—Apply to the Secretary, Science and Art Department, South Kensington, who will forward examination papers on receipt of 2d. in stamps. There is no really good book treating on all the branches of architecture except Gwilt's. I would advise "J. P. T." to procure books on separate subjects. For Gothic, consult the works of Pugin, the Brothers Brand and Britton, T. Talbot, Barry's Woodwork. Beware of investing in 15th century books on Gothic. Classic books of this date are, however, useful, if not the best, such as Stuart's and Revett's works, Nicholson's "Orders," and Henry Shaw's "Elizabethan Architecture."—JAMES F. BELL, Bolton.

[6661]—**Science and Art Exam. in Architecture.**—The examination of the Science and Art Department in building construction are usually held on the first Saturday evening in May in various parts of London and the country. There are three stages, viz. Elementary, Advanced, and Honours. Copies of past examination papers may be purchased at the stalls in South Kensington Museum, or may be had by post from the Secretary of the Department. Livingston's "Notes on Building" will be found good textbooks. I should strongly advise "J. P. T." to try one of the various classes that are now taking in various parts. I attended one at the Grosvenor Hall, London, last year, and received excellent instruction from a thoroughly practical man, and was enabled to pass the advanced stage.—H. SMITH.

[6661]—**Science and Art Exam. in Architecture.**—The following is copied from syllabus of the "1st and Advanced Art Examination" in the above subject. "Candidates for examination in architecture are expected to show a knowledge of the Five Orders of Greek architecture with their mouldings; a general knowledge of the principles of construction applied to ancient architecture, and of other leading features of classical architecture, such as colonnades, pedestals, doors, windows, &c., and of the decorative features usually applied to the various buildings, together with the principal differences between the Greek and Roman orders, and a knowledge also of the large distinctive characteristics of Gothic architecture in England from the time of Edward the Confessor to that of Henry VIII." I do not know of any copies of such examination papers published or not. For books, see p. 102, B. N. "Intercommunication."—W. B.

[6665]—**Rain Penetrating into Buildings.**—The shrinkage of the timbers would naturally cause rain to percolate at the joints. There ought to have been fillets to receive the panes or the laths. Painting with putty and white-lead may answer if properly done. If space allowed between the frame and timbers, and the surface of panes, small fillets might be fixed to cover the joints in putty.—G. H. G.

LEGAL INTELLIGENCE.

SHOP BASEMENTS.—At Wandsworth police-court on Wednesday an important case was heard, having reference to the construction of shop basements, Alfred Boon, a builder, being summoned at the instance of the Wandsworth Board of Works for proceeding to the erection of houses in the Battersea Park-road contrary to the order of the Board. It appeared that the defendant sent in an application for the erection of a number of shops with basements. Upon that the Board passed a resolution in effect stating that they could not permit the houses to be erected below the level of the road. Mr. Guy, who appeared for the defendant, said he believed the point had never been raised before. If allowed, it would practically prevent the construction of basements in London. Mr. Corbellis, clerk of the Board, said the main sewer was laid in the Battersea-park-road fifteen years ago, and on the occasion of storms the water arose and flooded the basements. The only way to avoid the difficulty was to prevent the construction of basements. Mr. Pidditch, the surveyor, was called to corroborate that statement. After a lengthened argument, in which the magistrate thought the Board had power to make the order, Mr. Corbellis suggested that the defendants should fill up the basements which he had already constructed. The defendant asked to be allowed to retain the basements to some half-dozen shops on the understanding that the remainder should be erected without them. The summons was ultimately adjourned to allow of an arrangement.

THE EMPLOYERS' LIABILITY ACT.—Farmer v. Jarvis.—City of London Court, Sept. 21.—Before Mr. Besley.—This was an action by William Farmer, a carpenter and shopfitter, residing in Fortham-street, Whitechapel, against his late employer, a builder, of Half-moon-street, Bishopsgate, to recover compensation in damages for injuries sustained through the alleged negligence of a fellow-servant.—Mr. Grain was counsel for the plaintiff. Mr. Forest Polton for the defendant.—Mr. Grain said this was the first action that had been brought under the provisions of the Employers' Liability Act, whereby an employer is now liable for injuries sustained by a servant through the negligence of a fellow-servant.—On the 29th of June the plaintiff was ordered to assist in the lowering of a sugar shelf from the top to the bottom of the defendant's premises. The shelf, which weighed about 3cwt. was being lowered by means of a rope and pulley, which was intrusted to a fellow-workman named Parrott, under the direction of the foreman. In the course of its descent it stuck on a projection, and the plaintiff was ordered by the foreman to go down and ease it off. He had no sooner touched the shelf than some one above jerked the rope, causing the shelf to fall rapidly to the ground, and in its passage downwards it caught the plaintiff's right hand and lacerated it. He attended at the London hospital for several weeks, and had earned but 6s. since, the wound being still open, preventing him from working.—The defence was that the accident was the result of contributory negligence on the part of the plaintiff, in suddenly pushing the shelf off its resting-place.—Parrott was called, and in answer to questions, admitted that there was a post on the stage where he was standing, for the purpose of winding the rope round to afford a better hold; but the rope in use at the time was too short to enable him to avail himself of it, and when the shelf was pushed off he (witness) was "drawn up." The jury returned a verdict for the plaintiff, damages £10.

WATER SUPPLY AND SANITARY MATTERS.

THE CANTERBURY SEWAGE WORKS.—After two years' labour, and heavy outlay, the New Sewage Works have been perfected and are now in full working order. The total cost has been £8,300. The sewage farm covers 22½ acres of land, lying to the east of Sturry-road. Eleven acres are devoted to the cultivation of mangold wurtzel. Three acres have been sown in oats and tares, the remainder in pasture land, from a portion of which a crop of very fine hay was recently sold for £18. In future, the whole of the land will be cropped as heavily as it possibly can be with a variety of what are considered to be the most profitable products. The Broad Oak Sewage Works will be utilised as heretofore in conjunction with the new works. The whole of the sewage matter from the city will be conveyed to the old works in the first instance; the solid matter will be separated from the liquid which after filtration will run to the new works for irrigation purposes as described below. The solid matter is retained at the Broad Oak Works, the effluent water alone being spread over the land. At the pumping-station, as the sewage water enters the well from the old works, it is pumped up and delivered through five lengths of 18in., 15in., and 12in. covered stoneware carrier-pipes, extending the length of the land. The sewage in its passage

along the carriers is stopped by sluices in the distributing-wells, which are placed at distances of about 200ft. apart. The water rises in these until it reaches the surface of the land, when it passes through sluices which are made to regulate the flow of water, so that either a small or large quantity can be put on any particular piece of land. There are 28 distributing-wells to the 25 sections of land, each 220ft. by 220ft. Each section is surrounded by a grip, which is sunk about a foot below the level of the land. Running by the side of this there is a path covering the carrier-pipes, which is raised about a foot above the land. This acts as a barrier to the water, and keeps each section divided. The distributing-wells are so arranged that they can all be opened at the same time, and allow of an equal flow of water over the whole land, or the whole force of the water may be discharged through one distributing well upon any section. The advantage of this in reaping and sowing crops is very apparent, as the distribution of the sewage water is under perfect control, and one section of land may be worked while another is recovering from a flooding. Mr. Hall is very confident as to the capabilities of the land to take all the water that is thrown upon it. It has a subsoil of gravel, through which the water easily percolates, and then it is assisted to the outlet by a very perfect system of under-drainage, in which there have been used 500ft. of 2ft. main to carry the raw sewage to the pump-well; 2,000ft. of 18in., 3,000ft. of 15in., 450ft. of 12in. carrier-pipes. Under-drains 1,520ft. of 12in. piping, 7,000ft. of 9in. pipes, and 1,670ft. of 6in. pipes. In laying the carriers and under-drains, the mould forming the upper surface has varied from 18in. to 2ft. 6in. in depth, the substratum being gravel to a depth of more than 10ft. The water becomes purified by percolating. After passing through the ground and into the drain it is carried to the outlet, where it is discharged in the main drain and carried to the outfall about 300 yards below Fordwich bridge. Here the effluent water presented a marked contrast to that in the outlet from the old sewage works. Its indescribable colour and poisonous odour had been entirely purified, and it came rushing forth from the drain in a colourless and tasteless state. With the exception of a small portion, the land is all about 4ft. 3in. above flood-line, and is perfectly clear of danger from flooding, but, as an extra precaution, Mr. Hall has raised a substantial embankment. The whole of the work has been executed from the designs and under the personal supervision of the City Surveyor, Mr. J. G. Hall, Assoc. M. Inst. C.E.

STATUES, MEMORIALS, &c.

BIRMINGHAM.—The ceremony of unveiling the George Dawson Memorial statue has been fixed for the 5th October. The statue, which has been executed by Mr. Woolner, R.A., has arrived, and will shortly be placed upon the pedestal. It represents Mr. Dawson in a characteristic attitude, standing as if addressing a public audience. The site is at the end of the wall on the north side of the Town Hall in Congreve-street. A canopy rising to a total height of 40ft. above the ground has been erected over the pedestal, and the structure is now receiving the finishing touches. The canopy is carried upon four granite columns, and has four gables, in each of which is placed, in medallion form, a head carved in high relief by Mr. Woolner. The heads are typical of religion, letters, statesmanship, and poetry, and represent Bunyan, Carlyle, Cromwell, and Shakespeare. The upper part of the canopy terminates in a pinnacle, the design of which is somewhat in keeping with that of the Chamberlain Memorial, and the gables are carried on foliated arches, and have pinnacles at the angles. The canopy is of Portland stone, and has been designed by Messrs. Martin and Chamberlain. This part of the work has been carried out by Messrs. Barnsley and Sons.

STAINED GLASS.

KIDDERMINSTER.—A stained-glass window has been placed in the north transept of St. John's Church in memory of the late Mr. Joseph Kitley. It is a three-light window, and represents scenes in the life of Daniel, the prophet. In the first Daniel is represented as interpreting the king's dream; in the second he is occupying the position of president of the council; in the third he is on his knees praying. The base and canopy of each is surrounded by a border of ruby and pearly-white. The top portion of the transept is lighted by a rose window, of a floral design. The window has been supplied by Mr. John Davies, Wyle-cop, Shrewsbury.

ST. MARK'S CHURCH, MILVERTON.—A memorial window has been placed in this church to the late vicar, the Rev. Chas. Carus-Wilson. The window is at the east end, and is about 25ft. high by 17ft. wide. It is divided into eleven scenes, in addition to the tracery work above; they all repre-

sent events in the life of our Saviour, "The Agony in the Garden," "The Betrayal," "Before Caiaphas," "Denial of St. Peter," "The Judgment of Pilate," and "Crowning with Thorns" are in the lower tier; above are "Bearing the Cross," "Ascent of Calvary," in the large central light "The Crucifixion"; "The Descent from the Cross," and "The Entombment." The tracery spaces are filled with angels bearing instruments of the Passion, and the scenes surmounted with canopies of "tabernacle" work. The colours are copied from old English glass of the 14th and 15th centuries, and the details in the costumes are founded on research. The work has been carried out by the firm of Cox, Son, and Buckley, of London.

CHIPS.

At a meeting of Galashiels Town Council, held on Monday, a letter was read from Mr. Scott, of Gala, offering the cricket-ground as a public park, if the Corporation would agree to keep it in order. It was agreed to accept the offer with thanks.

The parish-church of Bistre was reopened on Tuesday by the Bishop of St. Asaph, after restoration at a cost of some £700.

Amongst the liquidations by arrangement mentioned in Tuesday's *Gazette* is that of Tom Anderson, The Terrace, Boston Spa, and of Victoria-buildings, Park-lane, Leeds, architect and surveyor.

Newsick-wards are being added to the workhouse at Newport, Isle of Wight, from the plans of Mr. W. T. Stratton.

An exhibition of gas-heating, lighting, and cooking apparatus was opened at Aberdeen on Monday.

The new town-hall at Ayr, which has been erected at a cost of £30,000, was opened on Monday evening by the performance in the principal room of Handel's "The Messiah." The organ has been built by Messrs. C. T. Lewis and Co.

Mr. S. J. Cardidge, of the National Art Training School, South Kensington, was unanimously appointed, on Tuesday, by the committee, head master of the Hanley School of Art, in succession to Mr. A. A. Bradbury, who has been appointed head-master of the Derby school. There were twenty-six applicants for the office.

As some workmen were engaged on Tuesday in the repair of the front of an old timber house on the Wyle Cop, Shrewsbury, they knocked off a thick coating of plaster, and discovered, in a perfect state of preservation, a beautiful window, with Late Perpendicular tracery, of between 1500 and 1550. The window is in a room in which Henry the Seventh is said by tradition to have planned the battle of Bosworth Field.

American exchanges intimate the partial failure of the system of jetties devised by Captain Eade, for the South Pass of the Mississippi, and which has been described in our pages. It is asserted that the deep channels are not permanent, and are only kept partly open by continual dredging.

The town council of Ashton-under-Lyme agreed at their last meeting to accept the offer of Stamford-park, estimated to be worth £40,000, to be kept up at the joint cost of the local authorities of Ashton, Stalybridge, and Hurst, as a public park.

New Congregational Sunday-schools at Thornton-leath, Croydon, were opened last week. They are built of Lascelles' concrete slabs, on a wooden framing, rough-cast on exterior with cement and gravel. Inside the building is lined with match-board. The chief room is 40ft. by 30ft., and 12ft. 6in. high to plate of open-timbered roof. At the rear are four classrooms, two 14ft. by 13ft., and two 13ft. by 10ft. 6in.; over these is an infants' room, 28ft. by 18ft. The total cost has been £697, and it was stated at the meeting that estimates were invited from two builders for a plain brick building, and both were above £1,200.

The late Dean Stanley has bequeathed all his curiosities and historical relics to the University of St. Andrew's, and the executors, in handing them over, have expressed a wish that they should be preserved in a separate cabinet.

The eighth annual exhibition of modern pictures in oil at the Royal Pavilion Gallery, Brighton, is to be formally opened to the public to-day (Friday). The gallery contains about 550 pictures, 110 of which are by local artists.

The Hartlepool harbour commissioners resolved on Tuesday to apply to the Public Works Loan Commissioners for a further loan of £6,000 for harbour improvements. Reports were received from the consulting engineer, Mr. Hawkins, and from the commissioners' engineer, Mr. William Belk, as to the breakwater extension, which is of large concrete blocks, and has now been carried 15ft. below low-water point.

Our Office Table.

SIR EDMUND ANTROBUS, of Amesbury, has written a letter in regard to the restoration of Stonehenge, in which he says:—"For some years I have doubted the safety of the eastern trilithon, and, having obtained the professional opinion of an excellent architect of high standing, I find he also thinks its condition may occasion danger to visitors. Under these circumstances and under his advice the props complained of have been put up, so as to insure absolute security until the time arrives for taking further steps. The number of visitors always present in the autumn renders it difficult to proceed, and spring will probably have to be waited for. Before anything is done due notice shall be given, so that any interested in the matter may be able to be present and witness anything that the necessary disturbance of the soil may bring to light." In accordance with resolutions passed at a meeting of the Wiltshire Archaeological Society, the secretary (the Rev. A. C. Smith) has met a deputation from the Society of Antiquaries at Stonehenge, the object being to examine and report upon the best means of rendering secure the stones in danger of falling, and to consider the expediency of raising the trilithon which fell in 1797. Sir E. Antrobus has had the site surveyed by Mr. Cole, an architect, who directed the propping up of the isolated trilithon on the north-east side of the outer circle. No "restoration" will be attempted at present, and due notice is to be given before anything material is done.

THE TOWN COUNCIL of Newcastle-on-Tyne has appointed a committee to consider the subject of providing a new town-hall. The present building is, says the *Newcastle Chronicle*, utterly unworthy of the borough. From the very first it was an expensive blunder. It was erected in the wrong place; it was built on wrong lines; and it has never been an ornament to the town. Not only did it cost many thousands of pounds more than the original estimate, but large sums have to be annually voted in order to keep it in condition. During the last ten years, the outlay on the building has averaged no less than £630 per annum; yet such are still the defects of the structure that one of the Corporation officials a few weeks ago had a narrow escape for his life through being poisoned by sewer-gas. The question of providing new buildings was brought before the Council at its meeting last week. A committee was appointed to consider the propriety of purchasing the house and grounds in Northumberland-street and Bath-road which were formerly occupied by Sir John Fife, with the view of erecting thereon a municipal edifice that would do credit to the borough. If the existing town-hall could be levelled with the ground, so as to make one wide thoroughfare from Grainger-street to St. Nicholas' Church, the greatest improvement ever made in Newcastle would be effected.

An unusually large raft of timber was recently floated down the Hudson. It was 900ft. long and 34 wide, and contained 251 pine-logs, varying from 70 to 96ft. in length and from 18 to 30in. in diameter. The logs were cut during past winter in Ontario, Canada, near Capetown, Linden, and Onondaga. They were floated down to Toronto, on Lake Ontario, and on June 24 last they began their journey to Boston, in care of Capt. Edward Locke. They were made into a raft, and towed in three days and a half across the lake to Oswego, where they were separated into two rafts of six cribs each and a third raft of seven cribs. These were towed through the Erie Canal by John Wells, of Oswego. The journey occupied thirty-one days. The three rafts were then united into one large raft with two sections abreast, and floated down the river, travelling only on ebb tides. On its arrival at Gowanus Bay, Brooklyn, the raft was prepared for towing to Boston. The logs were chained together, and 113 logs from Pennsylvania were added, making a raft 1,300ft. long and 61ft. wide. The value of the raft was put at £5,000 sterling. The cost of towage was £700, or one-third less than it would have cost to send the logs by rail.

THE NEWCASTLE TOWN COUNCIL, at an adjourned meeting on the 14th, decided by 28 votes to 13 to give the three chief officers of their engineering staff—Mr. Fowler, Mr. Fulton, and Mr. Curry—six months' notice to

terminate their respective engagements, "in order that the engineering staff may be reconstituted on a more satisfactory and economical basis." For some time past considerable dissatisfaction has prevailed in Newcastle at the management of the engineering offices. Instead of there being one chief, there have been in reality three heads of departments without a master. With a house thus divided against itself, it was manifestly impossible that the affairs of the town could be conducted satisfactorily. Mr. Fulton, previously of Dundee, was appointed town surveyor in March, 1868, at a salary of £600. Mr. Lamb was then in the employment of the Corporation as property surveyor, at a salary of £700. A few years afterwards his salary was increased to £800, and that of Mr. Fulton, who was created borough engineer, to £700. Mr. Lamb resigned four years ago to take charge of the Grainger Estate, and the Council then determined to appoint a chief engineer, who should have sole charge of the works of the Corporation, and be known as the Town Surveyor and Borough Engineer. Mr. Alfred M. Fowler, the borough engineer at Salford, succeeded in obtaining the appointment, at a salary of £1,000 a year, and Mr. Fulton was made assistant engineer. This dual arrangement was found to be unworkable, and about eighteen months ago Mr. Fulton was created town surveyor with a separate office and staff of his own. Mr. Curry is the inspector of nuisances and superintendent of scavenging. The cost of the engineering staff at Newcastle reaches the large total of £4,451 per annum.

A CORRESPONDENT at St. Alban writes suggesting that, now that Sir E. Beckett's new west front of the Abbey has risen about 12ft. above the ground, it would be well to consider the desirability of removing the boundary wall on the south side of the nave, and that inclosing a small graveyard adjoining the south transept. If these were replaced by a light iron fence, similar to those on the north and east of the Cathedral a great improvement would be effected, and the building would be opened up to view. At the same time, the footpath through the graveyard on the north side could be opened up and joined across the west front to that already existing on the south side, thus providing a circular walk round the Cathedral.

A TEST of the strength and soundness of the completed portion of the Hudson River Tunnel was recently made. The new air locks at the river ends of the borings were closed and the air-pressure was gradually reduced in the portion between the locks and the shore. The test was satisfactorily borne, except by the unfinished part between the locks and the heading, about 30ft. in length. The escape of air from this portion by leakage allowed the silt to press in, crushing several feet of the iron shell which extended beyond the brickwork. The workmen had been withdrawn from this part of the tunnel before the pressure was reduced, and, except for the derangement of the extremity of the tunnel next the heading, and the pressing in of silt, no harm was done.

WE understand that a National Society for Preserving the Memorials of the Dead in the country parish-churchyards of England and Wales is in course of formation, and among those who have joined the society are the Earl Beauchamp, the Earl of Carnarvon, the Earl of Glasgow, the Earl of Northesk, the Lord Talbot de Malahide, the Bishop of Ely, the Bishop of Argyll and the Isles, the Right Hon. A. J. B. Beresford-Hope, M.P., Mr. Stanley Leighton, M.P., &c. It is proposed shortly to hold meetings in London. A wide-spread approval of the society has been received. Any persons willing to join are requested to apply to (and by whom all information will be given, and suggested rules sent) Mr. W. M. Vincent, Belle Vue Rise, Lower Hellesdon-road, Norwich.

THE VIENNA *Politische Correspondenz* says:—"The once famous cedar forest of Lebanon, formerly so extensive, has dwindled down to the dimensions of a mere thicket, numbering about 400 trees. To save it from complete destruction and preserve it at least in its present extent, Rustan Pasha, the Governor-General of the Lebanon, has issued a special ordinance, containing a series of stringent regulations calculated to check, if not put a stop to, the vandalism and carelessness of most travellers. It is expressly forbidden to put up tents

or other kinds of shelter within the district of the trees, or to light fires or to cook any provisions in their vicinity. No one is allowed to break off a bough or even a twig from the trees. It is forbidden to bring any beasts of burden, be they horses, mules, asses, or any other kind of animal, within the district. Should oxen, sheep, goat, or other pasturage cattle be found within the prescribed limits, they will be irredeemably confiscated.

Mr. FRENCH, of Museum-street, Warrington, has forwarded us one of his new pattern Solid Flame Gas-Burners, which, although so small, will readily boil 7 or 8 gallons of water, and at full power will boil a quart of water in a light kettle in five or six minutes, at an expenditure of one cubic foot of gas. The flame is solid with a brilliant green centre when working at full power, and according to the tests reported to the British Association of Gas Managers, the duty obtained is double that of an ordinary Bunsen. The new pattern is specially adapted for general domestic purposes, being designed to stand the roughest and hardest work, and it has the further advantage, when used for boiling, that the gas must be turned down, or the pots will boil over unless they are removed, thus preventing much of the waste of servants. It is unquestionably the best burner of its kind in the market, and will be found valuable in every household in which gas is used.

THE Portuguese Government has just issued an official announcement of an exhibition of objects of Spanish and Portuguese decorative art which is to be held in Lisbon in the coming month of November. The idea is entirely due to the Peninsular exhibition now open at South Kensington. The Spanish Government has consented to allow all the contributions now at that place to be transferred to Lisbon, and our own Government will reciprocate the action of Portugal by lending an extensive series of objects. It is hoped, also, that many of the private contributors to the Kensington gathering, both English and French, will, at the same time, allow their loans to be sent to Portugal. All the finest treasures of the Portuguese Crown will be exhibited, and the cathedral churches and convents will furnish a far richer series of objects than it was possible to send to London. The exhibition is to be held in the newly-constructed buildings destined for the museum of the fine arts in Lisbon.

NEARLY every variety of timber grown in the United States is found in Tennessee. This is owing to its great diversity of surface, which gives the State as great a diversity of climate. The difference of temperature at different altitudes is fully fifteen degrees, and the soil is of an equally diversified character. Hence, at different elevations in the same locality are found the white pine (*Pinus strobus*) of Michigan, the black walnut (*Juglans nigra*, of Indiana, and the white oak (*Quercus alba*, of tide-water Virginia. The magnificence of these forests in some parts of East Tennessee is unsurpassed anywhere in the United States. They reveal, as it were, in the exuberant fertility of the soil, and attain a size that is exceeded only by the giant trees of California. Oaks are reported in some sections 7 and 8 ft. in diameter, and poplar (tulip or whitewood) as large as 10 ft., and one of the larger trees as being 120 ft. high, and 2 ft. and 7 in. in circumference at the butt. From it were cut 6 twelve-foot saw-logs that measured an aggregate of 11,120 ft.

CHINA ink is known to consist chiefly of lamp-black and linseed-oil, with some binding material. Dr. Precht, of Silesfurt, says the lamp-black is got by burning different oils, with limited access of air, the quality depending partly on the raw material, partly on the kind of oven used. The inferior products are applied in printing. As a binding material, the Chinese often use the sap of various plants, but it has been ascertained that the black ink contains only animal gelatine and no gum-arabic. The usual addition of camphor and musk does not affect the goodness of the ink. In making the black ink, the drying mixture (which is compounded according to precise rules) is carefully watched. Most of the China ink sold is imported from China, but some German houses make the ink, and of excellent quality. China ink, used in drawings which often receive water-colours, should be highly insoluble in water. It is sold in so, but, according to Dr. Precht, if

bichromate of potassium (say, a 2 per cent. solution) be used instead of water in the rubbing process, the drawing, after one or two hours' exposure in daylight, becomes resistant to water.

CHIPS.

A building at Haddington, till recently known as the Knox Free church, has been reconstructed internally to serve as a public free library, from the plans of Messrs. J. and F. Farquharson, architects.

The town council of Leamington received, last week, plans prepared by the borough surveyor for alterations and additions to the waterworks, and decided to submit them to Sir F. J. Bramwell, C.E.

At a meeting held at Kirkcaldy on Thursday week, plans by Mr. Kinnear for the extension of the manse, at a cost of £520, were approved.

Major Hector Talloch held an inquiry, last week, at the town-hall, Folkestone, into an application by the town council for sanction to borrow £11,000 for the purpose of street improvement, the purchase of the King's Arms Inn for the widening of Guildhall-street being the main object for which the money is required.

A series of Turkish, Russian, and medical baths have just been completed and opened, in connection with the Imperial Hydropathic Hotel, Blackpool. The work has been carried out under the supervision of Mr. Constantine, of Manchester. The architect is Mr. F. R. Barker, of Manchester; and the contractor Mr. Smith, of Blackpool.

At a meeting of directors of the Highland Railway Company, held last week, it was resolved to promote a Bill in the ensuing session of Parliament for the construction of a line of railway from Keith to Buckie, with an extension to Farskane, which is within half a mile of Cullen. The line will be 17½ miles long, and of easy construction. It is anticipated that the cost will be a little over £5,000 per mile.

By the completion of a line of railway 200 miles in length from Krasnovodsk to Kizil Arvat, the Russian Government have finished the first section of the Trans-Caspian Railway, which is intended to bring the territory recently conquered from the Turkomans into direct communication with both the Caucasus and the interior of Russia.

A stained glass window has this week been placed in St. Nicholas parish church, Newbury. Messrs. Hardman and Co., of Birmingham, were the artists.

A Methodist New Connexion Chapel was opened in Eldleston-road, Crewe, on Sunday week. It is Gothic in style, is seated with pitch-pine benches, and has cost £700. Mr. Bailey, of Wilmslow, was the builder.

The sewerage of Keulworth is rapidly progressing, the tank and outfall works being on the point of completion, and a large portion of the main sewers are laid. Mr. Fell is the contractor.

In the arbitration case Sir W. Hart-Dyke v. the Darent Valley Main Sewerage Board, heard on the 30th ult., at the Institution of Surveyors, and fully reported in our issue of the 9th inst., p. 347, the umpire (Mr. F. Vigers) has awarded Sir W. Hart-Dyke £7,950 as compensation for the damage done to the grounds of Lullingstone castle by the sewer laid through them. £20,000 was claimed.

At a heritors' meeting held at North Berwick on the 15th inst., tenders amounting in all to £3,459 were accepted for the erection of the new parish church.

A new mansion, Early English in style, has just been completed for Sir H. W. Ripley, near Badstone, at the confluence of the Clun and the Teme. Mr. Harris, of London, is the architect; Messrs. W. Cabott and Co., of London, are the contractors, Mr. W. C. Carter being their managing foreman; and Mr. Old is the architect. On Saturday week allayed on the building, to the number of 130, were entertained at dinner by the owner.

One of the largest caissons in the world was successfully floated across the 100 ft. entrance of Milford Docks by electric light early on the morning of Wednesday week. It effectually shut out the water. Its dimensions are—length, 100 ft.; height, 48 ft.; breadth, 15 ft. Its weight is 100 tons.

A suspension passenger-bridge over the ferry at Cromdale, near Aberdeen, has just been finished. Messrs. Harper and Co., Aberdeen, were the engineers, and it has been erected under the personal superintendence of Mr. John Harper, of Seaford. The structure is of galvanised steel rope, and is 195 ft. in clear span.

A new eye, ear, and throat hospital at Shrewsbury, erected at a cost of £11,000, was opened on Wednesday.

Cambridge is at last to have a new post-office. After several years' negotiations, the Government have at length decided to purchase for this purpose a capacious site at the Petty Cur end of St. Andrew's-street, whereon stand an inn and some of the oldest houses in Cambridge.

A dispute between the Crediton School Board and Mr. William Dart, concerning a charge made by the latter of £74 14s. 10d. for certain "additional works" done in connection with the erection of an infants' school at Landscore, has been settled by Mr. C. E. Ware, architect, of Exeter, to whom the matter was submitted as arbitrator by the common consent of the parties interested. Mr. Dart's contention was that he was entitled to make the above-named charge under a clause in the contract which gave him the power to account certain works done under the direction of the architect, and for which the latter certified as "additional," and, as such, outside the estimate of the said contract. Certain members of the board disputed Mr. Dart's claim, and the others were induced to refer the subject to arbitration, with the result that an award has been made for the amount claimed, and the ratepayers will be mulcted in the costs of the reference.

An increasing characteristic feature of the business portion of New York is its lofty buildings for offices. Of the score of office buildings now going up or nearly finished there is only one—the Stock Exchange, four stories in height—which is less than twelve stories high. Lifts are a common necessity to a New York business man.

A Local Government Board inquiry was held at Evesham Town-hall last week, with reference to an application from the Town Council for sanction to borrow £1,000 for extensions and improvements to the gasworks. Mr. Scott explained the scheme, as representative of Mr. Bowers, the engineer, from whose plans it will be carried out.

The Roman Catholic Church at Haslingden, near Manchester, was reopened last week, after the addition of chancel, side-chapels, and a gallery to nave.

The Local Board of Richmond, Surrey, have adopted the recommendation of Mr. Homersham, their water engineer, that the artesian well should be deepened from 400 ft. to 1,200 ft. by a central bore. The tender of Messrs. Mather and Platt has been accepted, and the work is now in progress. Mr. Peirce is the resident engineer, and Mr. Harrup, the contractor's foreman.

A correspondent informs us that the recent gas exhibition at Weston-super-Mare was not "the first display of the kind in the West of England," as a similar exhibition was held at Shepton Mallett two years since.

An improved jointed pitch-board for squares has been patented by Frederick N. Marvick, of Palatka, Fla. The invention consists in a carpenter's square provided with a middle-jointed rule slotted in both sections, and connected by a clamp bolt and nut with the slotted arms of the square.

New Sunday-schools are in course of erection in connection with the Wesleyan chapel, Collegepark, Lewisham. The buildings will be Early English in style, and will accommodate 300 children in the main room, and its two classrooms, and 100 others in the infants' room. Mr. Charles Bell, of Old Broad-street, E.C., is the architect; and the builders are Messrs. D. and R. Kinnaird, of Lewisham.

The Norwich Town Council agreed on Monday to accept the tender of Messrs. Crompton and Co., of London, for lighting several of the principal streets of the city by means of electricity for twelve months at a cost not exceeding £400. It was stated that nearly one hundred gas-lamps would be superseded, and that the extra cost of the light would be only about £100. The cost of this experiment was, it was explained, less than half that of similar experiments made elsewhere; and the experiment already made in lighting the market-place has proved eminently successful.

The members of the Bradford Historical and Antiquarian Society visited the residence of Mr. John Holmes, at Holmstead, Roundhay, near Leeds, on Saturday last, for the purpose of inspecting his extensive and valuable collection of pre-historic and artistic treasures. The collection includes a valuable library (especially rich in antiquarian works), antique furniture, tapestry, implements of warfare, pre-historic relics, and rare examples of ancient pottery, particularly a unique collection of ware from Cyprus.

New schools for St. Paul's, Hammersmith, are about to be built on the south side of Hammersmith-road. The contract has been taken by Messrs. Parnell and Co.

The local authority of Kirkintilloch adopted on Monday plans, and a report by the engineer, Mr. Copeland, for the formation of a water reservoir, at an estimated cost of £5,000.

The tower of the parish-church of St. Helen, at the village of West Keal, near Spilsby, Lincolnshire, fell with a crash the other day, and is now a mass of ruin. Nearly the whole of the tower fell to the south in the churchyard, and clear of the edifice. The tower was built principally of sandstone, and possessed a peal of five bells, which now lie among the debris. The church of West Keal is quite a landmark over the fens, being situated on an eminence overlooking them, and the tower was a conspicuous object for miles around.

The Mexborough local board adopted on Tuesday plans by Mr. George White, C.E., for the proposed sewerage works and disposal of sewage.

At a meeting of the Harbour Commissioners of Burntisland, Fifeshire, held on Tuesday, it was decided to proceed at once with several pressing works recommended by Messrs. Meik, C.E., and of Sir James Falshaw, and Mr. Sheppard in a special report. The cost of the works is estimated at between £8,000 and £10,000.

Epps's Cocoa.—Grateful and Comforting.—By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected Cocoa, Mr. Epps has provided our breakfast tables with a delicately-flavoured beverage which may save us many heavy doctors' bills. It is by the judicious use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. Hundreds of subtle poisons are floating around us ready to attack wherever there is a weak point. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame. *—Civil Service Gazette.* Made simply with boiling water or milk. Sold only in Packets (labelled)—James Epps and Co., Homoeopathic Chemist, London.—Also makers of Epps's Chocolate Essence for afternoon use.

Lamplough's Pyretic Saline is refreshing, most agreeable, and the preventive and curative of FEVERS, BILIOUSNESS, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by chemists throughout the world, and the Maker, 113, Holborn Hill. *Use no substitute. See Medical Testimony.*

Holloway's Pills.—These famous Pills purify the blood, and act most powerfully, yet soothingly, on the liver, stomach, kidneys, and bowels, giving tone, energy, and vigour to the whole system. They are wonderfully efficacious in all ailments incidental to females, and, as a general family medicine, are unequalled.

Doubling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to **CHARLES TRASK,** Norton-sub-Hamdon, Ilminster, Somerset. **[ADVT.]**

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates. General Repairs and Alterations Executed. Experienced Workmen always in readiness, and sent to any part of the country. **[ADVT.]**

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE
CORSHAM DOWN

CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.
(See trade advt. on p. XXV.) **Adv.**

TENDERS.

*. Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ACCRINGTON.—For erection of Conservative Club, Accrington. Mr. H. Ross, Accrington, architect. Quantities by the architect:—

Accepted Tenders.	
Mason:—	
Clegg	£990 0 0
Joiner:—	
Roberts	480 0 0
Plumber:—	
Threlfall	171 0 0
Plasterer:—	
Cronshaw	85 15 0
Slaters:—	
Evans and Co.	75 0 0
Painter:—	
Foster	22 17 9
Total	£1,821 12 9

ACTON, MIDDLESEX.—For the erection of a house and laundry in Park-road North, Acton, for Mr. J. Howell, jun. Mr. N. Kempthorne, architect:—

Huntley and Rooney, Acton	£545 10 0
ADDEY. —For additions and alterations to Aldeby Vicarage, Norfolk. Messrs. N. Pells and Son, Beccles, surveyors:—	
Calver, Ringsfield	£480 0 0
Holsworth and Son, Bungay	470 0 0
Grimmer and Wright, Aldeby	440 0 0
Cutler, Beccles	336 0 0
Banns, Wheatacre	333 0 0
Hindes, Beccles	370 0 0
Watson, Bungay (accepted)	359 4 0

ALTON, HANTS.—For repairs to the exterior of the town hall, for the town council:—

Annett and Son	£109 0 0
Beale, F. (accepted)	94 15 0
ANDINGLY (SUSSEX). —For building a house, Mr. Woodman, Brighton, architect:—	
Ancombe, Brighton	£1,293 0 0
Davey, W. and G., Brighton	1,270 0 0
Ancombe, Lendfield	1,250 0 0
Fiach, Haywards Heath	1,195 0 0

ARNcliffe, NEAR GRANGE, WESTMORELAND.—For the erection of three villa residences at Arncliffe, near Grange, Westmoreland, for Mr. W. Mitchell. Mr. W. J. Newton, architect:—

Accepted Tenders.	
Masons, &c.:—	
Hinchcliffe, W. and R., Bradford	£600 0 0
Joiner:—	
Parker, J. G., Windhill	396 0 0
Plasterer:—	
Bland, M., Bradford	150 0 0
Slater:—	
Hill, A., Bradford	102 0 0
Plumber:—	
Ullathorne, S., Bradford	100 0 0
Painter:—	
Atkin, G. E., Bradford	65 0 0
Wall-stones found.	

ASHTON-UNDER-LYNE.—For (Contract No. 1) construction of about 50 lineal yards of brick sewer and side-drains in Winton-street. Mr. J. T. Earnshaw, C.E., borough surveyor:—

Burton, J. and Sons, Ashton-under-Lyne (accepted), at a schedule of prices.

ASHTON-UNDER-LYNE.—For (Contract No. 2) construction of about 150 lineal yards of brick sewer from Winton-street, under the railway to Oldham-road. Mr. J. T. Earnshaw, C.E., borough surveyor:—

Downey, W. E., Ashton-under-Lyne (accepted), at a schedule of prices.

ASHTON-UNDER-LYNE.—For (Contract No. 3) construction of about 150 lineal yards of 12in. earthenware pipe sewer and side-drains in Oldham road, from Wellington-road to the Lancashire and Yorkshire Railway. Mr. J. T. Earnshaw, C.E., borough surveyor:—

Downey, W. E., Ashton-under-Lyne (accepted), at a schedule of prices.

ASHTON-UNDER-LYNE.—For (Contract No. 4) sewerage paving, and flagging, &c., Hereford-street, from Grosvenor-street to William-street, a length of about 11 yards. Mr. J. T. Earnshaw, C.E., borough surveyor:—

Burton, J. and Sons, Ashton-under-Lyne (accepted), at a schedule of prices.	
BALDOCK, HERTS. —For erection of two small houses at Baldock, Herts, for Messrs. Simpson and Co. Mr. J. S. Hitehin, architect and surveyor:—	
Willmott	£450 0 0
Richardson	427 0 0
Jackaon	385 0 0
Brockett	380 0 0
Burnage	349 0 0
Ranson	323 15 0
Turner	315 0 0

BALSALL HEATH, NEAR BIRMINGHAM.—For erection of additions to the Balsall Heath Police Station, Birmingham. Mr. H. Rowe, 17, Foregate-street, Worcester, county surveyor:—

Taylor, T., Birmingham	£498 0 0
Wells, F. and Son, Worcester	481 0 0
Marshall, G. H., Smethwick	477 0 0
Parton, W. H., Birmingham	475 0 0
Willcox, H., Birmingham	470 0 0
Bowen, J., Balsall Heath (accepted)	419 0 0
Hunter, H. J., Widenhall	380 0 0
BATTERSEA. —For new counter, &c., at the "Prince's Head," York-road, Battersea, for Mr. Erwington. Mr. H. I. Newton, architect, 27, Great George-street, Westminster:—	
Davidson	£287 19 6
Warne	283 10 0
Kemble	278 15 0
Hellings	266 0 0
Heath	253 0 0
Matthews (accepted)	205 6 0

BEDFORD, HANTS.—For painting all the outside wood and ironwork at the Bedford Board Schools:—

Williams, W., Tredegar	£79 6 0
Davis, W. and Son, Cardiff	69 10 0
Lyddon, W., Ebbw Vale	65 3 0
Booth, J. L., Ebbw Vale (accepted)	41 8 0
BISHOP STORTFORD, HANTS. —For erection of a cottage near the hospital, for the local board. Mr. E. Dudley, surveyor:—	
Handcomb, J., Bishop Stortford	£245 0 0
Champness, H., Bishop Stortford	229 10 0
BLACKHEATH. —For house, Westcombe Park, Blackheath. For Mr. T. W. Powell. Mr. E. Robert Robson, F.S.A., architect:—	
Higgs and Hill	£3,229 0 0
Nightingale, B. E.	3,143 0 0
Kirk and Randall	2,990 0 0
Tongue, W.	2,960 0 0
Atherton and Latta	2,950 0 0
Wall Bros.	2,895 0 0
Jerrard, S. J.	2,843 0 0
Oldrey, W. (accepted)	2,794 0 0

BOOTLE.—For the supply of 8,000 tons of ordinary paving setts, and 1,000 tons of small setts, for the town council. Mr. J. Alexander, borough surveyor:—

Faill, A. and J., Craig-park, Glasgow (accepted) ordinary, Westfield quarries, 20s. 6d. per ton; special, Furnace and Bonau quarries, 28s. per ton. (Twenty-five tenders received.)

BRIGHTON.—For additions and alterations, Nos. 5 and 6, Victoria-terrace, West Brighton. Mr. Woodman, Brighton, architect:—

Parsons and Sons, West Brighton* £1,162 10 0

* Accepted.

BO'NESS, SCOTLAND.—For formation of a new cemetery and erection of superintendent's house at Bo'ness. Mr. J. Strong, Falkirk, architect:—

Accepted tenders.	
Mason's work:—	
Peattie, T., Bo'ness	£558 5 2½
Excavator's work:—	
Donald, A. and W., Parkhead	275 3 9
Iron railing and gates:—	
Cochrane, J., Bo'ness	222 12 1½
Joiner's work:—	
Simpson, J., Bo'ness	141 0 0
Plumber's work:—	
M'Kerracher, D., Bo'ness	22 13 11
Slater's work:—	
Draper, D., Falkirk	22 8 0
Plasterer's work:—	
Patrick and Boyd, Bo'ness	19 6 9

BRADFORD, YORKS.—For supply of school materials during the year ended Oct. 31, 1882, to the School Board. Accepted tenders:—

Brear, T., Bradford; Heywood, J., Manchester. [Part of contract given to each.]	
BRIDLINGTON, YORKS. —For additions to stable, Bridlington, for Mr. T. Woodcock. Mr. J. Earnshaw, architect:—	
Rennard	£72 0 0
Mainprize	70 0 0
Lesson (accepted)	61 0 0

BRIDLINGTON, YORKS.—For erection of engine-house, &c., Bridlington, for the Water Company. Mr. J. Earnshaw, architect:—

Owston	£578 0 0
Wallington	518 0 0
Leeson	459 0 0
Mainprize	442 0 0
Rennard (accepted)	399 0 0

BRIDLINGTON QUAY, YORKS.—For erection of pair of villas, Bridlington Quay, for Messrs. Stuart and Smith. Mr. J. Earnshaw, architect:—

Gray (accepted)	£1,229 0 0
BRIGHTON. —For St. Matthew's Church, Brighton. Mr. John Norton, architect. Quantities supplied by Mr. S. T. Thacker. The following is a list of the tenders:—	
Webber, W. H.	£12,250 0 0
Cheeseman, C. and Co.	12,000 0 0
Goddard and Sons	11,131 0 0
Saunders, H. J.	11,000 0 0
Stephens and Barstow, Bristol	10,999 0 0
Dove Bros.	10,995 0 0
Lawrence, C.	10,795 0 0
Boyce, T.	10,720 0 0
Lansley, J.	10,630 0 0
Chappell (accepted)	10,473 0 0

BRISTOL.—For alterations and additions to Redlane Bank, Bristol, for Mr. Ball. Mr. H. J. Jones, architect:—

Contract No. 1.	
Lewis and Sons	£937 0 0
Hatherley, E. and T.	893 0 0
Humphreys	870 0 0
Church	649 0 0
Supplementary contracts.	
Church	348 10 0
Decorations.	
Edkins and Sons	250 0 0

BROMLEY.—For new coach house, &c., to the "Tiger's Head," and repairs, &c., to the "Laurel," Bromley, Kent, for Messrs. John Fox and Sons. Mr. G. St. Pierre Harris, architect:—

Grubb, Bromley (accepted).	
BURTON, NEAR MANCHESTER. —For sewerage certain private streets in the township of Worley, for the Burton-upon-Irwell Rural Sanitary Authority. Quantities supplied by the surveyor, Mr. J. Price, Assoc. M.C.E.:—	
Jackson, J., Walsden	£40 17 2
Moss, T., Stafford	25 12 10
Naylor, M., Hulme	35 9 4
Smith, F., Rusholme	25 8 0
Unsworth, G., Moss Side	25 13 5
Unsworth, J., Walsden	20 12 10
Surveyor's estimate	22 0 0

BURTON, NEAR MANCHESTER.—For sewerage certain private streets in the township of Worley, for the Burton-upon-Irwell Rural Sanitary Authority. Quantities supplied by the surveyor, Mr. J. Price, Assoc. M.C.E.:—

Jackson, J., Walsden	£40 17 2
Moss, T., Stafford	25 12 10
Naylor, M., Hulme	35 9 4
Smith, F., Rusholme	25 8 0
Unsworth, G., Moss Side	25 13 5
Unsworth, J., Walsden	20 12 10
Surveyor's estimate	22 0 0

BURTON, NEAR MANCHESTER.—For sewerage certain private streets in the township of Worley, for the Burton-upon-Irwell Rural Sanitary Authority. Quantities supplied by the surveyor, Mr. J. Price, Assoc. M.C.E.:—

Jackson, J., Walsden	£40 17 2
Moss, T., Stafford	25 12 10
Naylor, M., Hulme	35 9 4
Smith, F., Rusholme	25 8 0
Unsworth, G., Moss Side	25 13 5
Unsworth, J., Walsden	20 12 10
Surveyor's estimate	22 0 0

BURTON, NEAR MANCHESTER.—For sewerage certain private streets in the township of Worley, for the Burton-upon-Irwell Rural Sanitary Authority. Quantities supplied by the surveyor, Mr. J. Price, Assoc. M.C.E.:—

* Several mistakes made; should be £10 more, owing to mistake. (Contracts Nos. 1, 4, and 5, accepted, should be £20 higher.)

BURTON, DURHAM.—For formation of a cemetery at Burton in the parish of Stanhope for the Wear-side Rural Sanitary Authority work consists of 277 lined yards of fence with, hedges, horse-stall, office, gateway, road, footpath, &c. —
Maddison, J., Cowshill, Wearside accepted.

CARDIFF.—For erection of two police-stations, one at Lower Grange and one at Canton, for the Cardiff Corporation. Mr. J. A. B. Williams, M.L.C. borough engineer. —

Canton Police Station.	
Bird, C., Canton, Cardiff	2,250 0 0
Dunn, C., Canton, Cardiff	2,338 16 6
Thomas, D., Canton, Cardiff	2,296 0 0
Shepherd, S., Cardiff	2,290 15 0
Barton, C., Routh, Cardiff	2,260 0 0
Trotman, E., Cardiff accepted	1,880 0 0

Lower Grange Police Station.	
Shepherd, S., Cardiff	2,296 19 0
Trotman, E., Cardiff	2,137 0 0
Bird, C., Canton, Cardiff	2,105 0 0
Barton, C., Routh, Cardiff	1,995 0 0
Marshall, H., Lower Grange	1,980 11 0

CHATHAM, PARK SOUTH, DELAWARE.—For the erection of 140 pairs of semi-detached houses. Mr. A. Shanton, C.E., 14, Farnham's Inn, E.C. architect. —
E. J. Goldbold, Hford accepted.

CLIFTON, BRISTOL.—For a pair of semi-detached residences, Band Hill road, Clifton, for Mr. J. S. Strong. Mr. Herbert J. Jones, architect. —
Hannam and Wilkinson, £1,880

CRAWLEY.—For various works of paving. Corporation to provide all materials, contractor to provide ballast and other material. Mr. G. Watson, borough surveyor. —
Pockarance, Chester ... 1,425 13 0
Minnie, Crawley ... 812 7 6
Borough surveyor's estimate ... 392 11 0
Mass, jun., Stafford accepted ... 183 3 10

DUBLIN.—For construction of works in connection with the main drainage of Drumcondra, Clonliffe, and Glasnevin Townships. Mr. P. F. Leonard, C.E. & S., 25, Lower Ormond-quay, Dublin, engineer. —

Bagnall, C. E., Cork	£10,323 0 0
Sadlow, J., Seville-pl., Dublin	8,995 7 8
Kelly, J., Thomas-street, Dublin	7,746 0 0
Lewis, T. D., Co. Antrim	7,265 4 6
Simpson, R., Dublin	6,722 0 0
Berwin & Boyland, Drumcondra	5,639 0 0

(Two tenders were delivered half an hour too late.)
* Accepted.

DUBLIN.—For supplying water mains for S. Patrick's-road. Mr. Leonard, engineer. —
Gregg and Mooney, Dublin ... 1,113 0 0
Simpson and Co., Dublin accepted ... 133 0 0

DUNDEE.—For stables, coach house, with living apartments over, for Mr. J. May. Mr. R. Peters, Wool Exchange, E.C., architect. —
Pierse and Ranyard ... 150 0 0
Watson and Dunnett accepted ... 450 0 0

DUNDEE.—For the erection of a market-shed at Dundee. Mr. J. Murray Robertson, architect. Accepted tenders:—

Mason:—Duncan, A.	
Joiners:—Brownlee, W. and R.	
Plumber:—Brown, D.	
Slater:—Storrier, A.	
Plasterer:—Ovenstone, J.	
Glaziers:—Lindsay and Scott.	

DURN (YORKS).—For erection of a cart-shed on the wharf at Durn for the Littleborough local board. Mr. F. H. Shuttleworth, surveyor. —

Ashworth, R., Littleborough	£51 0 0
Howarth and Baze, Littleborough	42 10 0
England, J., Littleborough accepted	41 0 0

ESLIE, MIDDLESEX.—For road-making and laying of sewers, Enfield. Mr. E. Howard, surveyor. —

Rowley, T.	£2,420 0 0
Harris, W.	2,390 0 0
Beattie and Co.	2,280 0 0
Ford and Everett	2,240 0 0
Aldred, G.	2,220 0 0
Pound, G.	2,048 0 0
Taylor	1,992 0 0
Taylor and Co. accepted	1,835 0 0
Pugh and Co.	1,638 0 0
Woodham, H.	1,560 0 0
Bailey, J.	1,419 0 0

EPING, ESSEX.—For erection of a brick, timber, and slate building for the purpose of an infectious hospital, and for rebuilding certain cottages as offices, for the Epping Board of Guardians. —
Nicholls, W. B., Lutton Harlow accepted. £715 0 0

EXMOUTH.—For erection of a dwelling house, with shops, bakehouse, &c., in Rother-street, Exmouth, for Mr. J. Jones. Messrs. Packham and Croote, 93, Farn-street, Exeter, architects. —

Perry and Sons, Exmouth	£1,832 0 0
Cooper and Son, Exmouth	1,325 0 0
Hopier, H. H., Exmouth accepted	1,290 0 0

FARNHAM, KENT.—For construction of a main sewer about 800 yards long from the existing sewer on the Ospringe-road, the head of Faversham Creek, for the Commissioners of Faversham Town. Mr. Thomas Watts, 35, West-street, Faversham, surveyor. —

Davis, A., Faversham	£1,471 0 0
Street, N., Sittingbourne	837 0 0
Neave, J., Faversham	797 0 0
Johnson, G., Faversham	647 10 0

* Accepted.

FITCHLEY, ROAD.—For pair of semi-detached dwellings, on a new foundation work, Fitchley road, N.W., for Mr. P. L. Hildway. Mr. W. Graves, architect. Quantities by Mr. W. Barnett. —
Kelford, C. accepted ... £2,900 0 0

FITCHLEY.—For proposed villa, for Mr. W. T. Dipper. Mr. R. Peters, Wool Exchange, Coleman-street, E.C., architect. Quantities by the architect:—

Parish	£1,198 0 0
Shepherd	1,163 0 0
Over	1,162 0 0
Merritt and Ashby	1,133 0 0
Dowds, R.	1,060 0 0
Donner, T., Julian and Co.*	1,030 0 0

* Accepted.

FULHAM, LONDON, S.W.—For new roads and sewers on the Fulham No. 2 Estate, for Mr. G. R. Holland:—

Dunmore	£145 0 0
Jackson	441 0 0
Pozzy	424 0 0
Wilson	413 0 0
Keeble	350 0 0
Harris accepted	320 0 0

GILGHEAH.—For new farm-buildings at Gilgheah, for Mr. Clement Burton. Mr. Elgar Golf, Lowestoft, architect. —

Bounce	£285 0 0
Gwynne and Wilkins (accepted)	£230 0 0

GLASGOW.—For supply of about 40,000 cubic feet of sawn pitch timber piles, ranging in length from 13ft. to 50ft., to the Clyde Navigation Trustees:—
Brownlee and Co., City Saw Mills, Port Dundas, Glasgow, (accepted).

GOSPORT, HANTS.—For the erection of shops and premises, North Cross-street, Gosport, for Mr. Bishop. Mr. James W. Stroud, architect. Quantities by Mr. C. M. Houghton:—

Harding, F.	£1,671 0 0
Hayter, T. B.	1,650 0 0
Batt, J.	1,620 0 0
Dash, C. M.	1,594 0 0
Cole, G. J.	1,490 0 0
Rapley, W.	1,435 0 0
Taylor, R. accepted	1,238 0 0

GREAT YARMOUTH.—For alterations and additions to premises at Great Yarmouth, for Messrs. Bantyn and son. Mr. J. B. Pearce, F.R.I.B.A., Norwich, architect:—

Lacey, J. W., Norwich	£940 0 0
-----------------------	----------

HAMPSHIRE.—For studio and chambers, Chalcut gardens, England-lane, Hampstead, for Mr. Towneley Green. Messrs. Butterbury and Huxley, architects:—
Manley, M., Regent's Park (accepted).

HOLBEACH, LINCOLN.—For deepening part of the Lutton Leam River, near the old sluice. Mr. E. J. Tatani, M.I.C.E., surveyor:—

Waterman & Bateman, Sutton & Gedney	£625 0 0
Cooke & Bennett, Spalding & Lowestoft	562 0 0
White & Broadhurst, Crowland & March*	540 0 0

* Accepted.

HOLSWORTHY BEACON, DEVON.—For building a Wesleyan chapel at Holsworthy Beacon:—

Petherick, Bros., Hatherleigh	£245 0 0
Beckley, W. A., Holsworthy	207 0 0
Beckley, R. A., Lana Pannas Week*	25 0 0

* Accepted.

HOXTON, LONDON, N.—For erection of warehouse, Hoxton-square, for Messrs. M. A. Harper and Co. Mr. William Smith, architect:—

Shurmer	£1,090 0 0
Harper	1,075 0 0
Dunford	1,059 0 0
Matlock	933 0 0
Wilkinson	917 0 0
Lurke	890 0 0
Stevens	887 0 0
Steele Bros.	875 0 0

HUGHENDEN, BECKS.—For general repairs and renovation of Hughenden Manor, for the executors of the late Right Hon. the Earl of Beaconsfield, K.G.:—
Liley and Wood (accepted).

HUNTINGDON.—For alterations and additions to a house on the Market Hill, Huntingdon, for new post office. Mr. R. Hutchinson, architect:—

Bunting, A., Fenstanton	£760 0 0
Howard, J. H., Huntingdon	730 0 0
Thackeray, G., Huntingdon	757 0 0
Balmer, W., Huntingdon	683 0 0
Markham & Mason, Godmanchester	684 0 0
Wade and Edey, St. Neot's	647 0 0
Lord, C., Huntingdon	630 0 0

INVERKEILLER, FORFARESHIRE.—For improvements of Clance Inn, Inverkeiller, for Colonel Rait, C.B., of Anniston. Messrs. J. MacLaren and Son, Dundee, architects:—

Accepted Tenders.	
Mason's work:—Ramsay and Gordon, Arbroath.	
Joiner's work:—Scott, Arbroath.	
Slater's work:—Brand, Arbroath.	
Plumber's work:—Brown, Dundee.	
Plasterer's work:—Middleton and Donald, Arbroath.	
Total cost, £325.	

KENSINGTON.—For the erection of seven houses and shops in Kenway road, Earl's Court. Mr. Hugh Roumieu Gough, F.R.I.B.A., 6, Queen Anne's Gate, St. James's-park, S.W., architect. Quantities supplied:—
Belham and Co., Buckingham Palace-road* £7,404 0 0
(* Accepted.)

KETTERING.—For the erection of six cottages in Ford-street, for Mrs. Bellamy:—

Manby	£1,155 0 0
Payne and Son	1,149 0 0
Henson, C. S. F.	1,100 0 0
Barlow, E.	1,074 0 0
Henson, H.	1,047 15 0
Henson, G. V.	1,000 0 0
Shurman, C. (accepted)	940 0 0

LEINTWARDINE, HEREFORD.—For construction of works of sewerage (2 mile in length) and sewage disposal for the special drainage district in the parish of Leintwardine (north side) for the Ludlow Rural Sanitary Authority. Quantities supplied. Mr. James Hine, surveyor:—

White, J., Birmingham	£650 4 0
Overton, Leintwardine	482 0 0
Lewis, W., Carmarthen	464 15 0
Birrell, W., Shrewsbury	463 0 0
M'Kay, J., Swansea	439 0 0
Russell, H., Ludlow	427 0 0
Davis, Ludlow	407 6 2
Hughes, H., Dudley	394 0 0
Harris, J., Shrewsbury	320 0 0
Aston, J., Wolverhampton	227 14 0
Tragne and Co., Birmingham*	217 10 0

* Accepted.

LEWES.—For rebuilding Bridge-wharf Brewery, Lewes, for Messrs. Harvey and Son. Mr. W. Bradford, architect. Messrs. J. and A. E. Bull, surveyors:—

Building:—	
Patching and Son, Brighton	£1,388 0 0
Howard, Brighton	4,304 0 0
Rewaters, G. H. and A., London	4,059 0 0
Cheesman, Uckfield	3,990 0 0
Chappell, J. T., London	3,976 0 0
Peartless and Son, Eastbourne	3,910 0 0
Card and Son, Lewes (accepted)	3,808 0 0
Herman & Floyd, Lewes (irregular)	3,800 0 0
Knight, Lewes	3,643 11 5

Engineer and Millwright's work:—	
Shears and Sons	1,248 0 0
Worsam and Son	1,230 0 0
Pontifex, H. and Sons	1,190 0 0
Ramsden, R. and Son	1,159 0 0
Bennett, J. J. and Son	1,120 0 0
Pontifex and Wood (accepted)	790 0 0

Coppersmith and pipe-work:—	
Ramsden, R. and Son	1,178 0 0
Worsam and Son	1,121 0 0
Bennett, J. J. and Son	980 0 0
Shears and Sons	944 0 0
Pontifex, H. and Sons	900 0 0
Pontifex and Wood (accepted)	790 0 0

Backwork:—	
Worsam and Son	327 0 0
Bennett, J. J. and Son	285 0 0
Ramsden, R. and Son	249 0 0
Oxley and Co. (accepted)	221 15 0
Whibley, R.	246 10 0
Pontifex, H. and Son	200 0 0

LEWISHAM, LONDON, S.E.—For construction of 9in.-in-cement brick water-culverts, about 4ft. by 3ft. wide and 5ft. long:—

Hairyman, T. W., Lewisham	£270 0 0
Hall and Gammon, Lewisham	240 0 0
Amer, G., Gifford	230 0 0
Wheeler, J., Lewisham	198 0 0
Woodham, H., Catford (accepted)	175 0 0

LLANDUDNO, WALES.—For amend-d tenders for contracts No. 1 and 2, for the Llandudno Pier Works:—
Smith and Pilkington, Bacup, for No. 1 (accepted).
Woodall, S., Dudley, No. 2 (accepted).

LONDON.—For new schools in connection with St. Andrew's Church, Thornhill-square. Mr. W. Smith architect:—

Larke	£1,870 0 0
Dunford and Langham	1,680 0 0
Matlock	1,671 0 0
Harper	1,632 0 9
Shurmer	1,583 0 0
Cole and Chant	1,555 0 0
Stevens	1,548 0 0

LONDON, E.C.—For the erection of house, &c., at Hatton-garden, for Messrs. R. and Co. Mr. Ansell, architect:—

Patman and Fotheringham	£2,750 0 0
Laurence	2,457 0 0
Anley	2,320 0 0
Godden	2,310 0 0
Macey and Son	2,253 0 0
Cox	2,218 0 0
Jay	2,150 0 0
Langmead and Way (accepted)	2,150 0 0

LONDON, E.C.—For taking down and rebuilding Wellington Foundry, Charles-street, City-road, for Mr. B. Slater. Mr. T. Mdbourn, architect:—

Sabey and Son	£1,265 0 0
Marr	1,264 0 0
Staines and Son	1,186 0 0
Langmead and Way	1,111 0 0
Fernley	1,085 0 0
Palmer and Sons	1,068 0 0
Royal	1,066 0 0
Anley	1,015 0 0
Snow and Co.	1,033 0 0
Conder	1,029 0 0
Crabb	998 0 0
Salmon, W. and H.	924 19 9

LONDON, N.W.—For additions and alterations, St. Andrew's house, Regent's Park. Mr. Arthur Vernon, architect, 26, Great George-street, Westminster, and High Wycombe, Bucks. Quantities by Mr. Walter L. Vernon, Hastings:—

Bird	£5,436 0 0
Wargstaff and Son	5,121 0 0
Holland and Hannen (accepted)	4,976 0 0
Perkins	4,690 0 0

LONDON, S.W.—For alterations and additions to the George IV. Tavern, Vauxhall Bridge-road. Quantities by Mr. E. Crutchley, 3a, Post's Corner, Westminster:—

Boyce	£715 0 0
Foster	710 0 0
King, W., and Sons (accepted)	698 0 0
Stihng	681 0 0
Badcock	604 0 0
Quinn	588 0 0

THE BUILDING NEWS.

LONDON, FRIDAY, SEPTEMBER 30, 1881.

CITY IMPROVEMENTS.

IN one part of the City architects and builders seem more than usually active just now in improvements and alterations—namely: the area lying between Gracechurch-street on the west, Leadenhall-street on the north, and Fenchurch-street on the south. A few years ago this locality could boast of many of the old timber-fronted houses which had come down from the 16th and 17th centuries. Near Hide and Leather-market six old half-timbered buildings were pulled down within the last 20 years which antiquaries were sorry to lose; and only a short time since we described the discovery of some remarkable remains of Roman and Mediæval walls on the site of Leadenhall Market, which was then being excavated for the new buildings. A carefully-plotted plan of these discoveries was made by the clerk of works; in one case a wall of nearly 13ft. thick was discovered, and above this were the remains of a thinner wall of Roman brick, well bonded, with footings of a yellowish sandstone, and these walls appear to have had their foundations, in some instances, 24ft. below Gracechurch-street. Another rather peculiar feature of these foundations, probably connected with some important monastic buildings, was that they were composed partly of Roman tile and partly of Kentish rag, those materials alternating in layers. We understand several antiquaries have been to inspect the work, and their conjectures do not yet appear to have established any satisfactory theory to account for the strange admixture of Roman and Mediæval masonry at this part.

It is quite certain that Leadenhall Market was one of great antiquity, and it has belonged to the Corporation for more than two centuries. It consisted of an area of about 3,900 square feet; but, around it, a much larger market has, of late years, sprung up. The Leadenhall Market and Improvement Bill was passed for the purpose of meeting the new requirements by abolishing the old market and the erection of a larger one, as well as the improvement of the site and neighbourhood. We believe the Bill passed on the condition that the new market was to have an area of not less than 25,000ft. The site of the new erections, which we now describe, is confined to the old Half Moon-passage leading out of Gracechurch-street, and a part of Leadenhall-passage; and the Corporation would have done well to inclose the greater part, if not the whole, of the space between Half Moon-passage and Leadenhall-street, which, we understand, is to be let. The corner of Gracechurch-street and Cornhill has long been a trouble to the police. The pressure of traffic is daily so great at this corner that it is time something was done to avert danger; and it appears to us a circus ought to be formed here, if such a necessary enlargement has not already occurred to the civic authorities. Now is the opportunity; and we hope the corporation will not lose sight of the urgent value of this street improvement. The block of houses between the Half Moon and Leadenhall-street has been taken down, and there is a chance—if only one idea, that of a magnanimous spirit, ruled the Corporation—for something to be done to atone for this long-neglected centre.

The plans, which have been carried out under the supervision of the City architect,

Mr. Horace Jones, though still incomplete, show a partial realisation of a scheme which is intended to include a considerably larger area than now embraced. From the Half Moon-passage in Gracechurch-street the eye is carried through a long arcade 30ft. wide of intended shops, which is slightly diverted from the straight axis at the eastern end or Lime-street entrance. These shops will each be about 15ft. square, and three stories in height. This main arcade is intersected by another shorter arcade, the north end of which forms an entrance to the present Leadenhall Market. At the crossing is an octagon, which will be surmounted by a domical roof, and the cross arcade will, eventually, be carried southward. The whole underground area forms a series of vaulted basements or cellars on each side of a wide corridor, also arched in brick in two widths, which runs underneath the floor of arcade. These vaults are lofty, and will be lighted by glazed openings, partly in the shops or stalls, and partly from the corridor above in front of stalls. The arches are flat, of brickwork, supported on cross girders of iron, and by a longitudinal wall, with openings along the centre of the corridor. At the extreme end, near Gracechurch-street, the thick wall of Roman brick was found: this has been left, and will be inclosed as a relic of the discoveries. A considerable quantity of the rubble of the old walls which had to be removed has been reused in the basement. On the ground-floor the side-shops are constructed of brick side-walls; the fronts having cast-iron stanchions between, cast in the form of pilasters, which carry the principals of the roofing of arcade. Between the shops will be timber-framed and cemented; and there will be two stories above each shop, the upper one being an attic over the guttering of the roof. We can form only a general and imperfect idea of the effect of the arcade at present. The roof is constructed on the Mansard principle with two slopes; and an arched rib springs from each pair of opposite pilasters, while the lower principals have louvred openings, which will afford ventilation and prevent glare. These principals are of massive scantlings. Wrought-iron girders are largely used in the cross-beams and flooring. At the crossing of the arcades the angles of the octagon have large three-quarter-fluted columns of a Composite order, of cast iron, with entablatures; and the main entrance from Gracechurch-street is pronounced also by four columns of a similar design, which are placed at a wider distance apart than the width of arcade. There will be an arched entrance here, and, on each side, there will be, we understand, a sort of pavilion crowned by Mansard roof or a cupola. Externally, the elevations exhibit red brick fronts and stone dressings with stone pilasters between the shops. These are of three orders, and are similar to the new market buildings in Farringdon-road. The pilasters look rather small and weak in the portions already finished; but the new market is so completely hemmed in by the old buildings that we refrain from passing, at present, any opinion on the architectural merits of the new structure. The effect on the locality of which this market will form the centre can hardly be estimated. Unfortunately, the Bills passed for improvements of this kind are dealt with in a very piecemeal fashion. Each parish or district, and each owner of property, has a voice; but these interests are so often inimical to public views, and they so often clash, that an improvement of this sort can only be judged when it is fully before the public.

At the corner of Fenchurch-street and Lime-street several old houses have been pulled down, and the space is to be let for shops and offices. The area abuts close to several properties, the owners of which have been prudent enough to label their windows

"Ancient Lights." Lime-street is an old, narrow, and tortuous thoroughfare, and one of the ends of the new market arcade will open into it. About half-way down is a new block of offices in red brick, with reddish sandstone dressings, in which the commercial character has been well expressed by wide windows; but the most noticeable features about the façade are the red terra-cotta stringcourses between the stone lintels; these have rows of conventional flowers. There is a deep corbel table at the top, in warm sandstone, and the gabled dormers are relieved by red tile or terra-cotta ornament in courses, and by green-painted bargeboards. The wooden window-frames are painted also a bluish green. As an example of red brickwork, treated in a semi-Domestic or Gothicised style, it is worth mention. Several plots of freehold land are to be let between Lime-street and Fenchurch-street-avenue, belonging to the Carpenters' Company. Many stone-fronted buildings let as offices have been lately erected near the avenue, which are remarkable for some breadth of treatment. One, with an open loggia on the top story, the windows being set back, is quite Venetian in its style and details, and the stone ashlar obtains relief by the breadth of shadow of the upper story, the polished red granite shafts of the windows, and the discs of coloured marble introduced in a broad band of low relief panel-work between the windows. The balconette, on massive corbels, is another Venetian feature. The value of property in this street has increased much of late years, and when the market entrance has been made, we may expect the houses on the west side to be set back, and the roadway widened.

In Rood-lane, a block of chambers of red brick, in Queen Anne style, erected some time since, is worth mention for the manner in which wide rather flat-canted bay windows have been introduced in a narrow street. These bays, of woodwork, are recessed within the piers of red brickwork, which slightly project, and are finished at the top by pediments with carved brick swags of foliage in their tympani. The bays or recesses are arched over at the top. Mr. A. Peebles was the architect, and an illustration of the building, though not exactly as carried out in detail, will be found in our volume for June 20, 1879. The entrance, of stone, is well managed, and there is a degree of refinement in the details. In another narrow house-front in Fenchurch-street, breadth has been sacrificed to crowding of pilasters and details—a sort of elevation which tires rather than satisfies. One of the most recent conspicuous buildings in this part of the City is Leadenhall House. It occupies a large frontage to Leadenhall-street. The façade over the shopfront consists of a rusticated mezzanine story, on which rest three-quarter columns of the Corinthian order, supporting a broken entablature. These columns embrace two stories. Above there is a richly-carved attic. The centre is emphasised by a slight projection of the main order, with disengaged columns flanking a bay window. We notice this front (which will be found illustrated Sept. 26, in our volume for 1879) chiefly for its ornate Italian Renaissance features, and for the employment of red and grey polished granite in the principal stories. The granite shafts of the columns are relieved by piers of the same material, and the tints produced by the admixture of material has a rich but harmonious effect. For London street-fronts, the style is too elaborate and gorgeous, and a rather flatter treatment would have stood the atmosphere better. The large quantity of carved work will, we fear, soon become coated with soot, and even the use of polished granite of some kinds has not favoured the cleanliness which architects at one time anticipated, for we

find, in numerous instances of its employment, the polished surface eaten away by the corrosive acids of the smoke, and speedy disintegration following.

The junction of such important thoroughfares as Leadenhall-street and Fenchurch-street, with Aldgate High-street, ought to be enlarged, and, indeed, the same necessity exists for widening the approaches here as it does at the western *embouchure* at the junction of Cornhill and Lombard-street. As a portion of the great City highway, running east and west, Leadenhall-street is a most important link of communication, and ought to be dealt with in any general scheme of City improvement.

THE USE OF COLUMNS.

IT is an old charge against modern architects that they are constantly borrowing features from old buildings without regard for their original use. If this assertion be true of one thing more than another, it is in the employment of columns. Most middle-age men remember when porticos were all the rage—when every church, chapel, and conventicle had its front decorated with columns carrying a pediment, in accordance with one or the other of those arrangements found in Greek temples, otherwise “in antis,” a “prostyle,” an “amphiprostyle,” a peripteral or a “pseudo-peripteral,” so named with reference to the positions of the columns, but without any relation whatever to the plan or uses of the building. Even the humblest structure of the kind had its two or four engaged columns *in antis*, while of more ambitious edifices we have examples all over London, and several on the south side of the Thames in Waterloo-road, at Kennington, and at Brixton. Except in the case of a projecting portico, which afforded a shelter as well as an entrance, there was nothing to urge in reason for the use of lofty columns which had to be constructed of large blocks of stone, and only to mimic a heathen temple and to carry a prolongation of the main roof. When funds did not admit of blocks of stone, brick encaused with cement became the substitute for these outward semblances of Classic grandeur, till people began to see the absurdity of using material in so extravagant and ambitious a manner only to adorn one front, while the other three sides were starved to a condition of bare meagreness painful to behold. In course of a few years this mania for tetrastyles and hexastyles passed away; but there was left still a desire to employ the “orders” in a less ambitious way, in subservience probably to the ruling of another style, the Italian. They were constantly being tacked on the fronts of banks, insurance offices, town halls, and other secular buildings, but never in quite so obtrusive a manner, for the sham portico of the purist had tired everyone of impositions in architecture, which not only were exceedingly gloomy and heavy for our climate, but very costly when any alterations were contemplated. Accordingly, the Italian mode of employing the column became general; smaller shafts were used, and these could be constructed of stones of less size, or of monoliths of granite or marble. The substitution was a step in the right direction, for there was less incongruity in building small shafts of bricks and cementing them, than in obtaining materials which our quarries were taxed to supply, but a more important consideration was that architects could use a columnar treatment without being obliged to space their openings at certain intervals, as the rules for intercolumniation and height of orders were not so binding, and, consequently, the plan suffered less by this more pliant use of the column. The Gothic mania assisted, it must be admitted, largely to

loosen the restrictions of academic rule, and to make architects feel that they could introduce the column as a feature to give richness and depth to a façade without being fettered by considerations of conforming to any particular type or Vitruvian canon. The late Sir C. Barry was the first to introduce what is called the Florentine school of Italian; and this mode of arranging façades consisted in relieving masses of plain wall by appropriate decoration, in which the column was sparingly employed, and only in strict subservience to plan and fenestration. It was very different to the Venetian method, in which orders were piled on orders, a type of composition aiming at greater freedom, richness, pomp, and ornament of a super-added kind; and modern buildings seem to have inherited the peculiarities of both these types. The Venetian has been always the most popular style of architecture, in both of the great divisions of art, for it always preferred floridness of features and pompous effect to intellectual beauty. There is, indeed, another school which made the orders dominant—namely, the Roman, but it lacks the refinement of the Florentine and the playful fancy of the Venetian, and has been generally employed for churches, in which a large order is used with an attic above. The leading characteristic of the Roman columnar façade is that it obliterates, as one writer says, the distinction of several stories. A column resting on a low plinth or pedestal rises to the full height of the building, or nearly so, and the best examples probably in England we have of this mode are Greenwich Hospital and the Royal Exchange.

We have sketched briefly these three leading forms of columnar composition with the intention of showing that the two former are the only reasonable ones for modern practice to follow. As we are gradually returning to the wholesome doctrine of designing in the materials ready to our hand, brick and terra-cotta, it seems unnecessary to say that the orders we employ ought to be executed to a scale in keeping with the limited stone we possess. The purpose and use of the building ought to dictate the extent of the use of columns, and the degree of massiveness or solidity they should have. A narrow façade in a street intended for an ordinary shop, is not the right place for columns, and such decoration is best confined to pilasters. Even in more extensive façades, the character of the building appears to be the only appropriate justification for them. A number of stories, united by a single order, belies the purpose of a structure, for it assumes an appearance of dignity not compatible with the object for which it was built; while, if each story has an order of columns, the effect is to destroy the unity of the front by dividing it into a number of small parts. The pilaster mode of division is less open to objection, yet this method is always weak when applied to several stories. In structures of a public or monumental character, we have the best justification for the use of the column as a feature in design; an element of strength and majesty seems to be wanted; something to impart to the bare outer walls an appearance of solidity and depth, and as a means of emphasising a prominent part of the external design. The Cinque-cento artists, with all their faults and unpleasing combinations, had yet the moderation to use the column in the least offensive manner. It is true they combined the arcade with the columnar ordinance in a manner set them by Vitruvian models, but they reduced the orders in scale and made them less objectionable than the Roman. In like manner broken entablatures and stylobates, and engaged columns—other devices which have been repeatedly made the subject of criticism by purists—show to what an extent they endeavoured to make

the orders adapt themselves to façades in which lightness and decoration were required. We do not assert that the attached or engaged column is the best form of use, but we think the Cinque-centist was quite justified in applying columnar ordinances in this manner, where insular columns would have been either heavy or too costly. The façades of Palladio, Vignola, and Perrault, are characterised by a degree of elegance which leave nothing at all to be desired, and of English adapters we place Sir W. Chambers in the foremost rank. The orders were never superfluously introduced, but placed with sufficient intervals of plain walling to give them force, richness, and a meaning. It would carry us too far to mention examples of modern buildings which carry out these principles, and probably in London there are only two buildings, one the work of Inigo Jones, and the other of Chambers, to which we need refer.

It is not necessary that columns should be placed in rows at regular intervals, any more than it is that they should be piled upon one another. Many architects have a notion that they cannot have too many or thick a series of columns, regardless of the principles we have started with—that these features should always be subservient to plan, and other necessities of a façade. Of course, where great solidity, depth of recess and shadow are required, thick-set columns may be desirable; but in modern architecture the requirements of ample light, if no other, suggest more open columniation. Again, for buildings of an official character; the formula of a rusticated basement and an order above is both dignified and expressive; while for residential structures and offices, superposed orders might be used. The chief thing is moderation and refinement, and, perhaps, the French style of Cinque-cento, as that seen in parts of the Louvre by Perrault, who was the Palladio of the French school, affords us some of the best models. It is unnecessary, because it is impossible, with the many diversities of composition, to lay down rules for the interspaces of columns or their proportions. What may be desirable for insulated columns would be heavy and over-massive in attached orders. What is called the arcostyle arrangement, or that in which a wide intercolumniation exists between coupled columns, is a very artistic and favourite mode of treating a centre by the artists of this school. The columns are often placed *in antis*, and the wall is either attached or disengaged from the columns, leaving them free. The porticos of Somerset House are thus treated.

There is one point about which architects have never agreed thoroughly—viz., with regard to the practice of piling orders on one another. In designing columnar ordinances of this kind, how often has the designer felt perplexed about the correct rule to follow in the superposition of his columns. At the angles of a composition of this sort the difficulty is felt to be greatest, and the question arises, Should the plinth and pedestals of the upper order project over the upper ends of the lower shafts, or be set to a vertical line with them? The practice of the leading Italian architects in arranging order above order is that the upper column shall have a diameter equal to the superior diameter of the column below it, so that, in fact, the plinth of the upper pedestal projects over the top of the lower shaft. By this arrangement a verticality of the shafts at the corner is preserved. A learned writer considers a more rational mode would be to carry the diminution through the columns of every story, so that the columns of each order would be diminished in regular gradation. Such a diminution would, however, reduce the upper orders very much, and the angles, when finished with pilasters, would appear to batter inwards. Two instances of the former plan

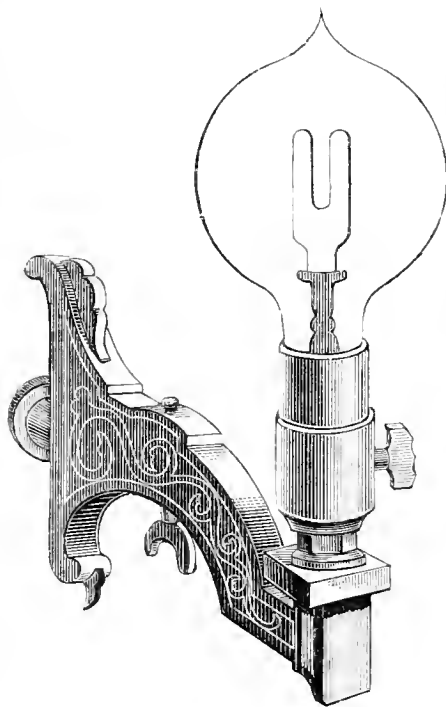
may be mentioned—one, the double order to the Church of St. Mary in the Strand, and the other of the façade of the new War Office at Whitehall, a building confessedly designed under difficulties by a Gothic architect. Of course, in all cases, the axes of the several orders of columns ought to be preserved in a vertical line, and it must be generally acknowledged the projection of plinths and pedestals at the corner has a rather awkward effect, and requires some forethought on the part of the architect. We have confined our remarks to façade arrangements; columns in the interior of buildings are regulated, generally, by similar considerations, and to them we do not now refer.

THE PARIS ELECTRICAL EXHIBITION.

IT has rarely been our lot to meet with any catalogue so badly drawn up as the "Guide Officiel" to the exhibition now being held in Paris. If ever there was an exhibition requiring a carefully-prepared classification of the various exhibits, and a condensed description of the most noteworthy of them, it is this; yet it is not too much to say that an ordinary visitor, unless he happens to have the advantage of being acquainted with one of the officials, may wander about the building for hours, with the catalogue in his hands, without being able to gain a clear idea of what is presented to his view. We think, also, that exhibitors have grave cause for complaint in the fact that a portion of the official catalogue is devoted to a most unfair puff of Edison's exhibits, in a description which bears on its face evidence of the most superficial knowledge of the history of electric lighting. Taken as a whole, however, the exhibition is a most wonderful one, and comprises by far the most complete collection of the applications of electricity for lighting purposes, and for the transmission of power, that has ever been got together.

The huge building of the Palais de l'Industrie is in the evening one blaze of light from the profusion of electric lamps displayed, and the ear becomes wearied with the incessant noise of saws, pumps, boring machines, sewing machines, pianos, and French horns, all worked by electricity. The ground-floor of the building, which is lit by a number of arc lights depending from the roof or elevated on tall standards, is given up to the machinery for producing the electricity, and to various means of utilising it, which are all extremely interesting to the electrician and engineer; but the various galleries on the upper floor and the vestibule constitute a zone which is of especial interest to the architect, as here are shown various methods of applying the electric light to interiors, and as the Commissioners of the Exhibition have with excellent judgment given up the different rooms to different inventors, to do the best they can with them, the various systems of lighting can be easily compared with each other. To take the large arc-light systems first, Messrs. Siemens Brothers show in the vestibule a magnificent chandelier of bronze and steel combined, which holds six of their large lamps enclosed in thick ground-glass globes, and the same firm have shown in some of the galleries various methods of using their lamps on standards or on brackets. The Jablochhoff Company also exhibit numerous standards and brackets for supporting their lamps. The picture-gallery is lit by ten French lamps of a new type, called the *Lampe-Soleil*, in which the electric arc is made to ignite some very refractory substance which burns away together with the carbons. The effect of this light is very good, and the tints of all the pictures are quite as distinct as when seen by daylight. Six single lamps, of

the de Meritens type, depending from the ceiling, are used in one of the rooms, and in another, nine of the Jamin lamps—which are on much the same principle as the Jablochhoff—are used both in a chandelier and on brackets. The Société Espagnole light up one room with four hanging lamps, and in another room six small Gérard lamps are used. It would be tedious and hardly suitable to this journal to describe the points wherein these lamps differ from one another; but it may be said that all the rooms are very brilliantly illuminated, though, naturally, there are differences in intensity and in steadiness between the various lamps. Our own opinion, however, is that, except in very large halls, these arc-lamps can never be made suitable for interior illumination when used as direct foci of light. No matter how carefully the light is tempered with semi-opaque globes, it is too intense for the eye when brought into proximity to it, and the blue-violet rays, which are the inevitable concomitants of the high temperature of the carbon-points in the arc-lamps, have a very unpleasant effect. Still, there can be no



question that the arc-lamps are most economical, *quoad* light intensity, and hence it would be very desirable to find some method of using them successfully in rooms. We believe this can only be done by concealing the light itself and reflecting it upon the white surface of a ceiling or some screen acting as a ceiling, from which it would be diffused over the room. Two methods of applying the light in this way are shown here. In one room there are two upright standards with seats arranged round them, the standards themselves being decorated with flowers; these standards have a saucer-shaped top, in which the lamp is placed over a reflector, which casts the light up to the flat surface of the ceiling, where it is broken up and equally diffused over the room. The lamps used here are the Serrin, which are neither so brilliant nor so steady as some of the other arc-lamps; but still the effect is decidedly good, and this method of illumination would be admirably adapted to a large drawing-room. In the next saloon is exhibited a similar method of using the arc-light, which is more successful. In this system the standards are dispensed with, and thus the whole of the floor-space can be utilised for a ball or any other pur-

pose that might be desired. The lamp is perfectly concealed in an opaque case of ornamental design lined on the inside with some strongly reflecting material, and the rays of light are reflected upwards on a horizontal circular screen resembling a sounding-board which depends from the ceiling, and is covered on the underside with white paper. This circular screen supports the lamp, which is hung by chains about 6 ft. below it. In the saloon, where the light is shown, there are three lamps and three screens, and although the real light of the lamps is about as great as that of the other arc-lights, the difference in the effect on the spectator is very marked. The three lamps and screens are not of equal merit, one having more shadow cast upon it than the others; but the probability is that an improvement could be effected in the arrangement of the reflector which throws the light up to the screen, that would obviate any objection on this score. No experiments have yet been made from which the cost of this method of lighting can be determined; but the results are admirable—whereas, with the other large lights, however well they may be tempered with opaline globes, an effect somewhat dazzling is produced. But in this saloon every part is perfectly illuminated with a soft radiance that is most pleasing and restful to the eyes, the blue rays being broken up and losing all their objectionable properties when reflected from the screen, and we are of opinion that this arrangement of the arc-lights is the most successful for interiors in the whole of the exhibition. The inventor is M. Joseph Jaspar, of Liège. It should also be mentioned that the lamps themselves, of which several others are shown in ordinary positions, with globes, in other parts of the exhibition, are as steady as could possibly be desired.

When we turn to the incandescent systems of lighting, we find that vast improvements have been made during the last few months. The principal systems exhibited are those of Swan, Lane-Fox, Edison, and Maxim. These are all admirably adapted for interiors, and are so nearly equal that it is difficult to decide which bears off the palm. The three systems of lighting by incandescence which have been longest in the field, are those of Swan, Edison, and Lane-Fox, but the latest invention, the Maxim lamp—of which we give a sketch—was expected to prove a formidable rival to them. In this lamp the carbon filaments are rather broader and larger in section than in the Swan and Edison, and consequently a stronger current of electricity may be used without fear of destroying the lamp, the result being that a whiter light can be produced than in the other lamps. From some cause or other—whether bad management or not—these lamps were not shown during the earlier portion of the exhibition, and now that the saloon appropriated to them has been lit up, the result certainly disappoints the expectations that had been formed, as the lamps do not show up so well as the others. The light-intensity of a lamp is, however, by no means the only element of its practical value, and until the jury—who are only now commencing their labours—have made sufficiently reliable tests for comparing the light given by any of these lamps with the horsepower expended in its production, it would be premature to express an opinion as to the relative practical value of any one system as compared with another, and another very important point is the length of time that these small lamps will last, as to which we are at present without any reliable information. But as regards the effect produced, we have no hesitation in saying that such an exhibition of electric lighting as that given by Mr. Swan has never been seen before. There is no fault to be found with the light given by the Edison, the Lane-Fox, or the

Maxim lamps; but these inventors seem to have been satisfied with employing various adaptations of gas-chandeliers and brackets as supports for their lamps. Mr. Swan has inaugurated a new departure, and one which we think strictly in accordance with the best principles of architectural design. In the case of gas, any chandelier or bracket must necessarily be of sufficient thickness in all its main branches to allow of the introduction of the pipes conducting the gas; but with electricity wires of the finest gauge form the conductors, and it is an artistic error to inclose these wires in thick tubes resembling gaspipes. In the refreshment room Mr. Swan has arranged three chandeliers, two of 25 lights each, and one of 100 lights. These—which we believe were all manufactured by Mr. Faraday, of Berners-street—are of the highest and most graceful description, and so simple without that there is not one unnecessary curve or ornament introduced. We understand that the small chandeliers are similar to some that were made for Earl Spencer, but the large one is shown here for the first time. The lamps have each a small shade over them of opaline glass, and the effect of the whole is of itself worth a journey to Paris to see. In the Congress-room the illumination is arranged on a plan which particularly appeals to French tastes. In addition to several groups of lamps in the centre of the room, depending festoons are hung all round the walls; but this arrangement, though extremely effective, will hardly suit our more severe tastes so well as the chandeliers. Several other rooms are lit by the Swan lamps very effectively; in one, arranged as a kitchen, three small lamps are hung close to the ceiling, under a reflector, and the room, which is about 26ft. by 20ft., is perfectly illuminated in every corner. In Mr. Swan's private office, which is about 25ft. long, we tested the light of a single lamp on a pedestal, and we found that the smallest print could be easily read at the farthest end of the room. With these small lamps there is practically no limit to the variety of decorative effect that can be produced; for instance, the lamps can be hung close to the ceiling, and arranged as stars—with no fear of blackening the ceiling—and one very strong point is that the scheme of artificial illumination can be arranged so as to be almost equally effective by daylight when the lamps are not burning as at night. We do not lose sight of the fact that the lamps of Mr. Lane-Fox, and of the other incandescent systems, can be equally well applied in this way; but to Mr. Swan is due the great credit of being the first to throw off the trammels necessitated by the old systems of gas-lighting, and to adopt a method of grouping and arrangement exactly suitable to the new light.

THE WATER QUESTION.—XVII.

THE SIZE AND COST OF A RESERVOIR.

IN the upper parts of river-basins, where reservoirs may be made, the opposite hill-sides approach each other towards the bottom, and almost meet in the stream with straight slopes. This is a general characteristic; but a really good site for the formation of a storage reservoir widens out in the bottom, above the site of the embankment, and the only way of ascertaining the quantity of water the site is capable of affording, with any given height of bank, is by a field measurement, either by sections across the valley or by contour lines laid down upon a plan every 1ft. or 5ft. in height; but where the sides of the valley approach each other, as above mentioned, the quantity of water the reservoir will contain may be calculated from the height of the embankment and the area of the water

surface. The top of the bank is constructed at a height of from 4ft. to 6ft. above the top water-level of the reservoir, being usually 4ft. in small reservoirs and 6ft. in large ones. Where the depth of water at the site of the embankment does not exceed about 30ft., the top of the bank may usually be 4ft. above top-water, or the level of the waste-weir. With a depth of from 30ft. to 50ft., the top of the bank may be 5ft. above that level, and where the depth is 60ft. and upwards, the height should be 6ft.; but it somewhat depends upon the direction in which the reservoir lies lengthwise, and to its exposure to gales of wind; but, irrespective of this, a certain height is necessary to meet a flood which may raise the water level above the waste-weir, and as a matter of prudence and safety the waste-weir should be of such length as to prevent the water rising, on the occurrence of the greatest flood, to a height more than about 2ft. above the waste-weir. But beyond that, an allowance must be made for the further height to which the water may be driven by wind, and the greater the depth of water at the embankment the longer will the reservoir be on the same site, and on a long reservoir the water is driven up by the wind to a greater height than on a short one.

Where the two opposite sides of the valley meet in the stream the quantity of water the reservoir will contain will be the area of its surface multiplied by one-third of the depth at the lower end. If this depth be designated D, and the area of the reservoir A, the capacity will be

$$\frac{A \times D}{3}$$

To take a case where the embankment would be 50ft. high, the greatest depth of water being 45ft., and the longitudinal inclination of the valley such that it rises 45ft. in 1,000 yards, and, further, where the side slopes are 5 horizontal to 1 vertical, the width of the reservoir at the embankment would be 450ft., and, its length being 3,000ft., it would

have an area of $\frac{3,000 \times 450}{2} = 675,000$ sq. ft., and the capacity would be $\frac{675,000 \times 45}{3}$

= 10½ million cubic feet; but this would be a small quantity for such a height of bank, and the site would not be a favourable one, although, in some situations, it might be the best that could be procured.

We may estimate approximately what quantity of water a fairly good reservoir site would probably afford by examining sites the capacities of which have been ascertained, and comparing these with the respective heights of the embankments, or, rather, with the greatest depths of water, D, and their areas, A, taking these also at several different heights on the same site. The results of an examination of 75 such cases where the depth D varies from 20ft. to 80ft., both inclusive, are as follows:—In each case the cubic capacity is divided by the area of the water surface giving the average depth; this then is divided by the greatest depth, D, giving the ratio set down opposite each case.

No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
1	912	20	19	39	452	68	74
2	583	21	187	40	445	50	74
3	580	22	185	41	445	60	74
4	572	23	183	42	447	61	74
5	560	24	188	43	445	62	74
6	543	25	188	44	441	63	736
7	537	26	188	45	427	61	736
8	528	27	190	46	422	65	734
9	526	28	183	47	422	66	738
10	525	29	185	48	412	67	736
11	515	30	181	49	412	68	735
12	515	31	183	50	412	69	735
13	511	32	182	51	412	70	7315
14	509	33	181	52	412	71	731
15	504	34	181	53	417	72	731
16	5	35	181	54	407	73	733
17	5	36	181	55	407	74	732
18	496	37	158	56	405	75	7281
19	496	38	155	57	4		

The general average of these 75 cases is about $\frac{1}{9}$ D. The shape of the ground, as it widens out above the site of the embankment, makes the average width of the reservoir in all these cases about twice as much as it would be with the straight slopes assumed to meet in the stream at the bottom of the valley, in which case the width of the reservoir is greatest at the embankment; whereas, in the better sites the greatest width is considerably above the embankment, the width there being nearly the average width of the whole reservoir. In the case adduced the area is $3,000 \times 450 = 1,350,000$ sq. ft., and, the greatest depth being 45ft., the capacity of the reservoir is

$$A \times \frac{1}{9} D = 27 \text{ million cubic feet.}$$

With the same proportions and shape of ground, an embankment 96ft. high, with a depth D = 90ft., would impound 216 million cubic feet, the average depth being $\frac{1}{4} D = 40$ ft., and the area $6,000$ ft. \times 900 ft. = 5,400,000 sq. ft. = 124 acres. In addition to the water area there would be required for wash when the reservoir is full, and for fencing, a strip of land along the margin which would amount to about three acres in the first of these cases and to six acres in the last. A tabulated statement would stand thus, including a reservoir of a size intermediate between these two:—

Reservoir.	Average depth.	Greatest depth.	Area of Water.	Capacity.
	Feet.	Feet.	Acres.	Million c. ft.
A	20	45	31	27
B	30	67½	68½	91½
C	40	90	124	216

To estimate approximately the cost of a reservoir for impounding water by an earthen embankment, the following work would have to be taken into consideration:—

Before depositing any earth, the seat of the embankment, would have to be examined, and the top soil and all boggy earth removed outside and reserved for spreading upon the outer slope.

The depth of the puddle trench could not be exactly ascertained before the work is commenced, but it would probably allow a considerable margin for contingencies if the depth were assumed to be, at the deepest part, equal to the height of the bank and 10ft. at each end.

Inasmuch as the depth to which the puddle trench would have to be excavated would not be known in beginning the work, the sides should be carried down vertically as far as the ground is of uncertain character, and until the ground below can be proved to be strong and suitable for the commencement of the puddling.

In almost every case close-planking the sides of the trench would be necessary. When this is done by driving the planking vertically behind horizontal wallings, the depth to which the trench can be carried down of the full width is limited to the length of the runners used, for at the bottom of each set the new set of timbering must be commenced 6in. or 8in. on each side within it, and when the depth of the trench is great, this continual narrowing does not leave sufficient width in the bottom, unless the width at the top be made greater than is required for the thickness of the puddle. It is, therefore, better in these trenches of uncertain depth to lay the planking horizontally.

In going down with the trench, water may be found to come in through fissures in the sides, on one side, or the bottom. As long as it comes through the bottom, the trench would be carried further down, so as to get

completely under the water, if possible; but if it come through a fissure in the side only, that fissure would have been passed through and may be caulked with cotton-waste or tow, or plugged with dry wood. If the water running into the trench can be stopped in this way, and the bottom is strong and likely to continue so, the clay may be got in and worked for puddle in thin layers all along the trench, doing the puddling more by labour than by water, enough of this only to soak the clay being allowed to run on to it; the bulk of the water being conducted to the sump-hole from which it is to be pumped. The bottom of the trench for this reason should be inclined sufficient to carry off the water quickly. Strong springs of water met with in excavating a puddle trench can only be dealt with by special means; but in nearly every case there will be water naturally soaking out of the adjacent ground when its balanced pressure is relieved, and it is necessary to lay the bottom dry by pumping before the puddling can be commenced. Nothing could be a worse beginning of the work than to throw a mass of puddled clay into a wet bottom; it could not be united with the sides of the trench by treading, as it can be in the absence of water, and it might well be expected that the water in the ground on the upper side of the puddle would, in that case, rise on its outer side between the puddle and the outer side of the trench; whereas, when once the puddle has been well worked of a stiff consistence, water cannot pass it or act upon it; but if, in the first instance, water is in excess, a way is prepared for a future run which would carry with it small portions of the clay continually. If the trench cannot be kept free from water while the puddling is being done, it is necessary to protect it from future contact with water by a facing of concrete and a concrete bed—although, as to the bed, the motion of the water in the bottom carries with it the cement or lime, and leaves little but a mass of loose materials, unless, in the first instance, a drain-pipe be laid under the concrete bed to take the water to the pumping-engine.

GROUND-ICE.

It has often been a wonder how ice could be formed at the bottom of a stream of water, seeing that it is lighter than water. The fact is apparent, but how to account for its formation had been a matter of difficulty. Mr. J. B. Francis, the eminent engineer and hydraulician, has explained this fact in his address, as president to the American Society of Civil Engineers, at Montreal, in June last. The essential conditions of the formation of ice at the bottom of a stream, and its attachment to stones, gravel, and other substances, are that the temperature of the water must be at its freezing-point, and the temperature of the air above it must be below the freezing-point of water; there must be a current in the water, and it must be exposed to the air. Under these circumstances ice is formed on the surface in small needles, which would remain there and form a sheet if the water were still: but if there is a current sufficient to mix the surface-water with that below it, the formation of the sheet of ice is prevented. Water flowing in a channel, whether rough or smooth, does not flow in horizontal layers, but rolls along, the surface-water becoming continually mixed with that below, and the bottom water rising to the surface. Experiments with coloured water in straight channels in earth and masonry showed that the bottom water reached the surface at distances varying from 10 to 30 times the depth of the stream, and in natural watercourses, where the beds are more irregular, the disturbance

would be much greater. The result is that water at the surface of a running stream does not remain there, and when it leaves the surface it carries with it the needles of ice to the bottom. Its adherence there is explained by the phenomenon of regelation, first observed by Faraday. He found that when the wetted surface of two pieces of ice were pressed together they froze together, and that this took place under water even when the temperature was higher than the freezing-point. Professor James D. Forbes found that the same thing occurred by mere contact, without pressure, and that ice would become attached to other substances in a similar manner. At the bottom of a stream, under the conditions named, there can be no abstraction of heat, and therefore pieces of ice may freeze together, or adhere to other substances. When a piece of ice, of considerable size, comes in contact under water with ice or other substance, it would usually touch in an area very small in proportion to its mass, and the forces acting upon it and tending to move it would usually exceed the freezing force, and the regelation would not take place. In the minute needles formed at the surface of the water, the tendency to adhere would be much the same as in larger masses, touching at points only, while the external forces acting upon them would be extremely small in proportion, and regelation would often occur. The adherence of the ice to the bed of the stream is always down-stream from the place where the needles of ice are formed. In large streams it is said to be frequently many miles below. The ice-needles do not all become fixed, but a large part form spongy masses which drift along with the current.

STONEHENGE IN TIMES PAST AND PRESENT.

IT would be difficult perhaps to find a subject—an architectural subject—of more interest and historic import than that of Stonehenge—that monument of a bygone age, on which so much has been said from time to time, and about which so little, if anything, has been certainly determined. Looking at Stonehenge through an old print of it, or at a photograph of it, to say nought of the sight of the ruin itself, is like the looking into the dead Past. It would seem, indeed, to be but a subject to wonder at and to dream about; and we should hardly have ventured, in these practical days at least, to more than glance at it, but for at last a gleam of something like certainty which is, by slow degrees, coming to us about it. It has, too, just been proposed, as all the world is now aware, to *restore*, as the term is, Stonehenge—that is, as we must needs suppose, ultimately to put upright again its fallen monoliths—i.e., those of them which remain, and thus to exhibit to the world at least a *part* of Stonehenge as it originally was. We say a part of it, for we can hardly suppose it possible, even in these days of “restorations,” to *rebuild* this primeval structure, and to thus make it again new, any more than it would be to again utilise it. Our simple object here is to ask attention to it, *as it now is*, and to urge contentment with this.

Attention having thus been called to a monument so exceptional, and altogether beyond what may be termed practical import, it may be of some interest to get together a few facts about it, and to jot down a thought or two of what others, equally puzzled with ourselves, have had to say in drawings and otherwise about it. It not only takes us to the beginnings of “architecture,” but to the very beginnings of history, and to much else that is now remote and out of the way, and beyond the present phase of things; but it does yet more than this: it adds to the meaning and scope of

the very word “architecture,” points to its very origin, and evidences out of what simple elements it may be built up, and how much out of such simple elements of solemn impression may be made on the mind, and thus rivalling the impression made by the great works of sculpture, embodying though they do life and living action. It is most certainly worthy of all preservation, if any thing of antiquity is, and will in the future, *if not now*, read many art and architectural lessons, seldom as things are at present thought of. We have made at times notes of it, and have restored it on *paper*. Turner, it may be remembered in the “*Liber Studiorum*” and elsewhere, has pictured Stonehenge as it was in the *last* generation, and even as it yet is. Surely its owner and the House, if he cares enough about it, ought to preserve it, as belonging to the nation, and as an item in art history.

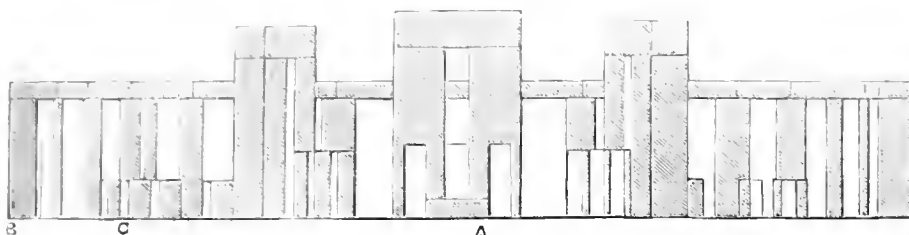
So many things there are which crop up, strange and unexpected, while looking at such a primitive structure, that it need, perhaps, hardly surprise us that the *geologists* themselves have even their say about it, and they tell us that the very stones, of which its huge monoliths are made, are, in themselves, proofs of what strange convulsions and changes this island of ours has been the theatre. It has been by a process of “*denudation*,” as the term is, that these huge blocks of stone have been laid bare, and so thickly in some places have they lain together, that for miles it has been possible to travel over them as in a road. Round the pre-historic town of Avebury, the ground, of chalk, is strewn with grey “*wethers*,” as they are termed, and immense masses of these huge blocks of stone have been thus set on end by a long-vanished people! These are called also, by the antiquarians, *sarsen*, and “*Druid stones*,” and these very stone-masses of which we are speaking, at Avebury and Stonehenge, have been actually left by the simple process of *denudation*, not far from the very spots whereon they have since been built up into such huge monuments as *Stonehenge*, by their antique builders and architects. We may add here, that the *smaller* stones have been brought from a distance, and are mostly, we are told, of *igneous origin*, and, as Mr. Fergusson tells us, have been “*votive offerings*.” Very much yet remains to be done, and to be gone into and examined on the spot before we can get a good and sufficient idea of this strange monument, and the very first thing needed is a good and correct *plan* of it; for but few, if any, of those who feel interested would be likely to credit the number of them which have been made at different times, and yet less to the infinite number of ways in which they are found to differ. We know of no good and thoroughly reliable and “*measured*” plan of this great monument. We can but go by what there is, and by putting one with another, and comparing them, get at perhaps a tolerably correct idea of what actually now is, and what it *was*. Stonehenge, as we can now imagine it, was a circle of monolithic blocks of stone, some 14ft. in height, and about 105ft. in diameter. They are thirty in number, and are covered or capped with blocks of stone, from one monolith to another, thus forming a circular stone wall; thus to inclose the inner range of trilithons, five in number, which indeed form the inner sanctuary itself. Within this outer wall, and at about seven or eight feet from it, is a *second* circle, or wall of monoliths, but much smaller and shorter, not more than about four feet high; these are thirty in number—not the least puzzling item in the whole structure.

We now come to the very “*temple*” or inner sanctuary itself, to the space surrounding and inclosing the “*altar*” in the centre. It consists of the huge “*trilithons*,” *five* in number, each trilithon consisting of two

huge masses of stone, each of them some 20ft. high—the lesser ones some 16ft. in height. Each pair of these blocks support a third across and resting on the tops of them, thus making up, probably—through simple size and weight of material and mere mass—the most sublime and simple effect of which architecture can boast. It fairly rivals the work of old Egypt, and more cannot be said of it or for it; and it serves to evidence, if it does no more, the fact of how fine and how curiously impressive is the influence on the human mind of a simply and simple reality of *truth*. A mountain rock mass is not more so. There is here, be it observed, no ornament or detail to help. There is nought but dimensions and reality of material, and *absence* of ornament. Within this circle of huge stone blocks are other smaller ones about 7ft. in height; three immediately in front of each trilithon; but for what purpose who shall guess? The altar, we must needs suppose of sacrifice, stands in

Talbert, and have been recently purchased, so the publishers inform us, expressly for this volume. The other designs include a series of domestic interiors, by Mr. Henry Shaw, architect, and a collection of designs for furniture, contributed by W. Scott-Morton, A. Jonquet, W. Simms, J. Ward, C. Porter, Alfred E. Robinson, W. Hamer, J. Breckin, E. Foley, G. Thomson, and other designers. They have been drawn and engraved by the publishers of the *Cabinet Maker and Art Furnisher*. Glancing over the 350 designs, we find the publishers have catered for every variety of taste, from Tabor to Anglo-Japanese and Renaissance. The Talbert sketches, which are headed by a likeness of the late artist himself, contain a few striking characteristics of a style of furniture which has nearly passed away, and, therefore, can hardly be called "fashionable." The "Pet sideboard" purchased by the South Kensington Museum, is certainly one of the

page 55, and for a panelled dining-room, the horizontal lines of the mantel and overmantel governing the panelling of the walls. Another part embraces designs by sundry artists, W. Scott-Morton, A. Jonquet, J. Ward, and others, and includes sketches for hall-seats and chairs, hat-stands, sideboards, and other dining-room requisites; library and drawing-room furniture. Some of these sketches do not add to the value of the work; for instance, the designs on pages 82, 83 the cornices and fringes would have been better omitted, as they give a rather catalogue-look to the book. Plans and details are not given, and we assume that the volume before us is chiefly intended as a pattern-book for the general trade. Some of the designs have been manufactured, and the names of the makers are given. Reference numbers are given under all the sketches, so that in ordering any article, it will be sufficient to quote the page and number.



a. Altar with great trilithon at back of it. b. Outer circle of monoliths. c. Inner circle.

the centre, thus strangely inclosed. In this simple way is Stonehenge "designed" and built up; and in the mind's eye and on paper it is easy to restore it and to see it as it was. But what imaginative power can repeople it and fill it with its antique life?

It would be, perhaps, difficult to add anything to what has been said by the stones themselves to the poetry and romance of Stonehenge. All alike is equally strange, and out of the ways of our every-day and modern life; but it has always struck us that, perhaps, the most remarkable thing about it, and its most striking fact, was the selection of its *site*, in the very midst of a wild, and wide, and open plain, and away, as we must suppose, from ordinary human habitation and dwellings. The finding of its very materials on the spot, and needing only to be utilised, partly, doubtless, explains this, but not wholly; and we cannot but think—and it adds to our earnest wish to preserve all that remains to us of such a monument—that those who planned and built Stonehenge, and other of such primeval structures, must have had it in them to, mentally and inherently, see into the meaning and value of this fitness of the *place* to the object proposed; and, doubtless, to make a sacrifice of much for the sake of it. That there must needs have been difficulties, of which we can form but little idea, would seem to be proved by the existence of the *valium* all round the structure, at the distance of about 300ft. from the outer stone circle. There is much to interest here, and we can but hope for further and *more detailed* inquiry and research, and would trust that the owner of Stonehenge will aid in this, rather than lend a hand to its destruction. Much might come of it, and at but little cost, comparatively. C. B. A.

FASHIONABLE FURNITURE.*

THIS is a book of designs or sketches for furniture under the above title. Nearly half the sketches are by the late Bruce J.

* Fashionable Furniture: a Collection of Three hundred and fifty original Designs of Cabinet-work, Decoration, &c., including Sketches by the late Bruce J. Talbert, architect, and H. Shaw, architect. Published by the Cabinet Maker and Art Furnisher, Finsbury-square.

best productions of the series, and it shows the end of a dining-room with a deep panelled cove and some side panelling. The designs Nos. 4 and 5 are not worthy the artist's reputation, but they are conceived in an Old English spirit, which is not the style he usually excelled in. The jambs and mantels of the chimney-pieces are heavy, and show a bare knowledge of Jacobean mouldings. The treatment No. 6 is better. The examples of sideboards, waggons, and other furniture for the dining-room are interesting, and indicate a certain Gothickesque feeling. We take, for example, No. 10, No. 15, No. 17 as exemplifying this spirit. No. 11 is a broadly and happily-treated specimen of a "Jacobean" sideboard, though the mouldings are essentially Gothic. The designs for chairs evince also the work of an artist whose strongest *forte* was Gothic. The study and library are next illustrated, but the specimens want the breadth of Old English work. The drawing-room decoration on page 25 is quietly arranged, and we notice several sketches for cabinets of pleasing and inexpensive design. Even Mr. Talbert was a little too much addicted to certain vices which are now chiefly limited to manufacturers of stock furniture, such as a redundancy of turned members, balusters, fretwork ornaments, &c., though in most of the sketches there is not much with which the practical cabinet-maker can find fault. Many so-called designs for furniture we have seen are simply impossible, and could not be executed like the drawings of them. Overmantels are numerous, and the sketches contain a few suggestive designs, and bedroom furniture is also well illustrated. The interiors by Mr. Henry Shaw are clever in parts. The designs for hall and staircase have some freshness, and are Renaissance in style; though the scrollwork of the staircase-balustrading is somewhat coarse and heavy for the style. It is a pity a sketch-plan did not accompany this design. The Queen Anne treatment of hall is quiet, but the arrangement somewhat queer. The side of library, page 51, is not so good an Italian design as the Queen Anne sketch for morning-room, page 53. Among other designs we notice a rather pleasing sketch for a bookcase cabinet,

PRACTICAL NOTES ON PLUMBING.— XV.

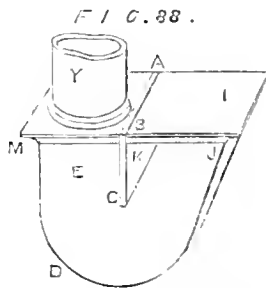
By P. J. DAVIES, H.M.A.S.P., &c.

TRAPS (continued.)

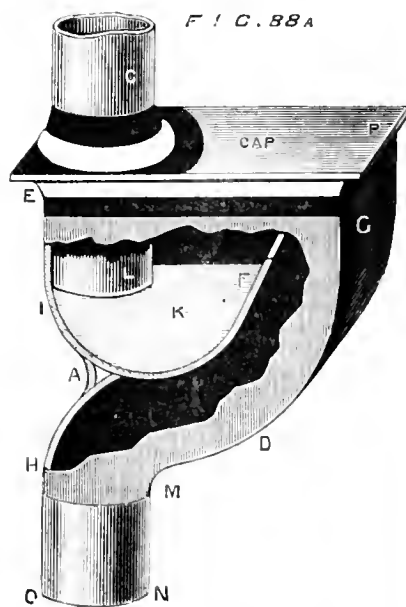
U-TRAP WITH FLAT DIP (Fig. 88.)

THIS trap being my own invention, I commence by giving my readers the proper instructions for its manufacture.

Make the body, Fig. 88, M D J I, as you would the body of the U-trap, Fig. 79, and then wipe in the inlet-pipe Y. Now measure off from



M to the front of the dip, and with a saw cut the cheek down to the depth you require for the



water-lock; then cut the other side, and finally across the top. Prepare a piece of stout lead K, just wide enough to drop into this cut, and burn

* All rights reserved.

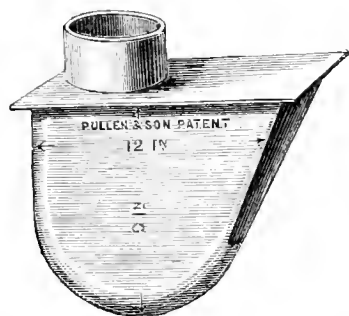
it there, or, with a copper bit, solder a good thick seam all round the cheeks and top; or, should you prefer to wipe it in, let the plate be prepared so that it will stand out $\frac{1}{2}$ an inch all round.

The object for making this style of trap, is to obtain the width across the dip, which allows anything to pass from the inlet side to the body of the trap.

CAST LEAD ROUND-BOTTOM \cap -TRAP, WITH FLAT OUTGO.

Pullen's New and Improved Patent \cap -trap may be had with a round bottom and flat outlet. The object of the rounded bottom is too well known to require any comment here. Suffice it to say that this trap (which is now made according to my scale for the \cap -trap), is not

FIG. 88, B.



only self-cleansing, but proof against waving out. It is very easy to fix, and, in fact, possesses every qualification that is required in and constitutes a good sound trap. Fig. 88 B, shows the elevation.

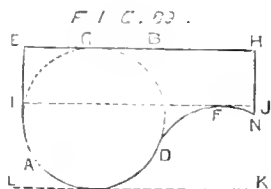
\cap HUNCH-TRAP.

This trap is made to answer the purpose of the \cap hunch-trap (Fig. 69 A, 98, &c) in positions where the pipe is required to be continued in a straight line. For mode of construction Fig. 88 A. Commence by cutting the cheeks and outlet in one piece, then solder on the back band G D M, next solder the inner band F A I E to form the outlet lip F, after which the small back piece A H; you must then put the top on as in an ordinary \cap -trap. This trap is also well adapted for use in cases where the closet or urinal, &c., is situated in a recess in the wall. See also Fig. 69 A.

\cap -TRAPS.

On page 87 in the copy of this journal bearing date July 15, will be seen an old \cap -trap, manufactured 1678.

The proper method of striking this trap correctly is as follows:—To make a 9in. trap, open the compasses $4\frac{1}{2}$ in., and describe the circle A D C, Fig. 89: draw the top line E H, cutting the circle as shown. Now draw the water-line

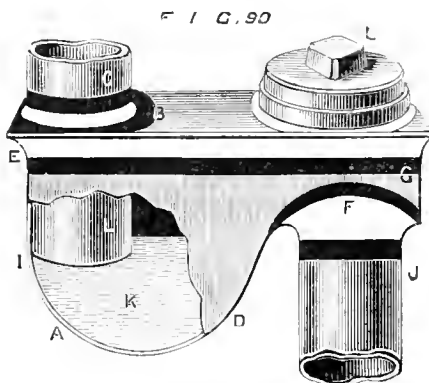


I J, which is generally the size of the dip-pipe; that is, assuming the dip-pipe to be 4in., you should keep the water-line down 4in. from the tap, though, if necessary to get a little more dip, you may make it a little higher. Next, with the same radius ($4\frac{1}{2}$ in.) strike the arc D F N, cutting the water-line, and also the outside of the first circle, as shown at D F; then strike the heel line E I square with the top-line, and cutting the circle, also strike the outlet end H N. If you prefer a sharper outline curve, set the compasses at a smaller radius. The trap is made up in the same way as the \cap -trap, excepting that the solder-line round the top does not join.

\cap -TRAP WITH SOLID END.

The object of this style of trap is to save a

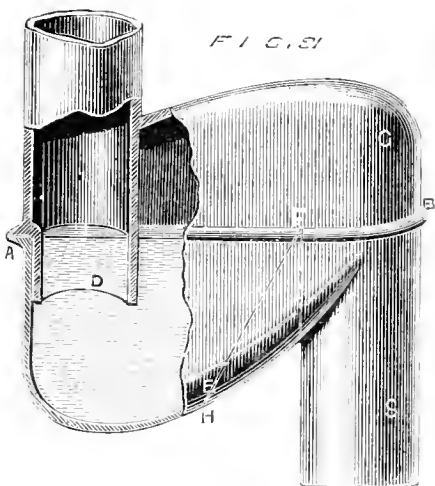
bend on the soil-pipe, and is done by making it with a stop or solid end, and taking the soil-pipe right down as at J, Fig. 90. Make the



joint F on the bottom of the band (which should be straight at this point), wipe round the cheek, as shown at F. Be careful not to have any sharp angles, and that the trap is not wider than the outlet, also that the soil-pipe is fixed in a line with the solid end.

THE ADEE TRAP.

This is an American patent, the action being that of the \cap -trap, but made in halves as shown A B, Fig. 91. D is the dip-pipe, S the soil-pipe,



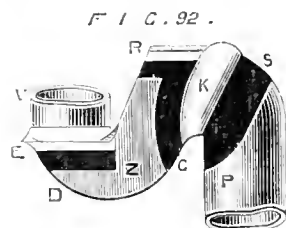
C the cover, E the body. While not wishing to say anything derogatory to this trap, I nevertheless think that it has a fault—namely, the outgo-pipe coming up to the point F. I think if the band were taken up as per dotted line E H, the soil would have a much better chance of getting away. Adee claims as one of the great merits of his trap that it will not siphon out, but this is nothing if an air-pipe is used. However, it will not wave out, which is a great advantage.

THREE-QUARTER OR CUT DOWN \cap -TRAP.

The title of this trap will explain for itself that it is a modification of the \cap -trap, or rather that, owing to inconvenient circumstances in fixing, the \cap -trap has had to be slightly altered to render it suitable for its confined or awkward position. To meet these trying circumstances it is sometimes necessary to cut down in the following manner:—

See Y E, Fig. 92. In instances where you can go down 1in. or more below the outgo, we sometimes do away with the dip, and the trap is doubtlessly useful in many places where the ordinary \cap -trap cannot be used—viz., for illustration sake, under the bottom of a cistern, or as an interceptor in a main drain. In the former case you can take the waste-pipe from cistern horizontally to the outside or from under the bottom of the cistern, and into the trap with a knuckle bend. Then, again, it may be used for a child's closet, where, to avoid a step, it is necessary to keep the basin low. These basins should in such an instance fit into a lead hopper, so that the top of the hopper

will be above the water-line. But, to be brief, there are many instances where this trap is



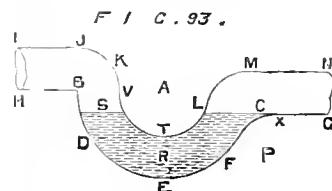
very useful, of which I will explain further when treating of inside work.

BELLY TRAP.

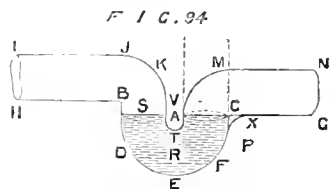
This, though known as the Belly, is actually the siphon. I have been able to trace back its use for at least 3,400 years, and it is beyond dispute that these siphons, or the system of siphonage, was well known even before that date.

As an instance of its antiquity we have only to quote the words of Pliny. He says:—"Water always ascends of itself at the delivery to the height of the head from whence it gave receipt. If it be fetched a long way, the water will rise many times, but the level of the water is still maintained." Fig. 93 is the belly trap, perhaps in an improved form. B is the inlet, which, please notice, has a drop or cathetus from B to the water-line S. This is most effectual for pushing forward solid substances owing to the law of falling bodies accelerating in proportion to the space travelled—i.e., suppose the depth from B to the water-line S to be equal to the depth of water within the trap, then the momentum gained will be of equal force to press this forward. Students in mechanics will find some exemplification of this law in the first lessons of mechanics by that item known as "the two balls showing reaction."

There is, however, another point to be considered in this trap. Fig. 93 represents a very



long trap-body, which holds more water than a trap made after the model of Fig. 94, so that in reality, assuming that an equal pressure of



water is applied to each trap, there would not be as much water removed by that pressure from Fig. 93 trap as would be from Fig. 94 trap. This is important to a degree from a sanitary point of consideration, as in all traps the whole of the water should be changed, if possible, for the very simple reason that the longer water is exposed to poisonous gases, the more it becomes imbued with the poison, and consequently the more injurious it becomes to the health.

To strike these traps out, first mark the dip part T out to the size required—I think the smaller the better, as at Fig. 94. Next decide upon the size of your trap, say 4in.; then from the same point A stretch the compasses to E, which must be 4in. beyond the throat line T, and strike the half-circle B D E F. Continue D to B straight up to the point required as high as you can for the fall; low to this line draw a right line, also having a fall as from H to B, but keep the intersecting point at B sharp from this line; open the compasses to across the other side

of the trap at V, and strike the backline V K J, and draw the line I I parallel to H B. Next describe the outlet with an easy sweep, as at E X, but with sufficient rise above the throat-line for the water-lock; draw the out-go line C G and the top curve L M, which you can obtain from the point P, or as shown at the intersection point C, Fig. 24.

N.B.—These traps are generally made in two halves, and soldered up the sides.

(To be continued.)

A NEW CARTHUSIAN MONASTERY.

NEW counties have had more of archaeological research bestowed on them than Sussex. Battle Abbey, Pevensey Castle, Lewes Abbey have all been exhaustively dealt with. Arundel, Chichester, its Cathedral, St. Mary's Hospital and Abbey of the Grey Friars, have received most patient investigation, and there is not an historic fact or a stone unturned for the enthusiastic antiquary to "turn up," unless perchance he burrowed beneath the foundations, whence he might unearth some Roman baths, inscribed tablets, stone coins, and votive altars.

I have, therefore, nothing to do with the past. My business is to describe a monastic building of the present, now approaching completion, which will add a page or so to the archives of the county, and probably interest the diligent archaeologists of the future; albeit the history of the present and future will be more exhaustively handed down than the history of the past if the records are not destroyed in a great natural or civil convulsion, in which case the diligent antiquary will have more scope for his deductions. Having visited a similar religious establishment in the Midlands sometime ago, where I received the utmost courtesy from the monks and all the information asked for, I concluded that there would be no difficulty in eliciting all I needed to understand the arrangements of the great building I had made up my mind to explore; but I was disappointed. Hence my narrative will be incomplete; however, I will endeavour to describe what I saw, and relate what I gleaned from the workmen and others. Starting, then, without any preparatory knowledge, except the few topographical hints necessary to find the place, I booked from Worthing to Partridge Green, and took my seat in the train about 11.20. Broadwater Church, with its Norman tower, was first sighted, remembered for its fine Norman chancel arch and its Transition choir-arch, after which, up among the trees, I espied the gable tower of Sompting Saxon Church, one of the very few remaining with any trace of the old work, its shingled roof, diamond-shaped and terminating with a vane, suggesting the spire of a later date, peeping above the foliage like the hood of a grey friar. Then Shoreham, with its fine Norman church (lately restored), where we changed for the main line. Passing Bramber Castle, one of a famous Norman stronghold, built upon the site of an earlier one, of which little remains above the foundations, I soon after observed a white spire on the right, tapering above some trees on rising ground about four miles distant. "What church is that?" I inquired of an agriculturist. "Taint a church; it's a monkery up at Cowfold." The object I have in view, thought I. Alighting at Partridge Green, I found that there were about three miles to be covered, and I set off immediately along the parish road, bordered occasionally with cottagers' gardens all day with the gayest of common flowers; the cottages, built of wood, having here and there a sturdy pear-tree, laden with fruit, reared like a child against the exterior. Turning sharply round to the left at the gatehouse, I soon reached the entrance to the grounds, and the buildings of the monastery, enclosed within high walls, with battlements. I endeavoured to obtain a good view of the exterior, to enable me to form an idea of its architectural features, but in vain. Everything worthy of notice within was shut out by the high walls, and everything worth seeing within was shut out from the fine view of the Sussex downs and villages notwithstanding. The old building, of a fine medieval structure, and of insignificant modern additions, between two, stood apart on a level of about 100 ft. on the left a pair of gates opened into a large yard surrounded with a high wall, and a small cemetery, carpenter's and other workshops, over which are the quarters for the lay or working brothers probably, well lighted from the yard side. This

section of the inclosure, I was told by a workman, is called the "Obediences." The centre on this, the east side, is occupied by the Hospitium, or guest-house, on one side, and the porter's lodge on the other; between which a bold archway leads to the first quadrangle (perhaps four acres), two large basins for fountains resting on either side, corresponding with the wells of the old monasteries; but these are evidently for ornament and not for use, as the standpipes are already fixed for the jets to throw up the streams in graceful forms. Looking at the number of basins for fountains in the grounds, the lavatories and drinking-fountains in the cloisters, and the sanitary arrangements throughout, it is evident that a good supply of water is expected to gravitate from somewhere. Spacious cloisters border three sides of this quadrangle, over which, approached by wide stone staircases, are the first set of corridors and chambers for the monks, and probably the guests' apartments, as I observed another staircase by the guests' house. The west front of the Church, or rather, the front facing east, tills the other side. The style adopted is Romanesque. The west front consists of a centre flanked by wings, from which towers and spires ascend, but the tall spire I had seen in the distance rises from behind the sanctuary at the opposite end. Entering the spacious porch (query, Galilee porch), I found myself in a good-sized and lofty church, fast approaching completion. The ceiling is groined, and the interstices filled with white glazed bricks. Long slabs of marble, waiting the manipulation of Italian workmen, lay about, evidently intended for pilasters to adorn the walls. The organ-gallery is over the space set apart for seculars, and at the other end is the sanctuary, with, as yet, only the foundation for the high altar, above which I observed the usual recess for a figure of the Virgin, with provision for shedding a tinted light upon the features to give them a supernatural appearance. When this church is finished and adorned with the usual embellishments of Romanism, I believe that it will be no mean competitor, for size and richness, with some of the first of its order in the metropolis. On the right of the sanctuary is a spacious vestibule leading to the vestry, in which stands an altar of carved Caen-stone, and on the floor above is the sacristy, both having vaulted and groined ceilings. In these offices I first noticed the excellence of the joiners' work in pitch-pine. High dados, with heavy mouldings and details, line the walls, and huge tables, with sliding shelves underneath for the vestments, occupy the centres of floors. From thence I passed through some bewildering corridors, noticing occasionally a niche for the shrine of some hallowed saint, until I reached another quadrangle surrounded by cloisters, from whence I ascended a wide staircase to a corridor communicating with another set of cells or lofty chambers with deal floors, each being about 15 ft. by 14 ft., and well lighted, overlooking the quadrangle with its central basin and fountain. Each chamber has a stove, to add to the comfort of the inmates, and when furnished, these apartments might be cosy and comfortable to those who can accommodate themselves to rest upon a bed and pillow of straw, if the sample I saw is the class of bed to be laid upon. Sanitary arrangements are provided for each set of cells; but the plumbers' device for flushing the arrangements does not appear to me to be as good as it might be, and if the next winter is as severe as the last, a good many burst pipes may send cooling streams among the brothers, even to their cells, of which there is no need, lavatories and bath-rooms being provided for their comfort. Descending again to the cloisters, I observed another open quadrangle, around which the private chapels of the Fathers are arranged, and entered from corridors running parallel. Each chapel has a curved altar of Caen-stone, every one differing in design, with a carved stone frame above for the reception of a work of art, may be from one of the suppressed French monasteries. Up to this time I had not seen a monk, excepting one dressed in a brown cassock, and carrying a pail—a working brother, I supposed; but he dived into a corridor and was lost before I could get near to him. Crossing to the other side of the church, I entered another large vestibule, which led to the chapter-house and to the library over it. The chapter-house has a stone groined ceiling about 30 ft. high, and measures (slight measurement) 60 ft.

by 30 ft. A large carved Caen-stone altar stands at the end, over which is a provision for the reception of a large picture, with stone frame carved after the same model as the others. Here again I observed the fine quality of the pitch-pine, and excellence of the joiners' work in the wainscoting and benches. The workmen were of different nationalities. I found Italian, French, Irish, and English. I inquired of an Italian workman the name of the architect, but could only learn that he was a Frenchman, and involuntarily answered, "I thought so." Ascending the staircase I reached the Library, which is about the same size as the Chapter-house, and lined entirely with pitch-pine from floor to ceiling. Bookcases climb the walls, bridged midway with a gallery, up to the heavy ceiling. Tie-beams run horizontally about 10 ft. apart, bracketed with heavy spandrels, which appear to dive into the bookcases for support. Longitudinal rafters, about 6 in. apart, have an easy task to support the boarding which covers the interstices. Library-tables of excellent workmanship occupy the centre of floor nearly the entire length, and the whole is well lit by side-windows. A Scriptorium, or reading-room, with stone-groined ceiling, and, as yet, bare walls, adjoins. Descending to the corridors, I saw a monk pacing up and down a little way off, and I approached him politely, hoping to get a guide, or, at least, some information; but he appeared to avoid conversation, being a Frenchman, and knowing very little English, and so I bowed, and left him to his meditations. At home and abroad I have received so much courtesy from monks, that, upon this occasion, I felt a little disappointed at his reticence. However, I determined to work my way through the building, and interpret it by the light of my own understanding, failing a better guide. The Refectories are two large and lofty apartments adjoining, wainscoted with pitch-pine, and with a stone pulpit in each. The smaller dining-room, I concluded, was for the fathers, and the other for the brethren. Wandering on, I entered a large chapel, having a plain stone altar, altogether plainer than anything of the kind in the building. Here I met another monk, habited in a coarse flannel cassock with cowl, and, finding that he was French, I tried to extract a little information in his own language, and, from him I gleaned that there are only nine monks at present in the building; but, after three months, it is hoped that it will be ready for occupation, when thirty-eight fathers, eighty brothers, and a number of serving brothers are expected; whereupon I inferred that there is an "upper ten," a "middle class," and "hewers of wood and drawers of water" within the walls of a monastery. The chapel we were in, I learned, was the servants' chapel, upon which I further concluded that the church was only for the "upper ten" and brethren, whilst the servants attended chapel, a parallel for which might be found outside the gates. I asked him if he was a working brother, or if he did any manner of work. "No," he replied; "we lead a contemplative life." I now thought myself in a fair way to obtain information and guidance; but, unfortunately, at this moment a bell rang for prayers, when he said, "I must go," and, bowing, left the chapel hurriedly. After this, I found my way through some corridors, into a large quadrangle (perhaps six acres), surrounded with broad cloisters, partly glazed with tinted glass, from whence I had a good view of the tower and spire, first seen from the railway, which rose immediately behind the sanctuary; a bell-turret rising from the roof about a dozen yards from the tower. The thirty-six detached houses for the fathers surrounded this inclosure, each one having an oak door communicating with the cloisters only—no back door or back windows. A piece of ground had been inclosed in front of the tower, and in full view of all the dwellings of the fathers, for a burial-ground. A party came along as I was returning to the cloisters, conducted, as I thought, by a guide, a man of the respectable working class apparently; but, upon inquiry, I found that he was not a guide, although he was conducting a party of friends, having been, to use his own words, "over the place several times, and know how to work through the maze better than a stranger." He said that the building had been "five years in hand, and would cost two hundred and fifty thousand pounds." "Bless me!—where does the money come

from?" said a lady of his party. "From Chartreuse, I suppose," he replied. "This is a branch of that monastery, I have been told." "Do they make the liqueur of that name here?" I inquired. "No, they can't grow the herbs about here to make it with, but they have a good stock in the cellar. I believe they act as agents for Chartreuse (the famous Carthusian monastery near Grenoble, France)." Our friend rattled on, and I did not interrupt him, hoping to pick up a few facts. "Yes, sir, and they live very well, too. I know a cellar, not far from this spot, where I stand, in which there are hundreds of bottles of wine, good stuff, sent over from France. They have plenty of beer, too. Why, I have seen two dozen eighteens go in at one time myself. Very good to the workmen: they get plenty, twice a day sometimes." This last remark relieved my mind, for I thought such a stock of beer rather too much for nine monks. "It ain't at all a bad thing, sir, to be a monk, I can assure ye—to live in a fine place like this with plenty of good things to eat and drink, and nothing to do but to read and walk about. Yes, they live on all the good things (except meat), fish, eggs, cream, butter, cheese, fruits, vegetables, and there's many ways of cooking those things to make a variety. Stewed eels, sir, and macaroni cheese are very nice, so meat is not so much missed. Very good to the poor, too; if a poor man comes and asks, they give him a meal, and not a teetotal one neither. Yes, sir, I have been here when there's been such a smell from the refractory, as they call it, as have set my mouth watering." "You have good digestion, my friend." "Well, sir, I can eat almost anything." "You don't require pepsine, then?" "No, sir, I don't agree with them teetotal things—I prefer beer." Having exhausted, as I thought, his store of information, which must be accepted at its value, I bid him good morning, and proceeded to walk round the cloisters for the purpose of estimating the distance; but meeting with a workman whom I found to be Irish, it struck me to test my own sight measurement with his acquired knowledge, if he had any. "I suppose these cloisters measure about half a mile?" "I don't know, surr; but they say two miles altogether intirely." If he had included the corridors he might have been within the mark. These cloisters are also supplied with lavatories and drinking-fountains, and in the quadrangle or pleasure-ground there are three large basins for ornamental water.

The door of one of the houses of the fathers stood invitingly open, and I accepted the silent invitation to enter the broad-entrance-hall paved with brick. Upon the ground-floor I found two good-sized rooms, also paved with brick, probably for stores. Above are the living and sleeping-rooms, of a good size, and lofty, the former having a cosy grate, Abbotsford pattern, and adjoining is the sleeping-room and lavatory. Two such comfortable rooms that some of the brethren of the Charterhouse might envy. In the sleeping-room opposite the window is the cot, under a canopy running parallel with the wall, on one side of which is an inclosed closet communicating with the lavatory, and on the other side a stall of the usual pattern, with carved elbows—I did not look for the misericorde; probably that is left to be carved according to the taste of the future occupant—a comfortable seat, before which there is a writing and reading-desk, with a kneeling-board for contemplation and prayer. Upon the cot a sample bed and pillow rested, with a slit cut in each, either by accident or design; at any rate, it proved that both were stuffed with straw, and no deception. So it appears that the fathers' couches are not any softer than those of the brethren. I recollect, though faintly, having read some time in my youth, of a Russian State prisoner who had been condemned to lie upon spikes; at length, his skin became so pachydermatous, that when liberated, he could not rest upon any other kind of couch, proving the old adage "Use is second nature:" hence a straw bed and pillow might become, with use, a comfortable resting-place. In the recessed window stands a pedestal dressing-table, and on the right a dresser with cupboard underneath.

The windows overlook the "pleasure-ground."—What irony! pleasure-ground with a cemetery in its midst, and an open grave waiting for a tenant, while blank walls shut out one of the most charming views in Sussex—Chancerybury Ring for a centre, and the fine range of

hills, with their dipping valleys on either side, waving above the productive plains stretching away beyond the limits of vision. Why the backs of the fathers' dwellings should be turned upon nature and from thence to "Nature's God," I, less than a neophyte, could not understand. After another look at the cloisters surrounding this, the largest quadrangle, I made my way to the old monastery, the insignificant progenitor, architecturally speaking, of the vast buildings now surrounding it. Workmen were engaged in stripping the cement off the flint and clunch-work, and evidently an effort was being made to elevate the elevations from present ugliness to something like order with the new buildings. The nine monks were in possession; consequently strangers were not admitted, and as I could not obtain any information as to the future of this building, I concluded that it was being prepared for the Abbot.

I had been nearly two hours exploring, and now thought it time to commence the return journey, through cloisters and corridors, passing the stairs, leading to a number of cellars for depositing "the wine that cheers,"—I hope not for purposes less cheering. The quadrangle through which I had passed first was reached, and I was soon after clear of the largest modern abbey, rivaling, if not exceeding, in extent, Furness and Fountains, but not destined to exercise the same influence upon the "country round," although it may dispense hospitality and good works. In these days, kings, princes, and nobles, with their retinues, do not seek the hospitality of a monastery; they somehow prefer a lordly mansion or a good hotel, and although hospitality may be gracefully offered, it is not likely to be accepted by many who can afford to pay for a dinner and a bed elsewhere. The world is undoubtedly indebted to the monks of old for many good works, and amongst them for preserving the choice manuscripts of ancient times, the production of illuminated missals, the fostering of architecture and painting, and last, but not least, in a popular sense, for the grand old buildings, now, alas, in ruins, which impart such a savour to our "waysgoose," and provide never-ending interest to architect and painter. But in these days there are so many diligent workers in the studios of art, in the vast and expanding fields of science outside the monasteries, with museums and caretakers of all that is ancient and refined, that I believe, however rapidly these institutions multiply in this country, and they are multiplying upon the strength of a "revival," they cannot do much service in the cause of science and art; and, therefore, we might leave these excellent and devoted gentlemen to live according to their pleasure, in silent contemplation within their own sacred buildings, without vulgar interruption.

On my way back to the station, I saw a stone-breaker doing his best to reduce a heap of flints to a macadamising size. "How long does it take you to break up such a heap as that, my friend?" "A day." "How much do you get for your day's work?" "Eighteenpence, if I break 'em all; it's hard work to do it." "Any family?" "Wife and four young 'uns." There are many ways of serving God, I thought, and this is one of them—to break flints at eighteenpence a day for the support of a man, his wife, and family, with all the practical devotion and self-denial of a monk. Having plenty of time, I diverged from the road into some fields. A farmer had just begun to cut a field of clover, from whom I learned that the grounds of and surrounding the monastery measure about 242 acres, in addition to which the "authorities" monastic have purchased another farm of about 500 acres nearly adjoining. At this moment the sun shone upon the field of clover, bringing out the full power of the rich purple, which dazzled my eyes, and I glanced onwards for relief to the cornfield above, where I found that the iris had absorbed the purple, which had the effect of mellowing the golden tints of the shocks of wheat, producing perfect harmony, or, as an artist would say, "a lovely bit of colour." Then there were the hills far away on the left, rising boldly in the sunshine, or retiring nervously and modestly into the shade. This, and such as this, is shut out at the monastery.

The train was late, and I sat down by the side of an elderly lady, who appeared impatient of the delay. I tried to divert her thoughts by conversation, introducing the object of my visit, and what I had seen at the Abbey. "Ah!"

she groaned, "we live in very dreadful times. Priestcraft is reviving, and we shall have the Inquisition, the tortures and dungeons—" The train at this moment rolled into the station and put a stop to her catalogue of "horrors," resulting in a very practical answer to her fears. The train had backed a little just as she was getting in, when she drew away alarmed. Addressing the guard, "Any fear—any fear, Mr. Guard?" "Oh, yes, ma'am; lots of fear, but no danger. Jump in!" J. M.

SUSPENSION BRIDGE OVER THE NIAGARA.

THE Niagara railroad suspension-bridge, which has been erected nearly 26 years, had for a long time given rise to doubts as to its safety. The very position of the bridge, about two miles below the celebrated Falls, was sufficient to justify any apprehensions that might have been entertained respecting it. A thorough inspection of the cables and anchorage revealed corrosion of some of the strands of wire near the shoes, and it was deemed necessary to make further investigations. A description of the bridge, and the methods and tests adopted are given in a paper read by Mr. L. L. Buck, member of the American Society of Civil Engineers, and reported in their "Transactions." The foundations of the bridge consist of level strata of rock, chiefly limestone, with a bed of red sandstone, about 40ft. thick, below it. A solid stratum of rock, about 15ft. or more thick, occurs at the anchorage. The bridge is constructed with four cables resting on the tops of two masonry towers at each end, the span between centres of towers being 821ft. At mean temperature the upper cables have a versed sine of 51ft., and the lower cables a versed sine of 64ft. The curves of these cables are in planes inclined, their lowest points being nearer together than the tops. The cables diverge from the tops of the towers to the anchorage. Of the super-structure suspended by these chains it may be described as consisting of two floors, one above the other connected at the sides by posts and truss rods, the latter inclining each way so as to form a trussed tube. These trusses are intended to prevent excessive undulation. In addition, lateral vibration is prevented by means of wire rope guys from the lower floor to rocks on the river banks. The author says "Each cable is composed of 3,610 iron wires (scant No. 9 Birmingham gauge), first laid in seven separate stands or bundles of straight wire made continuous by splicing. They formed a loop at each end which rested in a groove around the outside of a cast-iron U-shaped shoe." From an elevation or profile of the chains given in the paper we are referring to, the chains from the ends of the cables take circular curves of 43ft. and 26ft. radii. There are stone supports under each joint of the chain. At the ends, says the author, "pits were sunk into the rock 25ft. deep, 7ft. by 3ft. in plan; these were enlarged at the bottom to 7ft. square, for the reception of heavy cast-iron anchor-plates. The chains entered the rock vertically, and passed down to the plate, where the lower end of each bottom link passed through a separate hole bored through the plate, and was secured by a pin passed through the heads of the links, and resting in concave seats in the lower edges of the partitions. The plates and chains were then built in solidly with blocks of stone, cut to fit each place, and thoroughly grouted so as to exclude water from the iron." From a description of the top of towers, it seems that there are two grooves, with turned iron rollers, 5in. diameter, and close together, supporting a cast-iron saddle, upon which the cables rest in proper grooves.

The results of the tests of the strands of wires are interesting. These were conducted by Col. W. H. Paine. They show, 1st, that the elongation of the strands under a given load was what the modulus of the wire would give if the section was full; 2nd, that the tensile tests had an ultimate strength of about the same as the new wire was required to possess; the fracture was fine and fibrous, and the reduction good, but the stress was confined chiefly to the "etched" parts. It was interesting, the author says, to note that "even where a wire had its section nearly half-eaten away, its ultimate strength would still be from two-thirds to three-fourths

that of the whole wire, showing that the weaker portion of the metal was attacked first." In the repair of the wires it was discovered that the defective portions were confined to the outer wires; the inner ones were as clean and smooth as when first put in. Near the band which confined the strands into one bundle, the outer wires were etched, and from this point to the shoes, the underside of the outer wires were the worst. The cause of the corrosion is attributed to the elongation and contraction of the wires at the strands, due to loads on the bridge, thereby loosening the wires from the cement, and admitting moisture which worked down to the lowest point. The defective wires were cut out and new pieces were spliced in under a strain equal to that on the other wires. The method of splicing adopted is interesting, and we may quote the author's account of it.

1st. The wire bands were removed from the strands and that portion of each wire, seriously corroded, was cut out. Each of the remaining ends were filed to a scarf, and the side opposite the scarf nicked with a set having transverse grooves across one end.

2nd. A piece of new wire a little longer than the piece removed, having one of its ends scarfed and nicked as above described, was spliced to one of the fixed ends by clamping the scarfs tightly with a small hand vice, and then beginning at the middle of the splice it was served closely each way, to point about 1 in. beyond the splice, with No. 20 annealed iron wire, and fastened there by giving the wrapping wire a couple of "half hitches."

3rd. A straining apparatus consisted of two pieces of iron, each about 3 ft. long, hinged together at one end. The other ends were each provided with a hook and steel button, for the purpose of gripping the wire. About 6 in. from the button ends, a rod, with a thread cut nearly its whole length and a nut fitted to it, was arranged so as to draw the two ends towards each other. The new wire was then drawn as closely as possible by hand, and one end of the strainer secured to the end of the old wire. Then by screwing on the nut the desired strain was applied and the new wire cut to the proper length. It was then released from the strainer, and its end scarfed and nicked. The strainer was again applied, and when strained properly the splice was completed by wrapping as before.

4th. The strain was measured by means of a spring balance. The balance was hitched to one of the sound wires at the middle point of that portion of the wire having no bands. Then pulling on the balance, the wire was deflected from a right line about 1 in.—the deflection of wire and strain indicated by the balance, being carefully noted, to be used as the standard for straining all the wires on that strand. When the strainer had strained the new wire to that extent, that with the same deflection, the balance read the same as before, it was then drawn enough further to make allowance for the slip of the splice.

After having completed the splice, the strainer was removed and the strain tested by the balance. By exercising due care in making the splice in this manner, it has about the same strength as the weakest point of the whole wire.

The greatest number of wires thus renewed at either end of any one cable was sixty-five. As many of these were but slightly affected, it is not probable that any injury would have been done had the defective wires not been replaced.

In all cases where a wire was cut out, it immediately took the form of an arc of a circle with a diameter of about 4 ft. As this was the diameter of the coil previous to its going into the cable, it was evident that the wires had never been injuriously strained.

The commission appointed to examine and report on the bridge were satisfied with the conditions of the cables when the mending of the wires was completed. It was thought also that the form of heads and size of pins of the anchor-chains were not sufficient to withstand a greater strain than would be produced by 40,000 lb. per square inch of transverse section of the link. As it was found the chain would not have so great an ultimate strength as the cable, it was necessary to reinforce the strength of the chain to 50 square inches of area.

Mr. Buck, who was appointed to execute the work of reinforcement, describes the plan adopted: pits were sunk in the rock, from each of which two pairs of chains passed from a single anchor-plate to the surface of rock; these chains were secured by one pin, and, beyond the first joint, each of the four chains was made independent, but had the same curvature to the point of tangency with the line of upper cable, from which two of the chains were carried to the cable; the two others passed on each side of the old upper chains in grooves cut in the masonry. The author next describes the application and measurement of the stress. In the upper cable here was applied to expend them so as to raise the low joints and block them with iron plates to such a height as would produce the proper stress upon the chains when cold. The total sectional area of new chains for each cable is about 50 square inches, and the permanent stress from dead load, is 8,000 lb. per square inch. The writer goes into various technical particulars, into which it would be unnecessary to enter

here, referring to the sinking of the pits, which were 17 ft. deep on the New York side, and 23 ft. on the Canada side, also the cast iron anchor-plates, which were 5 ft. 6 in. square and well ribbed, &c. Details of the superstructure and trussing, and the upper and lower chords are illustrated. It was found the old chords had become useless, and the advisability of reconstructing the superstructure in iron was discussed. Plans for this work were prepared, and eventually Bessemer steel was specified, with a tensile strength of not less than 70,000 lb. per sq. inch, but the "Hay-process"—made steel was decided upon for the chords, Bessemer for the posts and lateral rods, and the other parts to be of iron. The execution of the work is minutely particularised; rivets were driven by pressure, and steel rivets were used to all steel portions. The paper also enters into the mode of making the adjustments, such as the camber, stress on suspenders, truss-rods, &c. These had to be made at a mean temperature. The old truss of bridge had a wind surface equal to 14,000 square feet, and the new one of only 8,000 ft. The figures show a total strength for one of the cables of 3,000 tons, or for the four of 12,000 tons. The total weight of bridge between the towers is 1,050 tons, or 1,400 tons including live load. The greatest stress upon the cables at the towers equals 1,400 by 1.78 = 2,492 tons, and it is estimated their factor of safety is 4.11, an equivalent to a factor of three for the dead load and 8.65 for the live load.

SOUTHWELL MINSTER.

THE fine Collegiate Church of St. Mary the Virgin, Southwell, which is being restored and altered to fit it for use as the bishop-stool of a new episcopal see, was reopened by the Bishops of Lincoln and Lichfield on Wednesday.

The Minster was founded early in the seventh century by Paulinus, first Archbishop of York, by whom were also founded the churches of Lincoln and York. The dimensions of that edifice, of which no traces have been identified, are surmised to have been unpretentious. In the middle of the ninth century it was rebuilt, and some few fragments of that building are incorporated in the existing fabric. The Norman portion of the present church is ascribed to the earlier half of the 12th century, and comprises the nave of eight bays, with its aisles and north porch, the transepts, and the three towers, all of them splendid examples of their style, and all executed in Bolsover-stone. The choir was, according to an entry in the Southwell Registry, in progress during the reign of Edward III. This entry relates to a licence from that king, dated 1338, to the Chapter of Southwell, for the taking and carrying away of stones from a quarry in the forest of Sherwood, for the purposes of the fabric, which had been opposed by the foresters. The foundation of the octagonal chapter-house is attributed to Archbishop Neville, at the close of the 14th century, and its archway at entrance is said to owe something to the taste and liberality of Cardinal Wolsey, while the immense seven-light west window to nave, with the battlement above, is one of the few Perpendicular alterations to the fabric.

A series of measurements taken in the early part of the present century give the dimensions of the minster thus:—Nave, 150 ft. 6 in. in length to inner line of transept, 28 ft. 6 in. wide between columns, and 48 ft. in height; side aisles, 16 ft. wide, including bases of columns; transepts, 122 ft. 9 in. across from north to south, and 28 ft. 6 in. from east to west; choir 114 ft. long, 28 ft. 6 in. wide, and 48 ft. high; western towers 106 ft. high from top of turrets to ground.

Close to the church, on the south-east, was the palace of the Archbishops of York, the ruins of which are still to be seen in the field. Seven of the archbishops are buried within the precincts of the Minster, the last being Archbishop Sandys, who died in 1558. Archbishop Walter de Grey, 1215-55, the builder of the south transept of York Minster, whose tomb in that portion of the cathedral is so well known an example of pure Early English work, was a great benefactor to Southwell, having purchased Hexxacre-park for the use of his successors, and procured the church of Rolleston for the

benefit of the chapter of Southwell. Archbishop Hutton built an archiepiscopal throne on the south side of the choir. Cardinal Wolsey often visited the palace, furnished the library there, and purchased a park contiguous thereto; in 1530, the last year of his life, he returned to Southwell with a retinue of but 160 persons, his possessions having been confiscated.

In the early part of Henry VIII's reign, the charities attached to Southwell Church were dissolved, and soon after the collegiate foundation was abolished, although it retained its dignity of head and mother-church of the town and county of Nottingham, and for a short time shared with Ely, Peterborough, and other monastic houses the dignity of being a cathedral. In the reign of Edward VI. the chapter was dissolved, but it was restored by Mary to the Archbishop and Chapter of York, whose property it remained till about 40 years since, when it came into the possession of the Ecclesiastical Commissioners. During the Civil Wars the church suffered much, and the Parliamentary troops stabled their horses in its precincts. Orders had been issued for its demolition, when Mr. Edward Cludd, of Norwell-park, close by, interceded with Cromwell, and procured a revocation of the mandate. In 1711 the spire on the north-west tower was struck by lightning, and a portion of the church consumed by fire, and at the beginning of the present century the wooden spires were removed from the western towers and the chapter-house, and other alterations made.

The present works of restoration are being carried out from the plans of Mr. Ewan Christian, of Whitehall-place, London, the architect to the Ecclesiastical Commissioners. The low-pitched, almost flat roof which now covers the nave is being replaced by an oaken one, of the high pitch shown by the Norman weathering on the central tower. The north and south aisles will also have new roofs of higher pitch, as will also the north and south transepts. All will be of oak, covered with lead. A new roof has already been added to the curious circular fragment of fifteenth-century restoration between the twin western towers, upon which the ancient spires have been reproduced, after careful study of all the available contemporary drawings; these spires are of wood, covered with lead laid herringbone-wise, and are conspicuous objects at a great distance from the Minster. The chamber over north porch—one of the most interesting surviving examples of a Norman porch—is to be restored and re-roofed in oak. This chamber, probably that of the Sacrist, is entered by a door from the north triforium, and is lighted by a triplet of windows in the gable of porch. Concurrently with the raising of the roofs, the parapets all round the building will be raised. The ornamentation upon the transept gables has been added to, and the apex of each is to be surmounted by the figure of an animal, carved in stone; an ancient figure of a bear, saved from the fire of 1711, is to be utilised upon one, and the other figure has been newly chiselled. On the east side of north transept is a chapel, but little later in its details than the choir, and built into the remains of one contemporary with the nave. This, which has been used as a library and vestry, is to be retained for the former purpose; it will be lowered to the former level of floor, several feet below that of transept, and will be approached by a flight of steps, being separated from the transept by a partition. Over it, approached by stone steps, will be the new library, and above this a roof of oak, covered with lead. The floors throughout the Minster are to be taken up, lowered 18 in., and filled in with cement, and a new pulpit will be added, at a cost of £150. The walls and triforia will also be rendered sound.

The works just described are estimated to cost £25,000, to be defrayed by the Ecclesiastical Commissioners. The Bishop Suffragan of Nottingham has purchased, at his own cost, the remains of the old archbishop's palace, as a residence for the new bishop. The contracts for the Minster restoration are in the hands of two building firms—Mr. Henry Cliphams, of Norwell; and Messrs. Cornish and Gaymer, of North Walsham, Norfolk; and the whole is superintended by Mr. James Wakefield, the clerk of the works, who has his office in an ancient chamber in the inclosure, once used for the administration of justice.

OUR COMMONPLACE COLUMN.

FARIAN CEMENT.

KNOWN formerly as Keating's, is a quick-setting white cement, and produced by mixing calcined and powdered gypsum with a strong solution of borax, then recalcining, grinding, and mixing with a solution of alum. There are two qualities made, the "superfine," and the "coarse." For large surfaces, Farian cement is preferable to Keene's or Martin's, as it works freer, but the arrises made are not so sharp. Farian cement has the advantage that it can be painted or papered within 24 hours. For decorative work it is of much value; several colours can be mixed with it to produce uniform tints. It can be used for floors, and is said not to effloresce. The cement is prepared by Messrs. Francis and Co. It is not safe to paint on Farian for six or nine months, according to one writer, as the salt works through; but it is just to say the manufacture has been recently improved.

PEACH-HOUSE.

A USEFUL sized peach-house, according to one authority, is about 32ft. long internally, 12ft. wide, 13ft. high at the back, and 18in. high in front, the lights being made of a steeper pitch than required for a greenhouse. The back wall would be about 2ft. thick, the front and end 14in., or a total outside width of 15ft. 2in. A bed for creepers is made along the house 12in. from back wall, and a trellis is fixed to the latter. The walk, 3ft. wide, of flags, and a space for mould in front 4ft. 7in. wide. A longitudinal air-flue, about 18in. by 15in., constructed of brick and fire tiles, and pargetted, is made, discharging warmed air throughout its length through the spaces in the hollow wall. The trees are often trained on iron frames or trellis-work. No front lights are required. Mr. R. S. Burn describes peach-houses at Worsley Hall, Lancashire, 39ft. by 14ft., of similar construction to a vinery. They are glazed with patent polished sheet glass, 21oz. to the foot, in lengths of 3ft. by 7 or 8in. wide. A brick gutter, lined with cement, in which are two rows of 4in. hot-water pipes, runs along the front wall, and along the middle of the earthen bed are two rows of 6in. hot-water pipes. The lights are generally hinged to the ridge for top ventilation, the lower lights being hung from the gutter-plate, and made to open outwards. About 4ft. forms a good height for front wall of lean-to. We refer the reader to details in R. S. Burn's "Conservatories," Fawke's "Hort. Buildings."

PEDE WINDOW.

A NAME for certain windows at the west-end of a church, especially of the north-aisle, and given to express symbolically the position of the Saviour's feet. West windows of this description occur at All Saints', Tinwell, Rutland, where is one of three lights; at St. Andrew's and St. Mary's, Fletching, Sussex, a lancet surmounted by a square-headed window of three ogee trefoiled lights. In Early Pointed work these lancets are sometimes trefoiled, in later work the spherical triangle is used. In Sussex, in the Early Pointed churches, a rude hole has been punched through the wall. ("Arch. Diet.")

PENALTY.

"THE courts will enforce as far as possible the assessment of damages, which the parties have assented to, but they will not allow one party to impose a penalty on the other." Jenkins and Raymond's "Building Contracts."

THE PERPENDICULAR STYLE

PREVAILED from about the end of the 14th century to the middle of the 16th century, and was contemporary with the Flamboyant style in France. This style is called the Third Pointed or "Rectilinear" style in Sharpe's nomenclature. The west end of Winchester Cathedral shows the change made from curvilinear to rectilinear forms, and William of Wykeham's magnificent nave may be considered one of the grandest specimens of the style. The general characteristics of the style are thus summed up in the "Encyclopædia Britannica." "The fondness for straight in place of flowing lines was more and more developed. Doorways and arches were inclosed within well-defined square outlines, walls were divided by panelling into rectangular divisions, vertical lines were emphasised by the addition of pinnacles and

battresses, used more for ornament than strength, whilst horizontal lines were multiplied in stringcourses, parapets, and transoms to windows. Groined roofs, which, in the 14th century, had been enriched by the multiplication of surface-ribs were now most elaborately enriched by cross-ribs subdividing the simple spaces naturally produced by the intersection of necessary ribs into small panels; these again were filled with tracery, and finally the keystones were formed into pendants, and the branching ribs, radiated as to produce the really beautiful and very English variety of groining called fan-tracery. The amount of skill shown in the construction of these vaults was very great, and most of them have proved their authors' science by the perfect way in which they have endured to the present time. Few things can be seen more beautiful than the steeple of Gloucester cathedral, or of St. Mary's, Taunton." The open-timber roofs, as, for instance, those of St. Peter Mancroft, Norwich; Sall and Cawston, Norfolk; St. Margaret's, Ipswich, St. Edmund's, Southwold; St. James's and St. Mary's, Bury St. Edmunds, and Laverham, are superb. The Perpendicular style finds no exact parallel in Scotland, although the style exists there. Melrose exhibits Flamboyant curves, and also Perpendicular features. The east-ends of Lullithgow and Stirling churches are examples. None of the specimens exhibit the 4-centred arch. (See Billing's "Baronial Antiquities.") On the Continent, the Flamboyant features characterised this period, as we find in Flemish examples. In Germany, this period led to a "spiky and prismatic" character and interpenetration of mouldings is common. For details of this style the reader is referred to Rickman, Freeman's "Hist. of Arch.," Parker's "Glossary," Sedding's lecture recently published. The east and south-west of England are both rich in Perpendicular architecture. The finest Perpendicular towers are found in the West of England: Gloucestershire, Wiltshire, Dorsetshire, and they reach their culminating point in Somersetshire. It has been noticed that Yorkshire has a preponderance of Flamboyant work compared with the south. Willis thinks Gloucester to have been the school of the style, as it was there shown of an earlier date (1338) than elsewhere.

PERSIAN ARCHITECTURE.

FOR information on this subject we refer the reader to Fergusson's "Handbook"; "Encyc. Brit.," 9th edition, p. 400; Layard's "Discoveries"; Owen Jones's "Grammar of Ornament"; Vaux's "Ancient History—Persia from Monuments." Except the ornamentation, many examples of which from MSS. are in the British Museum, there is little of importance to the architect; the Persians were not temple-builders, and their buildings are chiefly palaces crowded with domes richly decorated, and bazars of considerable extent. Their textile designs are rich, and afford the artist excellent models, and their carpets, shawls, and chintzes, and carved work are very suggestive.

PERSPECTIVE.

THE numerous treatises and handbooks on this subject make it unnecessary to describe the operations of an art which every student and architect is required to know. We shall here merely refer to the best works on the subject. For elementary knowledge of the subject, the student may study the lessons in perspective given in Cassell's "Technical Educator," and published separately, or Burchett's "Linear Perspective for Schools of Art." It is exhaustively treated also in the "Encyc. Brit." For architectural purposes, Dr. Brook Taylor's "Principles," published 1763, and Malton's "Treatise on the Theory and Practice on the Principles of Dr. Brook Taylor"; besides an excellent practical treatise by Nicholson, now out of print; and another by Brown, formerly professor of architecture, may be consulted. Moore's "Principles and Practice," and Gwilt's "Encyc. of Architecture," are more recent works. There is also a comprehensive treatise on the practice of perspective in Newland's "Carpenter and Joiner's Assistant." See BUILDING NEWS, 1863, p. 764, for a description of a scheme for working on the board with proportions after the extreme radiating lines have been drawn; Turrell's perspective, described in Society of Arts' Journal, XXXII.; and for the use of the centreline, see "Intercommunication"

columns. There is also a means of obtaining a perspective representation by computation (G. Bernard, 1839); but these methods are not generally followed.

PETERHEAD GRANITE.

THIS material is quarried about 30 miles from Aberdeen, and is very durable. Peterhead granite is red in colour, and is of close texture. The pillars of the Carlton clubhouse are of this granite. The Stirling-hill stones are considered very fine. Of the blue or gray sorts, that at Cairngall is the best. For information on the Scotch granites, with remarks upon them, see "Notes on Building Construction," Vol. 3.

PETERSBURG TIMBER.

THE deals vary from 7in. to 11in. The red wood of Petersburg is nearly equal to Memel, but not so hard. The white deals are not to be depended on and do not equal the Christiania deals; they are apt to expand and contract, even after seasoning, by change of weather. The best yellow deals are shipped from this and other ports, and are free from knots. A good brand is "P. B." (Peter Beliaeff) for best, and "P.B.2" for second quality. The well-known Gromoff deals are marked "C. & Co.," the initials of the shippers, Clarke and Co.—"Arch. Dict."

PIER CYLINDERS.

THE modes of sinking cylinders for bridge-piers are described in a recent article, p. 196, Vol. XLI., 1881. The "air-lock bell" and the "air-cylinder" have been largely used for this purpose. Both are open at the bottom, the working-chamber being filled with compressed air of force sufficient to hold back the water. They are also both accessible from the top, or surface, of water, and are protected by an air-lock. The chamber, however, may be a permanent structure, as after a solid foundation is secured the cylinder is filled with concrete, the air-lock being removed, and the cylinder becomes an iron column. They are generally weighted down, and the best plan of sinking them steadily is to place the weight round the inside of cylinder, low down, in the form of brickwork or concrete. Sometimes the pier is carried up in sections of brickwork, course by course, on a caisson. For practical information we refer the readers to articles in the BUILDING NEWS; Matheson's "Aid Book," p. 499.

CHIPS.

The Cardiff board of guardians on Saturday adopted plans by Messrs. James, Seward, and Thomas, of that town, for the erection of a relief office and pay-room to accommodate 200 persons, at an estimated cost of £350.

Westburne Free Church, at Kelvin-side, Glasgow, which has been built at a cost of £9,000, was opened for worship on Sunday week.

Two new beard-schools at Brighton, situate in Finsbury-road and Preston-road, were opened on Monday.

The Wesleyan chapel at Apsley Guise was reopened on Sunday week, after extensive alterations, including the erection of new roof. Mr. W. Pooles, of Woburn-sands, was the contractor.

St. Martin's Church, Colchester, is about to be restored, from plans prepared by Mr. E. J. Dampier, architect, of that town.

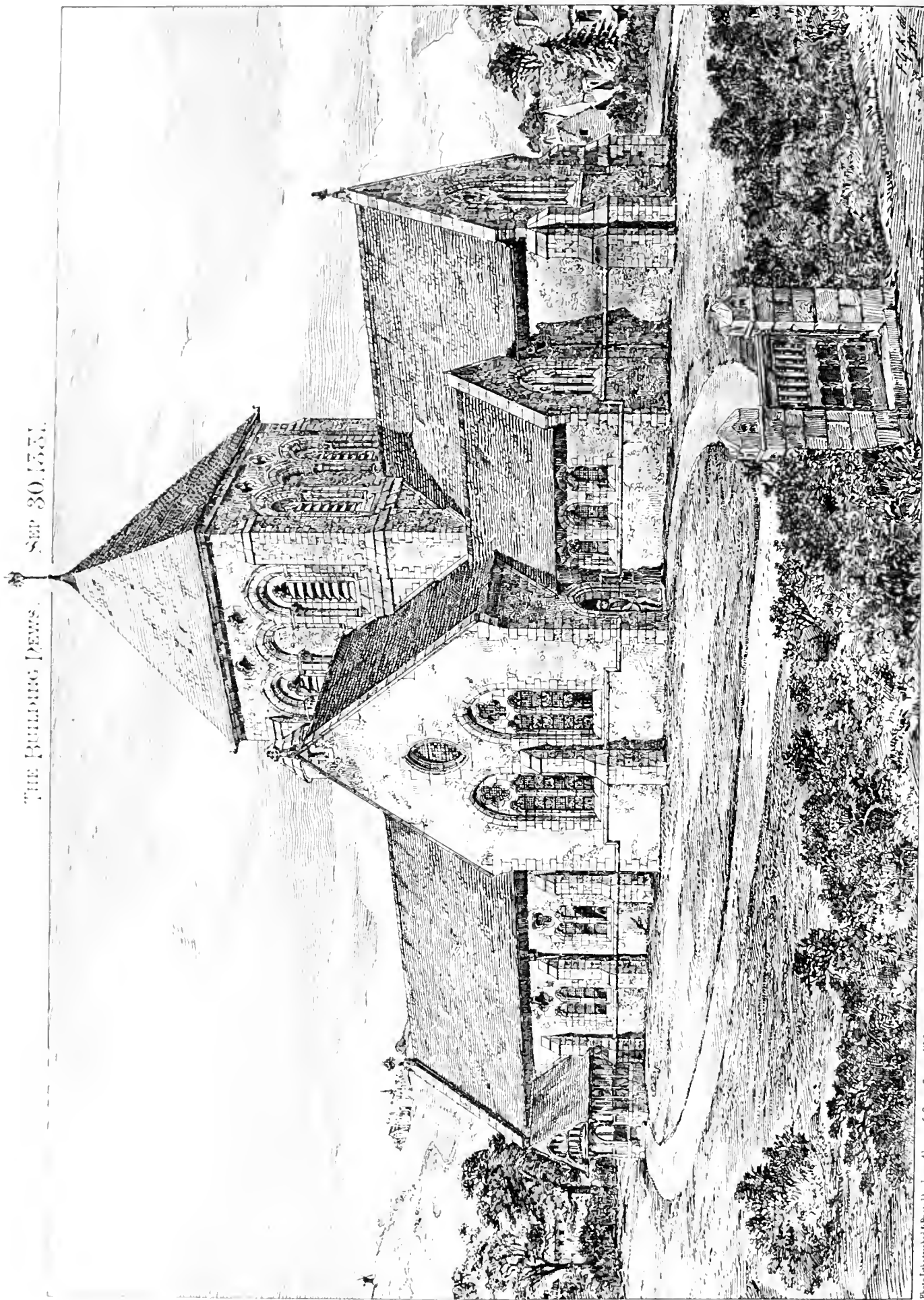
A new organ, built by Messrs. Conacher and Co., of Huddersfield, was opened in the Baptist chapel, Mytholmroyd, near Halifax, last week. The cost was £350.

The Llandudno Improvement Commissioners, at their last meeting, received a report that the new waterworks at Llyndulyn were all but completed.

A two-light window in Trefnant Church, near Denbigh, has just been filled with stained glass. Messrs. Clayton and Bell, of London, were the artists, and the subject is the Three Holy Women at the Empty Sepulchre.

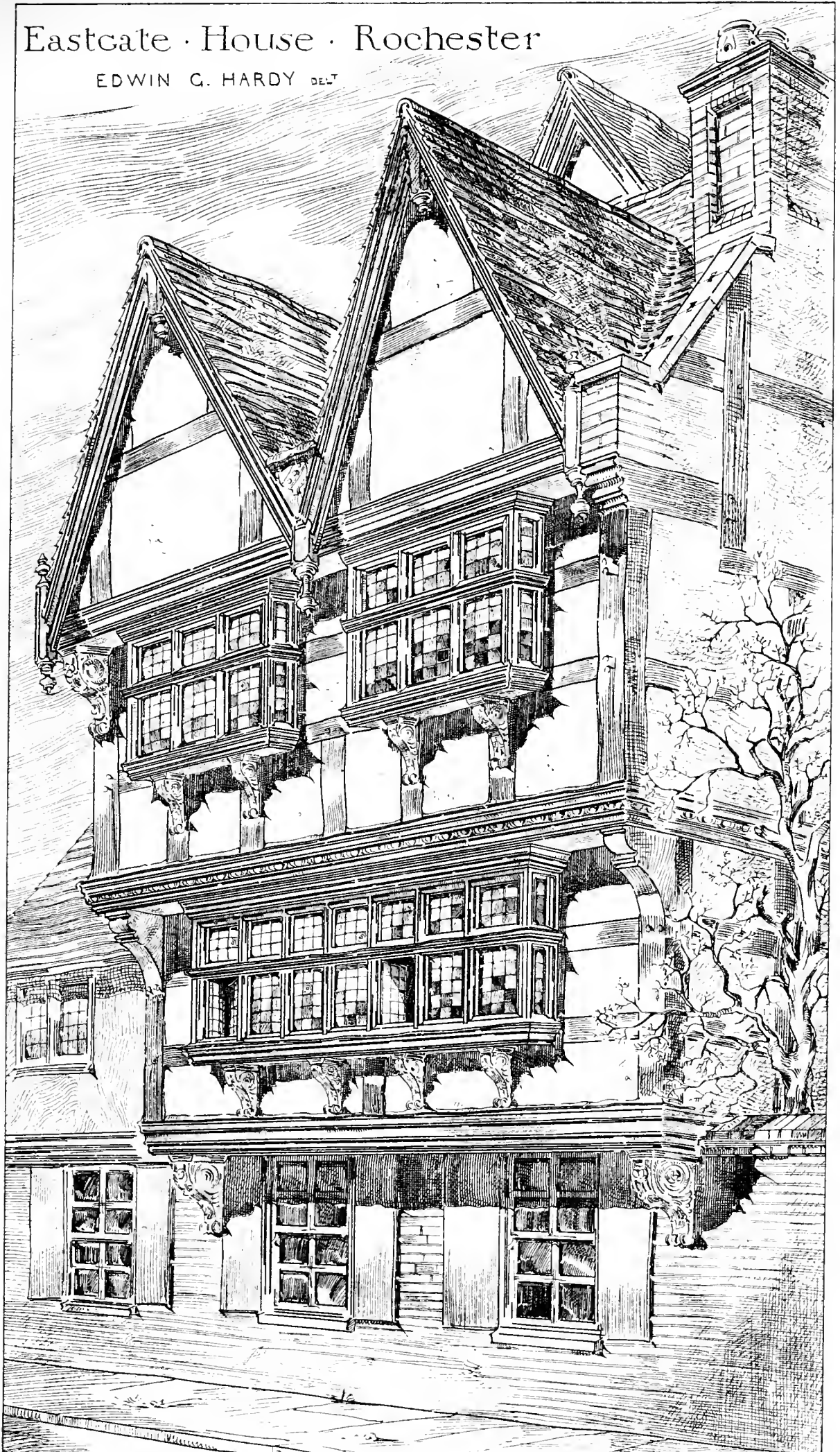
Dr. J. E. Taylor, of the Ipswich Museum, writes that in the course of the excavations for the main sewer, now in progress across the Cornhill, in the centre of Ipswich, a few interesting relics, chiefly Roman and Saxon, as well as the trunk of a tree, have been found.

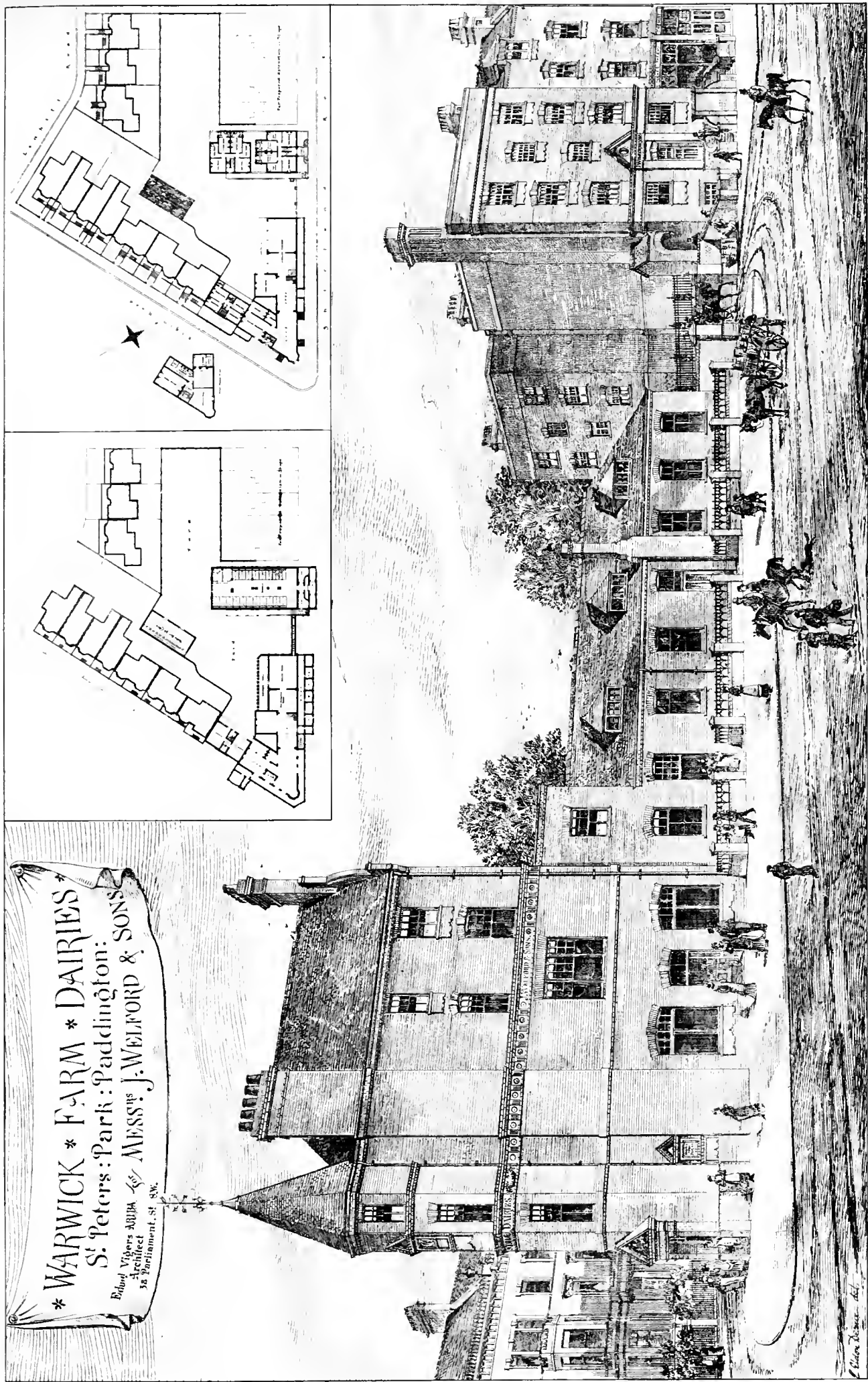
The foundations are being laid at Brasenose College, Oxford, of a new quadrangle, which will comprise about 40 sets of rooms. The architect is Mr. T. Graham Jackson, M.A., of London.



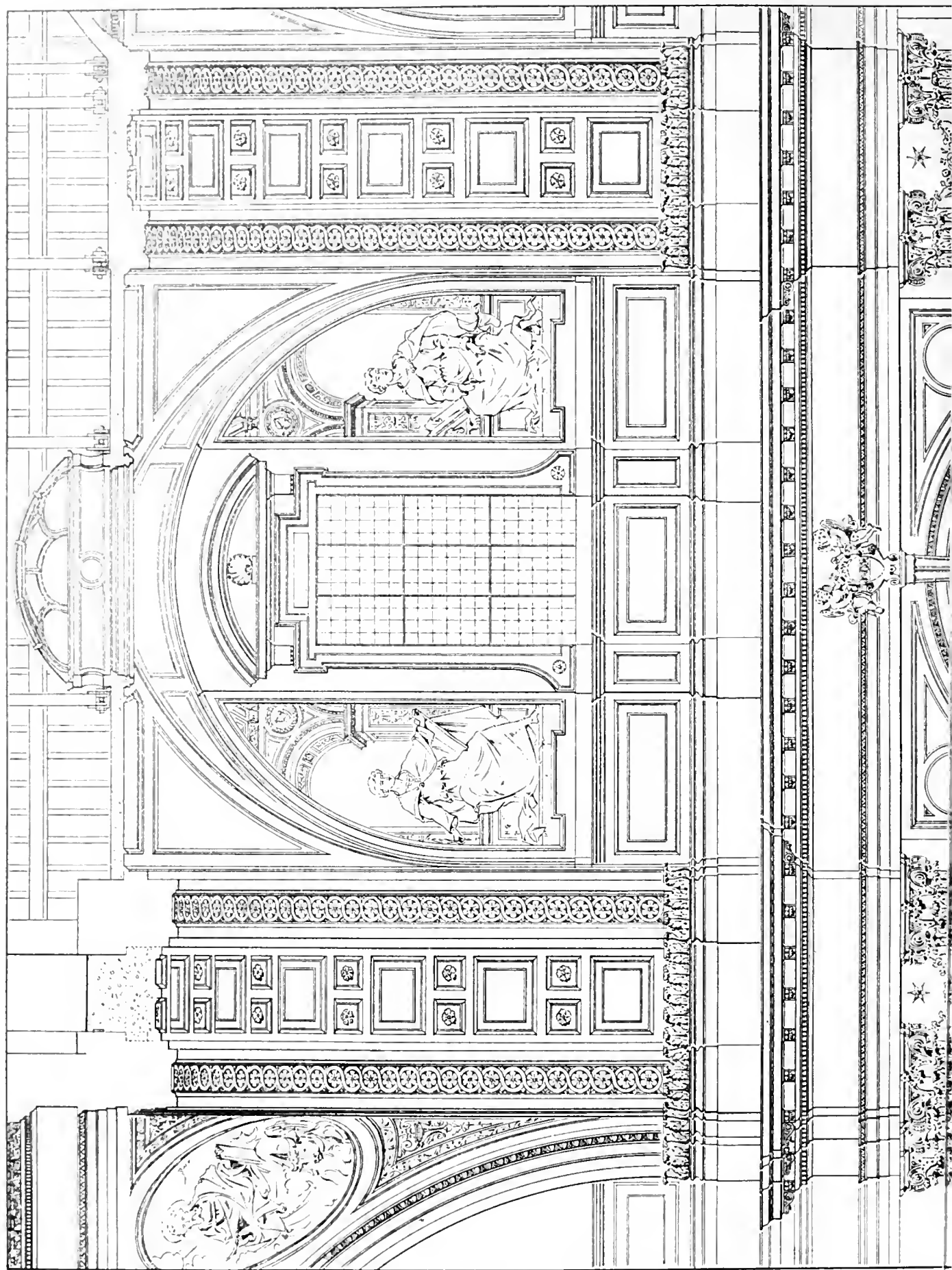
Eastgate House · Rochester

EDWIN G. HARDY DEL.





* WARWICK * FARM * DAIRIES *
 St. Peters: Park: Paddington:
 Edwd. Vigors ARMA Esq. MESSRS J. WELFORD & SONS
 Architect
 38 Parliament St. S.W.



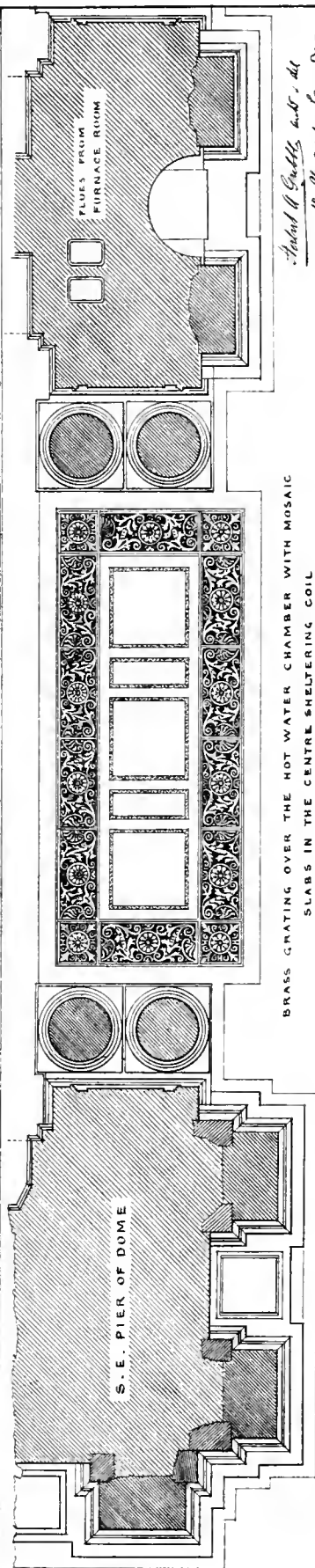
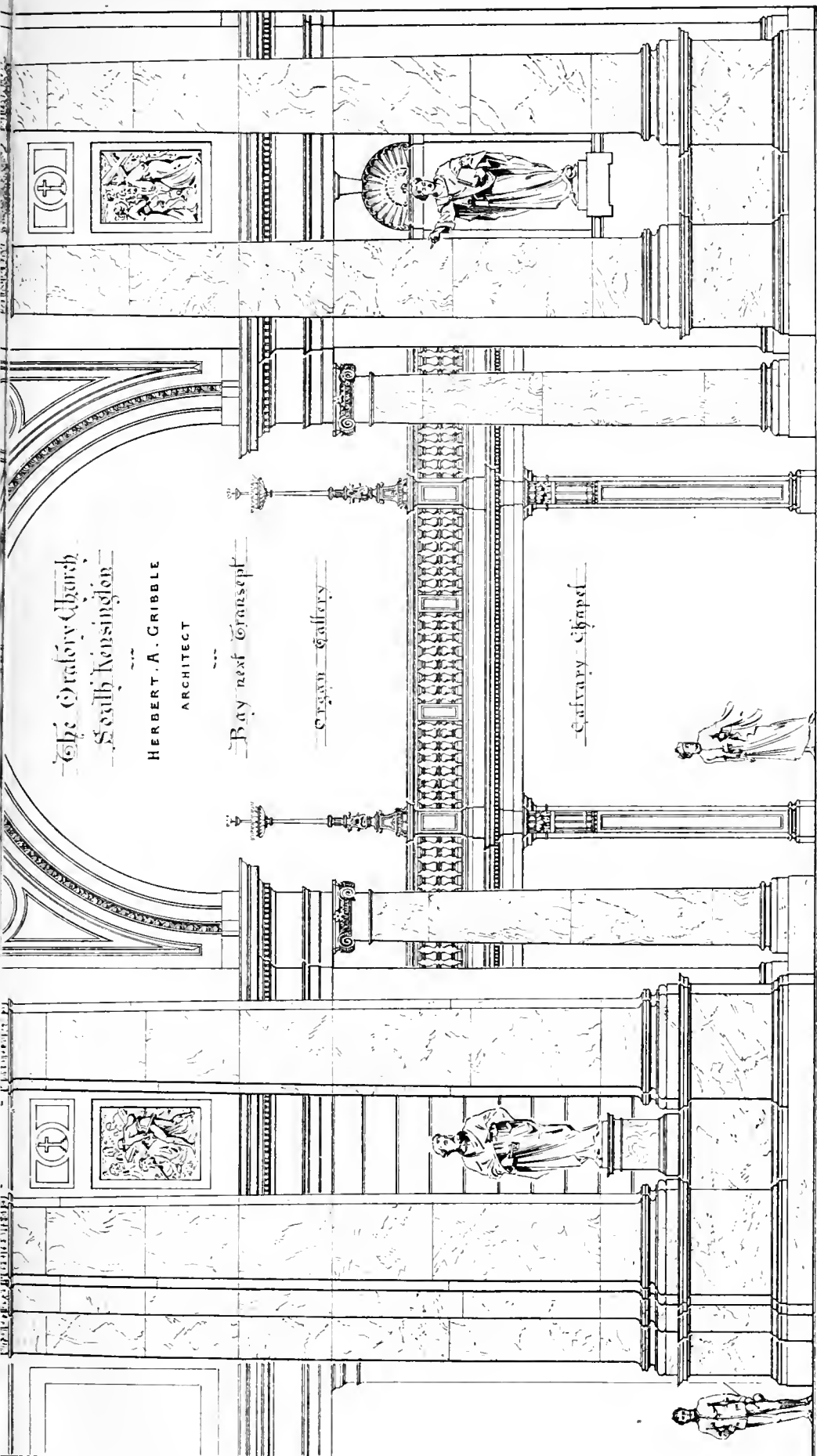
The Oratory Church South Kensington

HERBERT A. GRIBBLE
ARCHITECT

Bay next transept

Oratory

Chapel



BRASS GRATING OVER THE HOT WATER CHAMBER WITH MOSAIC
SLABS IN THE CENTRE SHELTERING COIL

Herbert A. Gribble, Architect
10, Grosvenor St., W.



ECCLESIASTICAL ART EXHIBITION, NEWCASTLE-ON-TYNE.

CONCURRENTLY with the Church Congress at Newcastle-on-Tyne there will be opened an Exhibition of Ecclesiastical Art. Most of the leading church-furnishers are represented, and there is in addition a Loan collection, embracing upwards of 400 exhibits, to which many local antiquaries and others have contributed. This department of the exhibition consists of examples of ancient embroidery, including a 15th-century altar frontal, the property of Lieut.-Col. Hill, Llandaff; a cope and portion of a chasuble, lent by Mrs. Bayman, of the Royal School of Art Needlework, and two sets of vestments, in the Cinquecento style, Italian work, contributed by Mr. Scarlett Thomson. Church plate is represented by a collection of ancient chalices and patens, the property of Mr. Hodgson Fowler, F.S.A., of Durham; a chalice made at York in 1599, and a chalice and paten formerly belonging to Hagley Church, Worcestershire, which formed part of the Demidoff collection, recently dispersed. The Rev. A. W. Headlam, Vicar of St. Oswald's, Durham, contributes three offertory basins or dishes, and a jewelled processional cross. Mr. Robinson, F.S.A., of Houghton-le-Spring, sends a remarkable reliquary, found appended to the neck of a skeleton in the old churchyard of St. Dunstons, Fleet-street. Among the modern examples of the silversmith's art may be mentioned a jewelled chalice, designed by Mr. Butterfield for the Rev. R. M. Benson, of Cowley.

Pictorial art is represented by various photographs and chromo-lithographs of ancient pictures, illuminations, drawings of churches and ecclesiastical furniture, engravings of chalices, and a large collection of rubbings of monumental brasses and incised slabs, embracing the oldest known specimen, representing Sir John D'Abernon (A.D. 1277), down to that erected to the memory of Robert Stephenson in Westminster Abbey. Bishop Mitchenson contributes a large collection of photographs of the ancient ecclesiastical buildings of the United Kingdom.

Perhaps no one single subject is so thoroughly illustrated as that embraced by Mr. Bragge's collection of Russo-Greek "Icons," or religious pictures, which are so frequently met with in Russia. These are fully explained in the catalogue.

THE SECRET OF FREEMASONRY.

"**T**HE secret of Freemasonry," says the *Saturday Review*, "is a secret de Polichinelle, and is to be read in fifty different treatises, any one of which will enable a reader to make his way into a lodge quite as well as though he had submitted to the inane ceremonies of probation and initiation. If this is not the case, the Society should authoritatively deny its truth, or it will continue to be under the imputation of having for a great number of years made a great fuss about nothing at all. But in the matter of the antiquity of the order, no disclaimer which they could make would be of any avail. The stories of Hiram Abiff, and of the mysterious pillars Jachin and Boaz which stood at the Temple entrance, as told by Masonic ritual, bear the unmistakable 'Brummagem' brand, and will not for a moment bear the test of criticism, either from an archaeological or Oriental point of view. The real origin of the order as we have it now appears to date from about the beginning of the eighteenth century, while an extinct organisation which furnished the motive for Freemasonry, though having no immediate connection with it, is some three or four centuries older. It has been indisputably proved that the institution of Freemasons took its rise in the guild of operative masons which, under the name of the 'Fraternity of Masons,' was formed by the architect and workmen employed from the 13th to the 14th century in the building of Strasburg Cathedral. The flower and pick of the profession were engaged upon this masterly edifice, and they were naturally desirous of perpetuating the secret of such good work, just as the *Comédie Française* preserve the traditions of the art of perfect acting. Their example was followed by other groups of masons throughout Germany, and all these different lodges were, some twenty years after the completion of the tower of Strasburg,

merged into one association. Their Act of Uniformity was drawn up in 1459, and ratified by the Emperor Maximilian thirty years later by an Imperial diploma. They adopted the instruments of the craft—the square, level, and compasses—as their emblems, and had a secret password, 'Liberty,' which in itself gives a clue to the ulterior aims of the Society. The Fraternity of Masons lasted until 1707, when it was authoritatively abolished by the Imperial Diet.

These are the simple facts about the origin of the Society, or rather of the Society whose constitution served as a model for the more recent and spurious association which has taken its name. It is not necessary to enter into the question of the so-called higher degrees in Masonry, such as the Knights Templars, Rosicrucians, and the like. Their rituals are even more impudent pretences than those of the craft itself, and exhibit a mixture of arrant nonsense, child's-play, and profanity which is rather shocking than ridiculous. Amongst the edifying ceremonies which accompany the initiation of the 'Knights' are parodies of the Holy Sacrament and other solemn services of the Church. Craft Masonry is at least free from the charge of blasphemy, however much it sins in the way of foolish and unwarranted assumption. Some visionary schemes for the formation of a Universal Brotherhood of Mankind, which should emancipate the world from the tyranny of priestcraft and despotism, was no doubt the idea which actuated the founders of the Masonic order, and which made the organisation of the then existing guild of operative masons a ready instrument to their hands. The possible political importance, too, of such an institution as offering a ready vehicle for international conspiracies had much to do with the original success of the movement. But the more widely spread the order has become, the more harmless have been its aims, and the denunciations of popes and kings have only had the effect of giving to a number of benevolent gentlemen the fearful joy of half-persuading themselves that they are conspirators of a very formidable kind. As a matter of fact, Freemasonry is an excellent Friendly Society, established for charitable and convivial purposes, and possesses a widely-extended and excellent organisation, while its so-called ritual, if spurious, is at any rate irreproachable on the score of morality. If the members of the Craft choose to meet together in groups from time to time for the performance of a solemn farce, or delight to deck themselves out in fantastic gear, we have no more right to find fault with them than we have to grudge the Foresters their processions, scarves, bandit-hats, and other paraphernalia at a Crystal Palace fête. The two orders are exactly on a par, with the exception that the Masonic one is the older of the two. It would be more dignified, no doubt, to give up the nonsense, and rely upon the intrinsic merits and real objects of the order; but mystery, even when it is such an open secret as Masonry, has its attractions, and probably does conduce towards holding the Society together. When, however, Freemasons lay claim to an antiquity and an Oriental origin which are absolutely delusive, and when they deliberately seek to impose the sham upon the credulity of the public, it becomes a duty to expose the real nature of their pretensions. Masonry is, as we have said, a very excellent Friendly Society, and very widely spread over Europe, and, indeed, wherever Europeans have settled; but it is essentially a European institution, has no claim to a remote antiquity, and has not the slightest immediate connection with the East or the slightest pretensions to antiquity.

PAINTING OF CEMENT AND PLASTER.

MUCH difference of opinion prevails respecting the question of painting Portland cement, and we have seen work painted a few weeks after the cement has set, which has stood well. There is one point which has a great deal to do with the question of successful painting, namely, the absorbency and dryness of the brick-work itself. Many new walls, saturated with moisture, are cemented, and in this condition no paint can possibly stand if laid on too soon. It is a good and safe rule to enforce that Portland-cement work should not be painted within a year of its completion, to allow it to dry

thoroughly; but we are safe in saying the majority of new fronts are painted before they have been finished three months. A very desirable precaution seems to be to coat the work with linseed-oil first, a recommendation which has been before made in these pages (see *BUILDING NEWS* for 1874, 509, also Vol. XXIX., 494). The painting of plaster-work requires the same care, and the lime works out in small bubbles, destroying the paint. In painting plaster, white-lead and linseed-oil, with a little dryer, is recommended by one authority. This coat should be of the consistence of thin cream, so that the oil is absorbed into the plaster in a few hours. In a day or two another thicker coat may be applied, and a third a few days after rather thicker, followed by the finishing coat. Four coats are not too much for good work. By the absorption of the oil into the plaster the surface becomes hardened, and may be washed. Another method to facilitate this absorption is followed by painters, which is to give the plaster two or three coats of boiling linseed-oil, and then to apply the other coats of paint. We are inclined to think the application of the oil before the paint a better plan, to insure a thorough saturation of the material. The colour of Portland cement and the uneven tints it sometimes assumes is the main reason why painting it is resorted to. For this reason we think it may be worth the attention of manufacturers to turn their consideration to the subject, and those using cement as a stucco might also prevent a blotchy and uneven tint by attending to the preparation of the wall and the sand they use with the cement.

ANCIENT WOOD AND IRONWORK IN CAMBRIDGE.*

ACCURATE and large-scale drawings of ancient iron or woodwork, taken from examples collected in an historic town like Cambridge, which is especially noted for its rich resources of Old English works of art, must always be of interest. It is, therefore, with pleasure that we turn to another part of Mr. W. B. Redfarn's sketches now before us. It includes an old carved oak settle, of which the author is the fortunate possessor. As a simple and hold example of Jacobean work, both rich and free from coarseness, it is well worthy of illustration. The admirable way in which the arms are treated, with their lion-headed terminations, is to be noted as a suggestive feature. The next page shows some woodwork at Christ's College, from the second set of rooms on the first-floor, and dated, in the description, written by Messrs. D. J. Stuart and John Willis Clark, of Trinity College, as 1616, and as being the work of Sir John Finch. Inigo Jones is said to have planned Christ College in 1638, the foundation-stone being laid two years later, and the buildings were partly opened for occupation in 1642. The third, or concluding sheet of the part, illustrates the library-door from St. John's College—a remarkably fine specimen of woodwork in a building notably rich for its series of several periods and styles of woodwork.

PROPOSED CATHEDRAL AT BUENOS AYRES.

WE have been invited to set of designs prepared by Mr. J. Pitt Bayly, architect, of Fulham-place, Paddington, for the proposed cathedral to be built at Buenos Ayres. As the design is to be submitted in competition, we can only here simply describe its main features without committing ourselves to the expression of any opinion. The instructions to competitors left them free to a great extent, and Mr. Bayly has adopted a plan which appears to fairly represent the requirements. The cathedral designed, and of which we have seen the general drawings in ink, has a plan comprising nave and aisles, a transept, apsidal-ended choir (semi-decagonal), three chapels and two western towers, one being a baptistery. The transepts slightly project, and the aisle is continued round the chancel as an ambulatory. On the north side communicating by a corridor with the transept is the chapter-house, an oblong compartment, and adjoining the choir on the same side are two

* Ancient Iron and Woodwork in Cambridge, by W. B. Redfarn. Published by W. P. Spalding, Sidney street, Cambridge.

sacristies divided by an entrance. The dimensions adopted show a nave 160ft. long by 38ft. in clear of the piers, a chancel 56ft. long by the same width, the aisles and ambulating round the chancel being 16ft. wide. The author has adopted a thoroughly French treatment in the planning. The bays of the side-aisles between the buttresses have been arranged for confessionals and open into the aisle by a trefoil arcade of three arches, and flying buttresses are shown supporting the nave-vault. There is a *dicke* at the crossing of considerable height, which is intended also as a ventilator and for the sanctus bell. The longitudinal section shows an arcade of five bays to the nave, over which is a low triforium of small arches and a lofty clerestory, pierced with windows of Geometrical character. There is a groined vault of brick. Externally the west end has two towers surmounted by lofty spires, relieved by pinnacles at the base, and by bands of tracery. Between these is the western entrance, and the end of nave is marked by an arched recess, with a large rose window, with blind arcading above the gable of entrance. The estimated cost is within the sum mentioned by the Government authorities, namely, £58,000. The drawings were to have been sent in on the 27th.

THE LATE MAJOR MANT, R.E., ARCHITECT.

WE have to record the sudden death of Major Mant, R.E., F.R.I.B.A., by his own hand, on Saturday, the 17th inst., at his lodgings, Tavistock chambers, Covent-garden, at the early age of 42.

The deceased was Architectural Executive Engineer for the Bombay Presidency, and also held the post of Consulting Architect to the native States of Baroda, Kolhapur, and Durbhanga. At an early period of his career he showed a decided taste for architecture, and made a special study of the Hindu Saracenic style, in which he was highly proficient. Amongst his numerous executed designs made in India may be mentioned—Bhowanagar Court House and High School, Kolhapur High School, and the Kolhapur Memorial at Florence; Mayo Memorial College, Ajmer (nearly built); Northbrook Hall, Dacca; and Colvin's monument, Agra. Several medical schools have been erected from his designs in various parts of Bengal, and his works include Kolhapur Hospital, Baroda Hospital, and Baroda Library, all in progress of erection. One of the deceased architect's most important buildings is the new Palace for the Guicowar of Baroda, which is now building, at a cost of about £200,000. He was also the architect of the new Palace for the Rajah of Kolhapur, which is at the present time in progress, costing about £65,000. Besides these important commissions Major Mant, at the time of his death, was building a new Palace for the Maharajah of Durbhanga, at a cost of not less than £150,000.

The deceased only arrived home on furlough at the beginning of the year, and was admitted to the Royal Institute of British Architects as a Fellow at the last sessional meeting of that society.

At the inquest the evidence tended to show that the failure of his plans for India led to the sad act; but we have the authority of his principal assistant, Mr. Fotheringham, for stating that this was incorrect, and that it was solely due to private monetary difficulties.

We shall shortly illustrate the new Palace at Baroda, now building, from Major Mant's designs, the deceased having supplied us with drawings for publication shortly before his death.

A series of tramways, authorised last session, are about to be constructed along the Albert Embankment, High-street, Vauxhall, and Church-street, Lambeth. The engineer, Mr. Cameron, proposes, having obtained last week the consent of the Lambeth Vestry, to lay a continuous iron sleeper, upon the top of which a steel rail will be keyed, with tie-bars every 8ft. under the parallel sleepers, clipping the bottom flange.

The Metropolitan Board of Works have decided not to bring forward any Bill for further street improvements in the coming session of Parliament.

New schools are being built at Trichuris for the Mather School Board. Mr. J. Lewis is the contractor, and Mr. Harpur the architect.

Building Intelligence.

BISKE.—On Tuesday week the reopening of Bistre parish-church took place. The amount required for the restoration was £700, and the greater part of this sum having been raised, designs were called for, those of Mr. Spaul, of Oswestry, being eventually accepted. The work, which was placed in the hands of Mr. J. Williams, builder, of Buckley, was commenced in May last. The gallery at the west end has been removed, as well as the whole of the interior fittings of the church. The apse at the east end has been raised and ceiled with wood, and the east window, which previously was level with the Communion-table, has been raised and fitted with stained glass by Messrs. Ballantyne, of London, the subject being our Lord in the Garden of Gethsemane. The body of the church has been filled with two blocks of open seats, capable of accommodating 400 worshippers; while the aisles have been laid with tiles, and the choir and sacristy with encaustic tiles from the Pen-y-boon works of Mr. J. C. Edwards.

BRISTOL.—The foundation-stone of the new church of St. Saviour, Woodcote-park, was laid on Thursday week. The style is Early Pointed, the exterior walls being of Pennant stone, with Bath stone dressings. At the west end, and springing from the gable, will be a bell turret rising some 80ft. from the ground, with a canopied niche at the apex containing a figure of our Lord as the "Good Shepherd." The interior will consist of nave, north and south aisles, chancel, organ-chamber, elergy and choir vestries on the north side, and on the south side a transept. From wall to wall the width of the nave will be 54ft., and the length from the chancel to the western extremity 93ft., while from the floor to the apex of the roof will be 58ft. The chancel is to be 38ft. long by 25ft. wide and 52ft. high. A contract has been entered into by Mr. Cowlin for the completion of the entire church at £4,839, subject to a deduction of £739 should the funds not be sufficient to allow of the building being completed when the first portion is ready for consecration. The total accommodation provides for 334 sittings. The architect is Mr. John Bevan, of St. Leonard's-chambers, Nicholas-street, Bristol, whose design was selected in a limited competition on the award of the late Benjamin Ferrey, F.S.A., who acted as referee. Mr. Bevan has also just been appointed architect to the Paulton Burial Board for certain works in connection with Holy Trinity Church, Bristol.

CREWE.—A new chapel, which has been built for the Wesleyan Connexion in Earle-street, Crewe, was opened on Wednesday week. The chapel is a brick edifice. Mr. G. B. Ford, of Burslem, is the architect, and Mr. M. Grosvenor, of Tunstall, the builder. The measurement inside is 56ft. by 42ft., and the height from the floor to ceiling is 29ft. There is sitting accommodation for 300 people; there is also a transverse gallery which will give further accommodation to about 150. Behind is the schoolroom, so arranged that, when required, it can be used as an extension of the chapel. The schoolroom has two stories, each measuring 50ft. by 21½ft., and will accommodate nearly 500 scholars.

DALWOOD.—On Wednesday week Dalwood Church, Devon, was reopened for public worship, after having been closed for the four years. The total cost of restoration has been rather under £1,000. The architect has been Mr. Edmund B. Ferrey, of 15, Spring-gardens, London, who has carried out the designs prepared four years since by himself and his late father, Mr. B. Ferrey, F.S.A. The builder has been Mr. Berry, of Honiton, the first contract having been executed by Messrs. Hutchings and Berry. The church, which is of 15th century work, although small and only providing accommodation for about 190 people, is now clean and comfortable. The north wall of the nave, with its piers and arches opening out into the north aisle, has been rebuilt, having been much out of the perpendicular. All the old stone has been reused. A new roof of Portmahoe slates covers the nave and chancel. The west gallery has been pulled down, and the tower-arch opened out. The pews have been replaced by new stained deal open benches, except in the chancel, where there are

handsome English oak seats, with a prayer-desk. The old Jacobean oak pulpit has been cleaned and refixed on a new base of Ham Hill stone, with Pennant steps. The porch has been rebuilt, and a substantial roof put to it. All the windows have been reglazed with cathedral rolled glass in different tints. A vestry has been formed at the east end of the north aisle. The tower has been partially repaired, but owing to want of funds, some work still remains to be done there. The chancel-arches are built with Beer-stone. The walls have been replastered internally, and all the whitewash and yellow ochre cleared from the stonework. The north aisle roof has been substantially repaired.

FENTON.—On Wednesday week the corner-stone of a new mission church at Fenton, to be dedicated to St. Matthew, was laid. The cost of building and site will be nearly £2,500. Messrs. Scrivener and Son, of Hanley, are the architects, and Messrs. H. and R. Inskip, of Longton, the builders. The style is Gothic of a simple character, and the plan of the building is cruciform, with organ-chamber on the north side of chancel, vestry and porch on the south side, and a porch at the west end. The nave, chancel, and transept will be each 27ft. wide, and from east to west the church will have an internal length of 89ft. 6in. and across transepts, from north to south, a width of 70ft. The walls will be of brick throughout, with moulded brick strings and labels to arches, stone being little used, except for the tracery of the large windows and for coping to gables, &c.

HEREFORD.—The foundation-stone of a new water-tower was laid on Broome-hill on Monday week. It is expected to furnish a high-pressure supply of water to the highest floors of houses on Aylestone-hill, and will be carried to a total height of 103ft. The base will be 34ft. by 24ft. across, and will be carried, in masonry from the Three Elms quarry, to a height of 31ft.; above that level, the work will be executed in bricks, from the yard of Messrs. Ralph, Preece, and Co., with Bath stone dressings, and will be 32ft. by 22ft. across. The iron tank will have a capacity of 30,000 gallons, and will be supported on girders; the water will be pumped up by a Shone's injector and air-pump compressor. The contract has been taken at £2,030, by Messrs. Huxson and Warwick, successors to Mr. James Bowers, and the foundations have already been put in. Mr. George Cole, city surveyor, designed the tower.

JESMOND.—The Wesleyan Methodists of West Jesmond on Wednesday laid the memorial-stones of a new chapel and lecture-hall. The committee entrusted with the carrying out of the new works some months back invited a number of London and provincial architects to furnish them with designs. The result of the competition was that they awarded the first premium to the design submitted by Mr. J. J. Lish, of Newcastle. A tower forms part of the design. A form of Gothic architecture has been adopted, and the chapel will consist of a nave, aisles, and transepts. Behind, or to the south of the main buildings, will be three large class-meeting vestries, a ladies' vestry with cloakroom adjoining, a minister's vestry with lavatory, a very spacious "mothers' meeting" vestry, and a tea-preparing room. The organ and choir are to be placed in an apsidal end, forming a continuation of the nave, from which it will be divided by a deeply-recessed arch rising from grouped marble shafts with carved caps. The angles of the apse will be occupied with marble columns carrying moulded-arch ribs springing from Decorated capitals. The ceiling will be coed, and so planned as to throw the whole volume of sound directly into the nave. Galleries will run round three sides of the building, and will be approached by three distinct staircases in convenient positions. Sitting accommodation is arranged in the chapel for between 800 and 900 persons, and in the lecture-hall for 350 persons. Messrs. Lishman and Siltor, Ryton, are the contractors entrusted with the carrying out of the works.

NORWICH.—In contemplation of the intended reopening on Tuesday next, October 4th, after restoration, from the designs of Mr. G. E. Street, R.A., F.R.I.B.A., of the cathedral-like church of St. Peter Mancroft, a special meeting of the committee was held on Tuesday week. A report was presented as to the work done, which as to the general fabric has been carried out by Mr.

G. E. Hawes, builder, of Norwich, under contracts. The windows throughout have been reglazed with cathedral glass in two tints, and the mullions repaired. Two entirely new windows, with tracery matching the rest, have been inserted at the west ends of north and south aisles, and nine windows in south clerestory completed. Two windows north and south of chancel, which were bricked up, have been opened out to their original sills. Seven new panels of stained glass in the east window and the Seaman memorial window are now in course of erection. The large turrets, one on either side of the east front, which were in a most dangerous state, have been taken down and rebuilt, under the clerk of works, on the old lines (Perpendicular in lieu of poor Renaissance). The roofs of nave and aisles were found to be in very bad condition, excepting in the north aisle of chancel. The principal oak timbers were utterly decayed, and cost about £700 more than was anticipated. The outer roofs have now a stout covering of asphalted felt between the oak boarding and the lead, which has been recast and relaid throughout. Twenty-four new stone corbels supporting the aisle-roofs have been carved and fixed. The organ has been removed and re-erected in the south aisle. The two vestries at the east end of church have also been restored, and in the course of the work an ancient piscina was found bricked up. When the old houses are removed from the south-east side of the church, a new stone staircase will be made to these vestries. An important alteration is the substitution of a stone cornice, with parapet and buttress heads, for the old wooden cornice, both on north and south side of the church. As to the tower, the works upon it have been executed under the personal supervision of the clerk of works, Mr. Ireson, who himself employed and paid the men. They include the repair of tower on its north, south, and west sides and its buttresses to the level of upper belfry windows. The modern tracery of the west window has been removed, and a new one of Perpendicular character, 30ft. by 13ft. 9in., inserted; this has been thrown open to the church, the ringers' loft being removed, and a stone screen erected on east side of tower. A letter from Mr. Street, dated from Aix-les-Bains, September 16th, was read, in which he reported that the work had been well and carefully executed, and he thought the results would justify the expenditure. Up to the present time he had been able to discover the original details of every portion renewed, and he had great satisfaction in announcing that at his last visit, he found concealed by a large cistern-head a portion of the original cornice of the tower. This consisted of a fine band of quatrefoils, between moulded stringcourses—not more elaborate than the one which he had contemplated before this discovery. As to the upper buttresses, their condition was very bad; indeed, he had never seen stonework in a worse condition. The committee, after hearing the reports, resolved to proceed with the work upon the tower uninterruptedly to completion, and to make a new appeal for the £3,000 or £4,000 that would be required for that purpose.

PETERSFIELD.—Churchers' College, on the London and Portsmouth highroad, was opened on the 15th inst. It has been erected from the designs of Messrs. G. R. Crickmay and Sons, of London and Weymouth, whose design, under motto "Thoro," was selected in 1877 by Mr. Ewan Christian, the official referee to the governors of the college, from five sets invited. The building is arranged with head-master's house at south-west corner, the kitchen and matron's department at north-west corner, and the school running eastward from between the two. The school-buildings proper comprise a series of rooms on either side of corridor, including dining-hall, library, and committee-room, with schoolroom at eastern end. On the floors above are dormitories, assistant-masters' rooms, and the lavatories and bath-rooms. Accommodation is provided for 50 boarders and 100 day-boys, with facilities for future extensions. The building has hollow walls, and is faced with Godalming Bargate stone, with Box-ground dressings, the roofs being covered with Hols-worthy tiles. The staircase and corridors are fireproof, the windows are sashes opening top and bottom; the floors of chief rooms are laid with solid wood blocks, herring-boned; open fireplaces are provided throughout, and Galton's ventilating grates placed in dining-hall, library,

school, and classrooms. The cost has been about £13,000, exclusive of site of ten acres, which was given.

SALHOUSE.—The restoration of the somewhat singular church of Salhouse is progressing, and the building will be reopened after complete renovation next November. Salhouse is some five miles north of Norwich. Its parish-church, dedicated to All Saints, is a plain old building, consisting on plan of chancel, nave, north aisle, and tower. Nearly all the south wall of the nave has been rebuilt in rubblework as before, the old roof of the tower has been removed and recovered, and the steps leading to the tower repaired. The nave-roof has been stripped of its thatch, and a strong and handsome one of English oak has been erected. This is covered by a layer of reeds to a thickness of about 15in. A south porch has been added—the walls of Trapp flint and the dressings of Ancaster stone. The stone carving has been executed by Mr. Harry Ilemas, of Exeter; the builder is Mr. George Dobson, of Colchester—his general foreman being Mr. George Stow. The works are being carried out from the designs and under the immediate superintendence of Mr. John Oldrid Scott. The estimated cost of the present restoration is £3,500.

SHEFFIELD.—The new Corn Exchange buildings in Sheffield, which cover an area of about 1,500 square yards, and which are now on the eve of completion, were inspected on Monday, by the proprietor, the Duke of Norfolk. The structure is in the Late Pointed or Tudor style of English architecture, the principal façade being 22ft. in length. In the central part of the front is a tower, at the base of which the main entrance to the Exchange has been placed. To right and left of this entrance are offices or shops entering from the street. These are continued along the fronts facing Broad-street and the Canal Warehouse. The length of the building in these directions is 135ft. The thin red bricks used in the walls are of the best description, and the stone facings are from the Bolehill Quarry, Treeton, near Rotherham. Broseley tiles have been utilised for the roofs. In addition to the Corn Exchange hall itself, there are within the extensive premises suites of offices, including those for the Duke's agent, which will occupy the chamber floor of the south and west wings. In the tower to which reference has already been made a fireproof munition-room has been built, wherein will be preserved the deeds and records connected with the Duke's Sheffield estates. Messrs. M. E. Hadfield and Son, the architects, have already entered upon the occupancy of offices over the main entrance. Branching off from the entrances, arcades have been erected in which saleshops have been fitted up, the shops being on a level with the street. The north-west corner of the buildings has been designed for an hotel, to which accommodation for a restaurant is attached. The hotel contains commercial-room, three private sitting-rooms, 32 bedrooms, and all the other apartments necessary in a first-class establishment. The whole of the buildings are cellared, and the total cost of the structure exceeds £60,000.

STAPENHILL.—On Wednesday week was consecrated the newly-erected and enlarged church of St. Peter, Stapenhill. The entire cost is estimated in round figures at £10,500. Messrs. Evans and Jolley, of Eldon Chambers, Nottingham, and Burton, were entrusted with the designs, and the work has been carried out under their superintendence. The style is Late Decorated; it is a plain but substantial structure, the walls being of Derbyshire stone, with dressings of Bath and Ancaster stone. There is a nave, 60ft. long by 32ft. wide; chancel, 30ft. long by 32ft. wide; transepts, 21ft. by 21ft.; and aisles, 60ft. by 17ft. The vestry is against the north transept. There is also a porch leading into the south aisle, and the tower forms an internal porch in the west bay of the south aisle. The tower, which is not yet completed, will reach about 100ft. in height, or 55ft. above the windows, and will be surmounted by a pinnacle 21ft. above the coping of the battlement at each corner. The church contains sittings for about 900 persons.

A new theatre has been built at Darlington on the site of the old building in Northgate. Mr. W. Hodgson, of Darlington, has been the architect. Accommodation is afforded for 2,500 persons.

COMPETITIONS.

AUSTRIAN COMPETITION FOR SEAT-FURNITURE.—The Section for Wood-Industry of the Technological Gewerbe Museum, in Vienna, proposes an international competition, from Dec. 1, 1881, to April 1, 1882, in technical novelties in production of seat-furniture. Applications may be made up to Nov. 1. All objects sent for competition will be exhibited in the museum. Drawings and models are excluded. For reward of meritorious work, the Lower Austrian Gewerbeverein provides ten silver and twenty bronze medals.

NOTTINGHAM.—Some time since, the Corporation of Nottingham, on the recommendation of the health and improvement committees, issued advertisements inviting "architects, surveyors, and others to send in maps, plans, designs, particulars, and estimates for laying out and utilising" an unhealthy area lying between Upper Parliament-street, the Row, and Greyhound-street. Premiums of fifty guineas and twenty-five guineas were offered for the best and second-best designs, such premiated plans to become the property of the town council, and the date for sending in plans was fixed at August 1st. The time was, at a late period, extended by a month, but no award has been made up till the present time, owing to the absence, on holiday, of the consulting engineer to the town council, Mr. M. O. Tarbotton, and in the mean time it has become somewhat doubtful whether any improvement scheme will be carried out. Nine plans have been sent in, and have been exhibited. The mottoes and schemes adopted by the competitors are:—"Just What's Wanted," shows a covered market, 190ft. by 120ft. on the centre of the area. "Sweetness and Light" provides three parallel avenues, the central one 45ft. and the side ones 30ft., between Parliament-street and the Market-place, with cross streets, and estimates the total value of sites at £33,250, of which £25,000 is allowed for the central avenue. "Albany" devotes an unusually large area to streets—4,847 square yards, leaving 7,751 for building allotments; the scheme shows one broad street from Long-row, cutting through smaller cross streets. "Take Aim from the Mark," has planned one main street, from the Market-place, 51ft. wide, the sidewalks being covered in with glass roofs as piazzas; on one side is a cross street, 41ft. wide, and on the other one 40ft. wide. "Maltese Cross" shows the centre of area occupied by an open space, with fountain, surrounded by four blocks of shops with covered arcade surrounding each block. "Hoppus," sends two alternative plans, both dealing with a very much larger area than that condemned, and proposes new and wide thoroughfares, connecting Parliament-street, the Market-place, and Clumber-street. "Prosperity to Nottingham" also deals with a considerably larger area than that originally contemplated, his main proposal being a street between Long-row and Parliament-street, with a crescent-formed link to Market-street and an entrance from the Market-place. "Lux et Aer," designs a T-shaped street, constructed from Long-row, with branches to right and left, and a central block of business premises with a covered arcade. "Cube" proposes to cut two wide streets from the Market-place to Parliament-street, with a suggested guildhall between them. Incidental to the above scheme, but outside the advertised conditions and recommendations of the corporation, Messrs. Parry and Walker, civil engineers, of Newcastle-chambers, Nottingham, have submitted a plan for the formation on the site and adjacent property, of twice its area (in all 10 acres of land), of a central railway station, for the joint use of the Midland and Great Northern Companies. The total cost of the scheme, approaches and connecting lines of railway, is set down at one million. The Midland Company have, however, just expended several thousand pounds on improving their present station.

RICHMOND, SURREY.—The directors of the Richmond Gas Company recently advertised for designs in competition for new offices, &c., and the following extract from the Chairman's speech at the half-yearly meeting of the Company is taken from the *Surrey Comet*:—"They had offered premiums to architects in general for the best plans of the proposed new offices. They thought it was better to do that than to select any one person; and have it said after-

wards that it was a hole-and-corner business. Fifteen competed, and their plans were sent in each with a motto and sealed envelope. He believed he might honestly say the directors had no idea who were the owners of those mottos. They fixed unanimously upon one plan, and when they had opened the envelope marked 'Lux Tenebrarum,' and saw the name of the person to whom it belonged, they were glad to find it was one of their own townsmen, Mr. F. Brewer, who had carried off the palm. It was a very nice plan, and all the details were in accordance with what the directors wished, and he thought it did very great credit indeed to Mr. Brewer. Well, that was the position in which they stood now. They had their plans, and competition for the building would also be invited, and the best man would get it. He did not believe there were two opinions about the plan itself, which was admirable in all its details, and he believed the building, when erected, would be a great advantage to the company as well as an ornament to the town."

ARCHÆOLOGICAL.

DISCOVERY OF A ROMAN MONUMENT.—On Wednesday, Sept. 21st, a remarkable Roman monument was discovered in the porch of Hexham Abbey Church. Mr. Charles C. Hodges, an architect now engaged in bringing out a series of illustrations of the church, and Mr. Robert Robson, the clerk, while excavating in the Sloppe on Monday evening, came upon a large slab a few feet below the surface. On further investigation on Wednesday, a monument 5ft. 6in. long by 3ft. 6in. wide, in a state of excellent preservation, was disclosed, the upper portion containing a figure of a mounted warrior, bearing in one hand the Roman standard, surmounted by an eagle. He appears to have slain a foe in his career, the latter being in a crouching position beneath the horse's fore-legs, and grasps in one hand a sword. Below this is a tablet with the following inscription:—

DIS MANIBVS ELAVNVS
EQ ALAE PETE SIGNIFER
TVR CANDIDI AN XXV
STIP VII HS

From this inscription it would appear that the hero of this monument was a standard-bearer in the Troop Candidi of the body of cavalry known as the Ala Petriana. The whole drawing and carving shows the most spirited handling, and is as fine a specimen of Roman art as is to be found in Northumberland. The stone has been a mural tablet in a cemetery, against the wall of which it probably rested, and on which the present Abbey presumably stands. Part of the base of the stone, just below the inscription, was beneath the foundation of the wall, and has been detached by the pressure from above. Otherwise it is uninjured. It is supposed to be between 1600 and 1700 years old; but the exact date will have to be decided by subsequent information as to the time at which the troop referred to in the inscription was stationed in this neighbourhood. How the same came to be in the position in which it was found must, of course, remain matter of conjecture. One theory is that it was placed in the foundations of some of the Saxon buildings which occupied this site, as its upper surface was covered with mortar, and other stones were placed on the top of it, and many large and rough stones have since been found beneath it—just such as would be placed in the foundation of a thick wall.

The Llantrissant burial board held a special meeting on Thursday week to consider their position with reference to the contractors for the new cemetery at Llantrissant, Messrs. Taylor and Son. At the previous meeting the board heard complaints as to the manner in which the contract was being carried out, the chief being that the drains were being tiled with loose stones of larger gauge than those specified by the architect and surveyor, Mr. Jenkins. As a result the board discharged Mr. John Morgan, clerk of works, summarily and unheard, and since then several members protested against this as unfair. It was now stated that the majority of the stones were of proper gauge, and that large ones are exceptions, and the contractor declined, in consequence of the attitude taken by the board, to stop the drains. The board determined to retaliate by withholding further payments on account, and there is every symptom of the creation of an expensive arbitration case.

"To a practical man with a taste for mechanics, and the bumps of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion.—*The Brightonian*. Price Two pence of all newsmen, or post free 2½d.—31, Tavistock-street, Covent garden, W.C."

TO CORRESPONDENTS.

(We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.)

All letters should be addressed to the EDITOR, 31 TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33s. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—B. and B.—R. G. B.—B. and J.—T. P. L.—J. H. and S.—H. A. Y.—C. B.—G. B. G.—H. T.

"BUILDING NEWS" DESIGNING CLUB.

The reason why the addresses were not given with the mottos in all cases was that the competitors did not send their names and addresses.

Correspondence.

"WAYSIDE NOTES IN THE WEST."

To the Editor of the BUILDING NEWS.

SIR,—I fear your correspondent "M.'s" hope that Gloucester Cathedral may long preserve its centrally placed organ and screen, is doomed to be disappointed. A month since, I spent a few hours in the Cathedral, and, when pumping the verges as to works completed, in progress, and to come, he mentioned that the Dean and Chapter were then consulting with their architects, Messrs. Waller and Son, as to the desirability of abolishing the present organ, removing the solid stone screen, and opening out the vista from east to west. I expressed a desire that the scheme might be rejected, fearing that it would tend to diminish the apparent size of the Cathedral and destroy the effect of mystery, but the verges said: "You may depend on it, the organ will have to come down, for it is not good enough nowadays, and when they put up a better one it will be divided and placed above the stalls on either side." I give the correction for what it may be worth.

While writing, may I ask "M." for chapter and verse of Cathedrals in which the late Sir Gilbert Scott was guilty of removing the organ-screens and organs? I have visited all the cathedrals which he restored, and remember several still retaining these features, although Hereford, Worcester, Lichfield, and Ely, it is true, have now only open metalwork screens.—I am, &c., EAST ANGLIAN.

SIR,—Your correspondent, "M.," in his remarks on Gloucester Cathedral, implies that the

late Sir Gilbert Scott's practice was to remove the solid choir-screens, with their lofts and organs, from the cathedral churches he was called upon to restore. Had "M." visited other cathedrals restored by the same architect, he would have found that Gloucester is not so exceptional in the matter of the screen, and in the position of the organ, as he seems to think it is.

The following churches, which have passed through the same hands, retain their screens, with organs upon them:—Gloucester, Ripon, Manchester, Exeter, Canterbury, Rochester, St. David's, Darlington, &c. In Beverley Minster, a double screen, with wide loft to receive the organ, has been erected.

Although Worcester has a light open screen, the original design was for a double areaded screen of stone and marble, carrying the organ. In the case of Exeter, the architect, wishing to maintain the screen, had to struggle against a strong party clamorous for its removal, the result being a compromise, by which the wall next he returned stalls, forming the eastern side of the screen, was in part cut away, forming large pinnings.—I am, &c., VIATOR.

SIR,—On reading the above in your last week's issue, I was vexed to see the following: "One can never see Chepstow Church without bitter regret at the stupid alterations which, under the name of restoration (hateful word), took place about forty years ago. I think it is a pity architects should be paid for church restoration. Certain it is, that the 5 per cent. system is a bad one. There are few architects but will make work for themselves, under the temptation of this inducement," &c. It is bad enough to hear the members of our unfortunate profession called hard names by "outsiders," but I think such an assertion as this, made by your correspondent "M.," in a leading architectural journal like the BUILDING NEWS, ought not to pass unnoticed, charging as it does all but a "few" architects with being led by such mean and dishonest motives. I hope "M." is not an architect; because if he is, he must have met with the "black sheep" of the profession (which I hope are the "few") to form such a bad opinion of the rest of the flock. Fancy an architect, with any love for his art, sacrificing old work for a paltry 5 per cent. commission on the new! When will there be more *esprit de corps* among architects?—I am, &c., PROVINCIAL.

HOUSE-TOP GARDENS.

SIR,—Any one who travels by the North Kent line must have been struck by the dismal expanse of tile roofs and crooked chimneys—like dogs' hind legs—that distinguishes the district about Bermondsey. We seem to have got into a groove, in the matter of roofs, we cannot escape from—these everlasting tiles—is there no chance of improvement within our reach? Take, for instance, a middle-class house finished to the eave. Let us put a watertight flat on the top of it: over this, throw angle iron or even wooden frames of the usual hip-roof shape; the sides of this, about 8ft. or 10ft. high, I would cover with rolled glass, the semi-transparent kind to be seen in our Lancashire factory windows. Cover the top with tiles, which are here in their right place, to keep the sun's heat out, and we have roofed our house with a winter-garden, wherein "Pater" may smoke his after-business weed, sitting under the shade of his own vine, surrounded by the roses and ferns grown by his own wife and daughters, to the great improvement of the roses on their own cheeks by reason of the semi-outdoor life they lead in the airy roof-room! What a place for an evening-party!—the flowers and vines round the wall forming the prettiest of all backgrounds to the pretty faces; and there will doubtless be many nooks among the greenery wherein a man may spon on his heart's content. Truly, the prospect sounds exceedingly Catholic and wholesome! Now for that flat roof: starting with a groundwork of rolled-iron beams, one end built into the wall, the other resting on a roller, so that expansion cannot bring much strain on the walls. We might lay corrugated-iron sheets on, one edge being riveted to the beam, and the other edge left free to expand over its fellow, so that the expansion in one direction is taken up by the corrugations of the iron, and in the other directions by the slipping of the sheets over one another, fitting up the

corrugations with lin. or so of asphalt and sawdust. We may now lay what floors we will—say, asphalt, with Minton tiles embedded in it round the edge. So we shall attain our wishes, and introduce a perfectly new feature into English town life. Why should it not be done? F. M.

STABLE FLOORS.

SIR,—In your edition of the 23rd inst., page 387, column 2, you write, "Asphalt is slippery, however otherwise suited, and it is *thought* doubtful if its advantage over cement is worth the additional expense."

So much for your theory. Now for facts. The following is from the Earl of Leicester's steward:—

20th May, 1881.

Lord Leicester's coachman, who has been here twelve years, says that he does not wish for any better floor than your asphalt, which was relaid in the stables here in 1855. I remember its being laid in 1843, and again in 1855, and am of the same opinion, that for such stables no better floor can be found; but care should be taken before the floors are laid to arrange so that the stable drains can be examined, and, if necessary, cleared without breaking up the floor, which was overlooked here.

Should this not be convincing, then visit the Duke of Sutherland's stables, St. James's, erected under the late Sir Charles Barry in 1843, and paved with asphalt, as also the coachhouse floors and stable-yard. I have had many occasions to seek permission to inspect the work with gentlemen contemplating the use of the material, and the result has always been the adoption of it.—I am, &c., J. FARRELL, Sec.

Claridge's Asphalt Co., Sept. 26, 1881.

HOUSE-DRAINAGE, AND SEWER AND GULLY VENTILATION.

SIR,—I was pleased to observe in your valuable paper of the 16th inst., the important letter of Mr. W. P. Buchan on this subject, whose views are sustained by reference to that eminent authority, Mr. Rawlinson, C.E.

Having used Messrs. Beard and Dent's siphon sink-trap with plug, I can speak as to its effectiveness. The plug being under the sink, the grating can be soldered down, thus effectually excluding flannel, spoons, forks and other articles which frequently find their way into the sink, and where there is a movable grating often pass into the drain.

The cleanliness and other advantages mentioned by Mr. Buchan, resulting from the discharge of waste water into the outer gully-trap under the grating, instead of over, cannot be disputed, and should any foul air be generated in the discharge-pipe, the siphon, and the absence of pressure would exclude it from the house.

Your correspondent, "C. F. M.," calls attention to untrapped gully-holes, the serious evils resulting therefrom, and the importance of providing for the ventilation of the sewers. It is impossible to over-estimate the importance of this subject. Many fivers might no doubt be traced to noxious vapours emanating from street-gullies, intensified in many cases by the trapping of house-drains in compliance with the by-laws of local authorities, without that extra provision for the ventilation of sewers, which thereby becomes necessary. I should, like, Sir, with your permission, to invite an expression of opinion as to the practicability and economy of trapping and ventilating street sewers in some such manner as the following—viz.: By trapping with siphon and manhole each end of every street, and ventilating the intermediate spaces with charcoal deodorisers, or otherwise, which would prevent the excessive accumulation of sewer-gas in any one place. This arrangement, it appears to me, would allow of the disuse of many costly sanitary appliances, and diminish liability to disease. I think it would confer a boon on the public if Mr. Buchan and other scientific gentlemen would kindly express their views on this subject, and thus supply information which would be valuable in the compilation of sanitary by-laws.—I am, &c., S. T. G.

Richmond, S. W., Sept. 22.

DAVIES' O-TRAP.

SIR,—On reading Mr. Davies' letter, on page 409, I referred to mine upon page 375, and found a printer's error. The size of the pipe

between the valve and the seal of the trap was 1½ in., and not 1 in. as you have in error stated.

In reply to Mr. Davies' other points, I will only say that I am carrying out my experiments with full-size traps, in the fullest and most careful manner, and shall be prepared, when the proper time comes, to prove all that I have advanced, or may advance, for which purpose I shall be very pleased to meet Mr. Davies at any public meeting of plumbers and practical judges in London; and if agreeable and convenient to Mr. D., I will meet him beforehand, so that we may agree as to our traps and programme, and thus avoid the possibility of any dispute at the meeting. By this means we should be able to come at this matter nearer than we are likely to do by letters.—I am, &c., DANIEL EMPTAGE, S.E.

Dane-hill Sanitary Works,

Margate, Sept. 24.

CHIPS.

The dock extension at Penarth, Glamorganshire, was commenced last week. Mr. H. O. Fisher has been appointed resident engineer, and Mr. Walker, who is just completing the extensive new docks at Swansea, is the contractor.

Extensive works of sewerage are about to be carried out for the Leyton local board in the districts of South Leyton and Temple Mills. Messrs. Bailey Denton, Son, and North, in conjunction with Mr. C. F. Gower, are the engineers.

Plans prepared by Mr. Henry Stone, of St. John-street, Bedford-row, London, W.C., have been accepted for the completion of All Saints' Church, Walton-on-the-Naze, and the work will be commenced shortly.

A stained-glass window has been placed in the north side of nave of Saddleworth parish church, near Huddersfield, as a memorial to the late vicar. The subject is Christ Disputing with the Doctors in the Temple. The work has been carried out by Messrs. Lawton and Broadbent, of Upper-mill.

At Darlington on Monday night the theatre in Northgate was opened, after having been rebuilt on an enlarged scale from the plans of Mr. W. Hodgson, architect, of that town. It now accommodates 2,500 persons.

The town council of Aberystwyth last week raised the salary of the borough surveyor, Mr. Rees Jones, by £20. At the same meeting it was reported that the new works of water supply in course of construction under Mr. Stooke, C.E., would be virtually completed by the second week in October.

The county magistrates of Dorsetshire have adopted plans prepared by the county surveyor, for the reconstruction of the Backwater-bridge at Weybridge, a wooden structure about 666ft. in length.

The new church of St. John, Lescudjack, Penzance, is to be consecrated by the Bishop of Truro, on Tuesday next.

At a public meeting held in Ipswich on Thursday week it was decided to take steps for forming a limited liability company for the purpose of establishing public baths at the foot of Fonnereau-road, St. Margaret's. The proposal by the promoters, to aim at a capital of £2,000 only, was smartly criticised, it being suggested that this would be insufficient to provide baths of adequate size.

A new Baptist chapel was opened at Yarningdale Common, Henley in Arden, on Tuesday week. It was designed and erected by Mr. John Smallwood, of Wootton Waven.

A new organ, double manual, with 600 pipes, was opened at Bourton-on-the-Water Church on the 21st inst. It was built by Mr. C. Martin, of Oxford.

The Unitarian chapel at Swansea was reopened yesterday (Thursday) after internal reconstruction, repewing, and decoration. The general works were executed under contract by Messrs. Thomas Watkins and Jenkins, the pew alterations by Mr. John Davies, and the refurnishing by Messrs. B. Evans and Co., all under the supervision of Mr. Holt Huxham.

A loan exhibition of fine art is about to be held in the castle-hall, Taunton.

The town council of Guildford received on Tuesday week a report from the sewerage committee, who recommended, after visiting several towns, that a system similar to that used at Twickenham and Aldershot should be adopted. It was resolved to call in a consulting engineer to advise the authority, the choice to be deferred till the next meeting.

The Sanitary board of guardians have adopted plans by Mr. Musgrave, architect, of Hull, for the extension and improvement of the workhouse.

Intercommunication.

QUESTIONS.

[6679].—The White House.—Why is this well-known building at Washington so-called? When was it built, and by whom? Is it of marble?—SCOLLER.

[6680].—Painting Vinery.—Will any of your readers kindly answer me the following:—What is it worth per yard to paint a vinery four coats plain colour, the work measured inside and out? Length of vinery, 36ft.; width, 17ft.; length of rafters, 21ft. The roof consists of eight bays of glass, the front and ends being in the same proportion. Is it usual to deduct one-third the measurement for glass when the full price is charged?—A SUBSCRIBER.

[6681].—Beer Stone.—In your report for the current week (Sept. 16) is an account of a visit paid by West of England architects and other gentlemen to the celebrated quarries at Beer. Amongst the names of those present is that of Mr. Harry Hems, of Exeter. Mr. Hems is well known to us all as a thoroughly practical man, and an instructive and prolific writer upon many subjects. Will he kindly say whether he thinks Beer stone a good workable material, and if it has really been as largely used in ancient churchwork as those interested in it assert it to have been? If so, when and why did it fall into disuse?—ENQUIRER.

[6682].—Printed Reports in Competitions.—A few months ago I was asked to furnish a set of plans in competition for a new church, and in the conditions to architects it was stated that along with their plans they should furnish a specification describing their design, and the kind and quality of the material to be used in its construction, for the purpose, I suppose, of enabling the committee to come to a proper decision. Along with my plans I sent several printed copies of my report for distribution amongst the committee, and addressed them to the convenor as instructed, but the distribution of which was objected to, because it was considered an unjust procedure on my part sending printed copies of my report when the other competitors had forwarded only written reports (one each), and therefore they considered that I would have an advantage over the others. My main reasons for printing my report were to enable each member of the committee to study and fully understand my plans for himself, and, secondly, the competitive plans being sent in under a motto, I hold that a written report is a means of disclosing the author of certain plans by their writing, and therefore to avoid this mine was printed, and I have yet to learn that information given in a printed form to each member of committee is acting less in the spirit of the conditions than a merely written communication. Would any reader say, through your columns if my procedure has been unjust, or has been such as should be avoided in future? Because, if it is so, as in the opinion of the committee it seems to be, the result is that the less information one can give to a building committee in submitting plans the better!—ENQUIRER.

[6683].—Cost of Caissons.—I notice in your last issue you give the size of one of the largest caissons in the world. Can any of your readers kindly tell me the cost of same, and also the approximate cost of a caisson 66ft. long 25ft. high, with a breadth of 15ft.?—A. J. S.

[6684].—Figures of Saints, &c.—Can any of your correspondents kindly inform me of any illustrated work in outline, of the Apostles, Saints, &c., of the English calendar, with their emblems, suitable for reference for an architect?—M. F.

[6685].—Variation of Compass.—What is the present variation of the compass in Kent?—P. PLAYFAIR.

[6686].—Hedges.—Is there any rule as to which property hedges and fences belong? In West of England the south and west hedges seem to be included in the property measured.—P. PLAYFAIR.

[6687].—Chimney Shafts.—Are there any regulations as to the construction of chimney shafts for factory purposes, published by the Metropolitan Board of Works or other authority except what is stated in clause 10, sec. XX., cap. 122 of 18 and 19 Viet.? There must surely be some orders about heights and the thicknesses of independent shafts.—P. PLAYFAIR.

[6688].—Durham Cathedral.—Montalembert speaks of the Cathedral church of Durham as being one of the seven rival churches of Christendom. Can any reader of BUILDING NEWS give me the names of the other six?—DUNELM.

[6689].—Washable Distemper.—Will any reader give me some information respecting washable distemper? What ingredients are used, and what are their respective quantities?—ANGLICANUS.

[6690].—Institution of Surveyors Exams.—When are these held? Is it compulsory to pass preliminary before final? After passing final, does the candidate become a member of the institution? Any further information will oblige.—W. H.

[6691].—Deductions in Brickwork.—Will some correspondent kindly say what is the usual custom, especially in the Northern counties, as to deductions in brickwork where stone dressings occur? Of course ordinary sills or heads would not be deducted, but in the case of quoins having copings, &c., I contend that the stone ought not to be measured in with brickwork, in order, as a builder alleges, "to allow for mortar" which he finds for mason.—YOUNG SURVEYOR.

REPLIES.

[6619].—Roof.—I would like to support the answer to this question given last week by "G. H. G.," it appears to be on the whole very correct, and the only part I can find any real fault with is in supposing the slightest possibility of the thrust of such a roof on the walls being "nil." I do not believe "G. H. G." means this to be understood, as he considers there should be at least thick walls with buttresses. A more scientific roof would be to do away with the cross braces and substitute a collar, lengthen the wall struts to join the principals, keeping,

however, the joints therewith below the joints of collar and principals. I would also add two small braces between the feet of principals and the wall struts, to prevent the latter breaking so readily by bending; these braces serve the same purpose as herring-bone strutting between floor joists when the span requires it. This roof would be much cheaper than the one proposed by Dennis, besides being much stronger; the walls also require less thickness. "Dennis" is moreover I think wrong in supposing the truss to be only loaded with 34 tons; it would have been better had he given the distance between the centres of two trusses supposing them to be equally spaced. He should allow for 52lb. load per sq. foot on the truss, 40lb. thereof to be allowed for wind pressure and the remainder for weight of roofing material. I had intended to give more information but have not found time; next week I may possibly do so.—HUGH McLAUGHLIN.

[6650].—**Ventilation of Soil-pipe.**—The reply of William H. Butler, on p. 142, ought not to be allowed to pass without correction. He says that for ventilating soil pipes, and he seems to also include drains, he had "used all the corks in the market, and for the above purpose considers them useless." Now, I doubt his statement as to using all the corks in the market. Will he tell me, e.g., the size and number of the one of my mixed 1 C. ones he used, and where he got it? Further, if he considers a good cork "useless," I, in a large and varied practice, have not only found it useful, but even necessary in many cases—*inter alia* at a job for the Clyde Trust at Dalmar, in 1879, where the ventilating pipe of the soil pipe was carried up outside the wall, and several feet above the gutter, the inlet air opening if the drain trap proved a nuisance to the manager whose house it was at, owing to the foul air coming out at the ground level instead of above the roof, but so soon as the soil pipe was capped with an 1 C. fixed ventilator the complaint ceased, and eight months after it was certified by the engineer that everything was working satisfactorily, and it has done so for two and a half years. Take off the cork, however, and complaints would soon be made. I could mention other cases, and can easily give the practical and scientific explanation of how and why the addition of the cork improves matters.—W. P. BECHAN.

[6651].—**Ventilation of Soil-pipe.**—As well as doing what your correspondents suggest, "T. P. F." ought to carry the ventilating pipe above the ridge of roof. If the pipe is only carried a few feet above the gutter, it would, when the wind is in a certain quarter, act as an inlet, not an outlet. Let me advise "T. P. F." by all means to do away with the pan closet. This is undoubtedly the primary cause of the smell he complains of.—C. F. M.

[6652].—**Wood Block Flooring.**—Another way of laying these floors is to press the wood blocks down on hot asphalt. The blocks are splayed so as to be narrower at the bottom than at top. By this means only a thin asphalt joint shows. A floor of this sort has been done with oak at a cost of ten pence per square foot, but the pieces of wood were only one inch thick, in other respects about the same size as "Provincial" used.—C. F. M.

[6653 and 6656].—**Dimensions of School.**—"Alpha" can obtain the rules of the Committee of the Council on Education by writing to the Education Department at Whitehall, London, S.W. I do not know if stamps should be sent, but they are given free on personal application. National schools have generally been made from 16 to 20ft. wide. This width is in accordance with the named rules. Board-schools in many cases had been made wider, even as much so as to have a total width of 30ft. In National schools there are seldom more than three rows of benches and desks, but now in Board-schools four rows are more often used, six rows having been used in a few cases. There should be a width from 10 to 12ft. between the front row of desks and the wall for teaching and supervision, the teacher's desk is included in this space. The distance between the back of one desk and the next to it is given by the Council of Education as 2ft. 5in., and in galleries for infants 1ft. 6in.; 15in. should be allowed between one group of desks and that next to it, to allow of passage-way between. It is best to seat children only two to a desk that one may always move out of his place without disturbing any other children, this naturally requires more space, and is consequently more expensive, it has been done in a few of the schools for the London and some of the Provincial School Boards. "T. J. C." will therefore see that it is not advisable to give the lineal dimensions for 250 boys as it will vary with the number of rows of desks and also with the number seated at each desk; this should never be more than six and a larger number than four is not advisable. Desks are usually on the same level, infants are generally taught seated on low galleries, and desks then seldom provided. Windows are generally placed 4 to 5ft. above the floor.—HUGH McLAUGHLIN.

[6655].—**Museum Roof.**—Use a wrought iron arched principal with purlins of same material and then from that skeleton, frame your windows, &c. A good example is to be found in the new Corn Exchange, Mark-lane, London, in this the thrust of the main arches is counteracted by half truss or arches in the manner of Continental Romanesque vaulting. I believe the roofs of the galleries to the new Natural History Museum at Kensington, the Westminster Aquarium, and other similar buildings have roofs of arched construction. See drawings of Southport Winter Garden, illustrated in the Building News, Dec. 24, 1879.—HUGH McLAUGHLIN.

[6656].—**Plasterers' Work.**—In addition to information from Mr. B. H. last week, number the angles and keep external and internal separate. Angles have generally to be finished by hand after the cornice is run; internal angles have to be left to get out the moulds, external angles only require the mitring to be made good.—HUGH McLAUGHLIN.

[6657].—**Road Material.**—Allow 1½ yards of hard core and 20 cubic feet of blast-purified foot. A load and a cubic yard are each considered as having 27 cubic feet.—HUGH McLAUGHLIN.

[6658].—**Disinfecting Stoves.**—"H." only partly answered this last week. If "H." had visited the recent Medical and Sanitary Exhibition he would have seen several stoves, &c., for disinfecting. There are two sys-

tems the merits and demerits of which are much debated, these are hot-air and steam. The advocates of the former hold that the required pressure of steam cannot be raised, or if raised sustained, and that hot air does not destroy the linen or clothing as alleged. The advocates of steam directly contradict the former. Messrs. Benham and Sons, of Wigmore-street, supply both systems; Messrs. W. J. Fraser and Co., of Commercial-road, hot air, and Washington & Lyon's apparatus is also steam. These are all patented. The best plan is to go to some first-class heating engineer and trust to him.—HUGH McLAUGHLIN.

[6659].—**Religious Houses of the Middle Ages.**—"Inquirer" will find much information on the history of religious houses in England, with special reference to Cleeve Abbey and others in the South-west, in a little work by Mr. John Reynolds, member of council, and hon. assistant congress secretary of the British Archaeological Association, of Manor House, Redlands, Bristol. The title of the tractate is "Some Notes on English Monasticism," and the publisher S. Cox, Free Press, Williton. The price is probably 6d., or at most 1s. In a dozen concise pages Mr. Reynolds summarises what is known of the introduction of the religious orders and fraternities into England—their rise, growth, principal houses, decline, and suppression.—EAST ANGLIAN.

[6660].—**Rights of Light.**—If A. has enjoyed his lights for 20 years, B. cannot obstruct them. Twenty years' enjoyment of windows gives a right, and no one can in any way interfere with that light. But if they have been stopped up, that right is lost. If the property belonging to A. is a malthouse or manufactory, and B. partially obstructs his light, and the light admitted is still sufficient for the original purpose, an action cannot be maintained.—J. F. BELL, Bolton.

[6661].—**Interior Perspective.**—"A. B." cannot command a "full-length" view of his church from any position within its interior, as the range of distinct vision is contained in an imaginary cone, having an apex of about 60°, and if his picture extends far beyond this limit it will appear distorted and unsatisfactory. I would advise him to determine his station-point somewhere near the centre of the west end, and confine his picture to the above limits.—W. B.

[6662].—**Water Colour Painting.**—"If Art" has only limited means at his disposal, he could do no better than procure the water-colour subjects in Vere Foster's series, price 6d. each. I may also mention the series of lessons in neutral tint, sepia, and water-colour painting by R. P. Leitch, price 4s. 2d. each. If, however, "Art" requires more expensive and ambitious works, I refer him to Barnard's "Theory and Practice of Water-Colour Painting." There is also another work by Aaron Penley, entitled "The English School of Water-Colour Painting." The former is 17s. 6d., and the latter 12s. 6d. I advise "Art" to obtain the cheaper editions above referred to, as they are more suitable for a beginner. It is not the books that make a clever water-colour artist, but a keen observer of nature and effect, combined with a natural talent, and plenty of practice. A few practical lessons in mixing colours will save him a deal of time and trouble.—J. F. BELL, Bolton.

[6663].—**Mounting Lecture Illustrations.**—Of the three different kinds of paper "East Anglian" mentions in his query last week, cartridge paper is in my opinion the most suitable. Fasten the photographs to the paper with starch. When you wish to remove them lay the paper in cold water for an hour or so; afterwards they will float off uninjured. I successfully removed some this way a short time ago.—FRED. J. FREEMAN.

[6664].—**Schoolrooms.**—The width of schoolroom would be determined according to the number of scholars it would have to accommodate. Thus a full sized schoolroom to accommodate 250 boys should be at least 55ft. by 35ft. with ample means for ventilation and an open-timbered roof is to be preferred. The desks are best on same level, except for infants, when a gallery is more suitable. It is best to light the schoolroom on one side only, leaving the other free for maps, charts, &c., the blink wall generally dividing school from playground, and having master's desk and several presses fixed to it. The windows would not affect the teacher's eyes if not placed too close together, and having windows at each end of school is practicable. The height from floor to sill of window would be governed by the length of window and height of schoolroom from floor to wall-plate or ceiling; 3ft. 6in. or 4ft. would be enough. For size of desks, see "G. H. G.'s" reply to "Alpha" in last week's B.N.—J. F. BELL, Bolton.

A new church is to be erected near Brighton College, in the district of St. Matthew's, Kemp-ton, Brighton. The committee met at Brighton last Saturday, and decided to commence the new church forthwith, and to accept the tender of Messrs. Chappell, of Lupus-street, Pimlico, for about £10,470. The new church, to be erected from the designs of Mr. John Norton, of Old Bond-street, will accommodate 1,200 people. The plan comprises a nave and chancel, 100ft. long by 36ft. in width, and 27ft. in height; north and south aisles, organ-chamber and vestry south of chancel, and children's chapel on the north. The tower, forming an entrance-porch, stands on the south-western angle, and will be surmounted by a spire 250ft. in height, the walls faced externally with split flint and internally with Burgess-hill bricks, and the stonework without from quarries in Somersetshire.

On the advice of Dr. B. W. Richardson, the executive committee have decided to hold a health congress in connection with the projected sanitary and scientific exhibition at Brighton in December next. The Pavilion committee resolved on Monday to recommend the town council to grant the promoters the free use of the whole of the Pavilion buildings, including the Dome and the Corn Exchange, for a week.

LEGAL INTELLIGENCE.

HULL AND BARNESLEY RAILWAY ARBITRATION.—On Wednesday a Court of Arbitration sat at the Station Hotel, Hull, to assess the value of land owned by Messrs. John and William Harland at Willerby, which the Hull and Barnsley Railway Company had acquired by compulsory purchase in the construction of their line.—Mr. W. J. Beadle, Board of Trade surveyor, officiated as umpire, and sitting with him were Mr. M. Samuelson, C.E., acting as arbitrator for the claimants; and Mr. F. S. Brodbeck, acting in a similar capacity for the Hull and Barnsley Railway Company. Mr. Shaw, Q.C., Mr. Cyril Dodd, instructed by Mr. Birks (Stamp, Jackson, and Birks, solicitors), appeared for Messrs. Harland, and Mr. Balfour Brown, and Mr. Leadam instructed by Mr. Lowe (Lowe, Moss, and Moss, solicitors) represented the company. The land in question is owned both by Messrs. John and William Harland, separate claims being made on behalf of each. It was decided to take the claim Mr. John Harland first. The land affected, which measures 70,595 yards, is situate below the new railway embankment at the entrance to the village of Willerby. The company had run in a diagonal direction through the plot, of which they had taken 7,797 yards. It was contended by counsel for the claimants that this particular land was building-land, and that in going through it in the direction they had, and by constructing an embankment adjoining, the company had made it totally ineligible for building-purposes but had reduced it to land that was barely worth 6d. per yard. £1,364 9s. 6d. was claimed for 7,797 yards taken by the company; £3,691 10s. claimed for damage done to 24,610 yards at 3s.; £1,700 for damage to 17,000 yards at 2s.; and £1,589 2s. for damage to 21,188 yards at 1s. 6d.; making a total of £8,543 1s. 6d., or £1,172 10s. 9d. for each claimant.—Mr. W. H. Wellsted, C.E., Mr. Charles Johnson, auctioneer and valuer; Ald. Woodhouse, Ald. Dowsing, Mr. Samuel Musgrave, architect; and Mr. Joseph Beaumont, architect, Beverley, were each called in support of the claimant's case, which was concluded just previous to the adjournment for luncheon.—Mr. Balfour Brown opened the case on behalf of the company. He contended that the land in question was not and never had been building-land, but simply high-class accommodation land. He denied that such a large amount of damage had been sustained as alleged, and remarked that the whole of the claim was exorbitant. He called Mr. Digby Cayley, land agent, York, and Mr. John Coleman, agent to Lord Wenlock. Both these witnesses assessed the value of the land acquired by the company, and damage done to the remainder not purchased by cutting through it diagonally, and by erecting an embankment adjoining at a total of £665 0s. 11½d. They also said they considered the land was agricultural, and not building-land, nor was it likely to be within the next generation.—The company had other witnesses to call, but at this stage the inquiry was adjourned until the 4th November at the Surveyors' Institution, 12, Great George-street, Westminster.

STATUES, MEMORIALS, &c.

PROPOSED MEMORIAL TO DEAN STANLEY.—We hear that it is the intention of Dean Stanley's successor to take an early opportunity of calling a meeting to consider the best mode of raising within the walls of Westminster Abbey a monument to his lamented predecessor. A proposal which has already received influential sanction, as both appropriate in itself and likely to receive wide and general support, is that of an altar-tomb, with recumbent statue, to be placed in the Chapel of Henry VII., in the immediate vicinity of the grave in which the remains of the late Dean were so recently laid by the side of those of Lady Augusta Stanley.

LORD BYRON.—The Greek Government has at length undertaken the erection of a monument to Lord Byron, and has fixed upon Missolonghi as its site. The competition will probably be confined to national artists, though it is hinted by some that even this restriction may not prevent a repetition of the misunderstandings which have arisen concerning Mr. Bell's statue of Lord Byron which is now in Hyde Park, but which, it is said, runs a fair chance of being removed to some other less prominent site.

ST. ANNE'S-ON-SEA.—A reredos was unveiled on Sunday week in St. Anne's-on-Sea parish-church. It has been erected at a cost of £300, as a memorial to the late Mr. T. H. Clifton. It is built of Caen stone, and extends across the chancel, the design being a mingling of 13th and 15th centuries work. The central panel is occupied by a figure of the Good Shepherd, with sheep and lambs pressing towards Him; to the right is St. Peter kneeling before Christ, and to the left the Miraculous Draught of Fishes. The outer panels are a sheaf of wheat and a vine. Mr. Freeman, of Bolton and St. Anne's-on-Sea, designed the reredos, which has been carved by Mr. Earp, of Manchester.

STAINED GLASS.

NEWBURY.—The new window in the parish church, which has been provided from the funds of the St. Nicholas Stained-glass Window Society, has been filled in the south aisle of the parish church, by Messrs. Hardman and Co., of Birmingham. It consists of four lights and tracery. The glass has been treated in the Perpendicular style, to harmonise with the stonework in which it is set. The subjects chosen for illustration are taken from the Parables of our Lord. The tracery is filled partly with foliage on a coloured ground and partly by angels in white and gold, also on coloured ground, but with canopies and bases treated in the same way as that of the lights below.

KIDDERMINSTER.—A stained-glass window has been placed in the north transept of St. John's Church. It is a three-light window, and represents scenes in the life of Daniel, the Prophet. The design is one of the last century, and the base and canopy of each are surrounded by a border of ruby and pearly white. The window has been supplied by Mr. John Davies, Wyle Cop, Shrewsbury.

DEWSBURY.—**METCALF MEMORIAL.**—The large window in the south transept of St. Mark's Church has just been filled with stained-glass "in loving memory of the late Williamson Metcalfe, of Elmwood House, &c." There are four chief openings in the window. Each is divided into two compartments by bordures and panels of rich ornament, thus allowing the introduction of eight painted groups. In the upper range the subjects are—"Recovery of the Lost Sheep," "Prodigal Herding Swine," "Prodigal's Return," and "Recovery of the Lost Piece of Silver." Beneath are "Christ Raising the Daughter of Jairus," "The Wise and Foolish Virgins," and "The Raising of Lazarus." These are richly coloured, on a diapered ruby background very full in tone of colour. The intervening and inframing spaces of ornament are kept chiefly in white and dull blue, with here and there a little golden stain, so that each subject composition stands prominently forward, distinct in its own artistic integrity. The tracery-lights are rich in foliated ornament in white and light greens, worked on blue and ruby. The widow is the donor of the window, and Messrs. Powell Bros., Leeds, are the artists.

WATER SUPPLY AND SANITARY MATTERS.

MILTON WATERWORKS.—The works for the water supply of Milton-next-Sittingbourne have been completed, and were formally opened on the 27th inst. They have been carried out by Mr. Henry Robinson, C.E., of Westminster; the contractor being Mr. George Torkington.

PAISLEY.—A reservoir, for the supply of Paisley, which has been for two years in course of construction at Glenburn, near the summit of Gleniffer Braes, was formally brought into use on Monday. The embankment is half a mile long and 3ft. wide at top. It will afford three weeks' additional storage accommodation for the present population of the water-supply district, and has been constructed by Mr. Peter Quin, of Glasgow, whose contract was taken at £19,679. Messrs. J. and A. Leslie, of Edinburgh, were the engineers in chief, and Mr. Robert Sharp, the local master of works. The Paisley water commissioners have recently obtained Parliamentary powers to execute the Rye scheme, which is estimated to cost £100,000, and the first third of this sum will be expended within the ensuing year. The Glenburn reservoir just opened, together with the three previously existing reservoirs, affords a total storage for six months' supply.

CHIPS.

It is proposed to construct at once an experimental section, two miles in length, between Strete-gate and Torcross, of the intended South Hama Railway, which will ultimately be run from Laira-bridge, Plymouth, to Modbury, Kingsbridge, and Dartmouth, a length, with branches to Salcombe and Bigbury, of fifty miles. Mr. R. P. Brereton is the engineer, and Messrs. S. Lake and Son, who are now constructing the Milford Docks, the contractors.

New schools for 1,000 children are about to be built in Whitchurch-road, Crwys, for the Cardiff School-board. Mr. George E. Robinson, of Church-street, Cardiff, is the architect.

Mr. Ewan Christian is the architect of a convalescent home about to be built at Folkestone.

The new Public-hall at Devonport, erected from the designs of Mr. Samuel Knight, of London, is to be opened on the 9th November.

New offices are being built in Grosvenor-square, Manchester, for the Chorlton-cum-Medlock board of guardians. The architects are Messrs. Mangnall and Littlewoods, of Manchester.

Our Office Table.

THE sudden death is recorded of Mr. John Fraser, C.E., who for many years filled the position of engineer to the Great Northern Railway Company, on Saturday night last, at his residence, Grove House, Headingley. The deceased gentleman was 64 years of age. Mr. Fraser was the son of the late Mr. James Fraser, architect, Manchester, and was well known in local circles and also in other parts of the country by his connection with the Great Northern Railway. Mr. Fraser, who was the brother of Mr. J. B. Fraser, architect to the same railway company, has, during the last few years, assisted in the construction of several railways for that company. Amongst these may be mentioned the Bradford, Halifax, and Thornton line; the Castleford and Garforth line; the Bramley, Stanningley, and Pudsey line; several lines in Leicestershire near Melton, and including the Waltham branch; and the continuation of the Thornton line to Keighley, about half of which has now been finished.

THE extensive works which were contemplated for the permanent repair of Over-bridge, Gloucestershire, have, at any rate for the present, been abandoned on account of an unexpected difficulty. About fifteen months ago, Mr. Baker, C.E., was consulted as to the condition of this bridge, and reported that it was in a very critical state, pronouncing the opinion that theoretically the structure was a ruin. The eastern or Gloucester abutment had subsided, causing a thrust of the arch in that direction, resulting in fissures in the masonry. Mr. Baker could hold out no hope that the cracks and settlements would end unless the abutments were held up against the thrust of the arch by two brick struts, bedded firmly against heavy blocks of ironstone and concrete, built 120ft. back from the abutment, and he also advised the underpinning of the wing walls. The county magistrates accordingly entered a few months since into a contract for the execution of the works recommended by Mr. Baker. The preliminary examination of the abutment revealed the fact that it was 8ft. wider than it was stated to be in the drawings and records which Telford had left respecting the bridge. The wing walls were found to rest on a river deposit, but 3½ft. lower a fairly compact stratum was reached, on which thick beds of concrete were laid, underpinning the walls. A shaft was then sunk for the purpose of constructing one of the blocks of brickwork against which a strut was to be bedded, when a spring was tapped yielding a supply of 2,000 gallons per hour. The shaft, which was within 11ft. of the full depth, rapidly filled, and both Mr. Baker and the county surveyor declined to take the responsibility of pumping it out, lest the foundation of the abutment should be endangered, and the contract is accordingly stopped. At the same time there is less concern as to the stability of the bridge, partly because the abutment is so much wider and stronger than it was supposed to be, and partly because the wing walls have been securely underpinned. The cost already incurred has been under £1,000, less than one-fourth the total estimate.

THE docks which are being constructed near the entrance to Milford Haven, for the accommodation of American lines of fast steamships, have been inspected by representatives of the Dock Board. The masonry entrance of the graving dock and of the lock are among the greatest works of the kind in the kingdom, the whole of them being founded upon the solid rock, which, owing to the natural dip of the strata, is, in places, as much as 70ft. deep from the dock coping. The execution of such work in tidal water has been a stupendous operation, extending over a long period. The whole of this deep-water tidal work is, however, now complete, and the immense iron caisson, 100ft. long, is now in its place; the water is thus excluded from the dock area, and the remainder of the work will, therefore, be executed in the dry. This will enable an increased number of men to be employed, and to work continuously without tidal interruption. The size of the principal graving dock may be inferred from the fact that it has been executed around the Great Eastern, which was floated from it a few weeks ago.

A PARIS correspondent of the *St. James's*

Gazette writes:—It has been found necessary to remove the pinnacles from the tower of the chapel at Vincennes; and as they are very good specimens of the architecture of the 15th century, they have been removed to the grounds of the Cluny Museum, and will be carefully preserved. The Vincennes chapel, built by Francois I. and Henri II., is situated near the keep of the castle; and the stained-glass windows, painted by Jean Cousin, after drawings by Raphael, are considered to be the finest in Europe. The chapel was restored in 1840, and in one of the transepts is the tomb of the Duc d'Enghien, executed by Desorme. The murdered Prince is represented leaning upon Religion, and supported by Innocence, with his eyes raised heavenwards, and his right hand indicating the spot where he wishes to be struck; while Crime, as represented by a man with a dagger, rushes forward against him. Upon the other side of the main group, France, in the attitude of a grief-stricken woman held captive, holds a broken sceptre in one hand and strains to come to the relief of the Prince. The chapel also possesses the font which was for a long time used at the baptism of children of the French Royal family, and which was taken to Fontainebleau for the baptism of Louis XIII. This font, which is said to be nearly a thousand years old, is made of red copper; but it is so covered with embossed silver plates, representing various personages of note who have had to do with the Royal baptisms, that one can scarcely see the copper.

SOME interesting experiments were made on Friday last at the well-known glassworks of Messrs. Chance Brothers and Company, Smethwick, near Birmingham, with a new lamp, which they have just constructed to crown the summit of the South Head Lighthouse, Macquarie Harbour, Sydney, New South Wales. It is called a first order, dioptric, revolving light, with the electric arc. The lamp has a special arrangement of prisms for securing vertical divergence of the beam. It is over 6ft. in diameter, and the height is about 9ft., and it is said to be the first time such dimensions have been applied to illumination by the electric arc. The lamp or regulator has a power of about 12,000 candles in the focus of light, and the merging beam has a luminous intensity exceeding 12,000,000 candles. The light will give flashes around half the horizon at intervals of a minute, and will make a complete revolution every 16 minutes. On an average the light will be visible at a distance of 40 or 50 miles. The lamp was designed for Messrs. Chance by Dr. Hopkinson, F.R.S., and is constructed for the Government of New South Wales. Its makers claim that it will be the largest and most powerful light in the world. The experiments were thoroughly successful, the light being so intense that it could hardly be endured with the naked eye.

A RETURN has been issued in the form of a Blue-book, in pursuance of an order of the House of Commons, "of an abstract of the accounts furnished by building societies incorporated to the 31st of December, 1880, under the Building Societies Acts, in pursuance of the Act 37 and 38 Vict., c. 42, s. 40." The total number of the societies in England and Wales is 1,267. Of these 23 had been dissolved and 21 were in default. The number of members was 372,035, and the amount of the receipts in the year was £18,694,555. In all 1,111 societies made return of their liabilities and assets. The liabilities were to holders of shares £21,813,095, to depositors and other creditors £14,079,762. The amount of the balance of unappropriated profit was £1,104,735. The balance deficit reached £47,209 for 167 societies. The assets were represented by a balance of £34,847,320 due on mortgage security and £2,103,063 invested in other securities and cash.

ARCHDEACON DENISON has circulated amongst his villagers at Brent Knoll, in Somerset, a paper setting forth the extent to which he has, after unceasing efforts, during the last quarter of a century, supplied the district with water. Finding that epidemic disease prevailed for want of water, he dug for wells, and has now ten reservoirs, four springs, and eight dams with fountains, filter-beds, tanks, and pumps. The drinking-water is supplied through galvanised pipe directly from the springs. The six lower reservoirs are fishpools, pools for swans and ducks, and drinking-places for cattle. The Archdeacon has spent £1,500 on the works, and he now calls upon the people to take up the

matter and continue what he has successfully commenced.

THE *Stercity* describes a piece of sculpture modelled by the Rev. F. Knill Harford, Minor Canon of Westminster, consisting of one of a pair of angels, each holding a cresset for containing a brilliant light, and intended to be placed on pedestals, in advance and on either side of the high altar of some great church. The scale is life-size. The cressets were intended for a group of gas-jets; but wires have been placed in the models with a view to the possible use of electric light. "The idea of a soft light, like that of the moon, ever burning before the altar, seems," the *Stercity* observes, "at all events to be one of poetry and beauty." The soft light of the moon seems more and more to affect the brains of alchemists and advocates of ritual and ceremonies unknown to the English Church.

A COMPANION has just been discovered, according to the *Daily News*, to the chief monument of Rome's regal period, the Cloaca Maxima. This drain starts from the Piazza Paganica, and passing under the Ghetto or Roman Jewry, discharges into the Tiber, opposite the island of San Bartolomeo. It is built of blocks of Gabii stone. The walls, 1.80 metres high, are formed of blocks, each 0.90 metre high, 0.70 metre deep, and 2.50 metres long. The vault consists of five wedges, fitted together without cement. The bottom is paved. In several points restorations are visible, dating apparently from the 16th or 17th century.

THE committee appointed to examine the application for the appointment of borough engineer and surveyor for Leeds, in the stead of the late Mr. A. W. Morant, reported to the council that in answer to the advertisement 80 applications had been received, and the committee, after carefully examining the same, recommended the council to make the appointment from the following six applicants:—Mr. Garrett J. Barry, engineer and surveyor, Liverpool; Mr. Joshua Cartwright, borough engineer, Bury; Mr. Thomas Hewson, borough surveyor, Rochdale; Mr. James A. Jowett, district engineer and surveyor, Manchester; Mr. R. L. Mestayer, deputy borough engineer, Salford; and Mr. William J. Morley, architect and surveyor, Bradford. The several applications were read, and each candidate was called into the room and questioned as to his experience and standing in the profession, after which some discussion took place. The voting then took place as follows, the candidate receiving the lowest number of votes being struck out after each vote:—First vote—Barry, 25; Cartwright, 20; Hewson, 23; Jowett, 29; Mestayer, 23; Morley, 17. Second vote—Barry, 22; Cartwright, 17; Hewson, 23; Jowett, 20; Mestayer, 18. Third vote—Barry, 20; Hewson, 24; Jowett, 18; Mestayer, 19. Fourth vote—Barry, 23; Hewson, 27; Mestayer, 22. Final vote—Barry, 23; Hewson, 26. Mr. Hewson was, therefore, appointed, and the council confirmed the appointment by a unanimous vote.

THE village of Ryton-on-Tyne has just received a valuable acquisition in the shape of a large clock, which has been erected in the tower of the parish-church, in memory of the late William Webb, M.A., who was for fifteen years the rector of the parish. The work was entrusted to Messrs. W. Potts and Sons, of Leeds. Though, of course, smaller, it is similar in construction to the great clock in the Houses of Parliament, at Westminster, designed by Sir Edmund Beckett, Bart., Q.C., and similar in principle to the magnificent clock recently erected by the above firm at Lincoln Cathedral. The clock-frame is made of solid cast iron, on the horizontal plan, the top surface of which is planed; this rests upon cast-iron brackets, which are firmly bolted to the wall of the tower—a firm foundation for a clock of this description being very important. The escapement is what is technically known as the double three-legged gravity, the invention of Sir E. Beckett, an arrangement which insures, with absolute certainty, a uniform impulse to the pendulum, and prevents the going parts of the clock being affected by extraneous influences, such as wind on the outside hands, winding, &c. The pendulum, on which so much depends, is what is known as a "compensated pendulum," being ingeniously constructed of zinc and iron tubes in such a manner that variations of temperature

do not affect the length of the pendulum, which is thus to vibrate in exactly the same time in all weathers and is entirely uninfluenced by heat or cold. The pendulum, which weighs two hundredweight, vibrates in one and a quarter seconds. As the church of Ryton is so situated as to render the dial, in whatever place it may be fixed, difficult to see, it was considered essential that the greatest accuracy should be obtained in the striking parts of the clock, and in order to render it as useful as possible, it was determined that it should chime at each of the four quarters as well as strike at the hour; and a strong desire being expressed that the chimes should be similar to St. Mary's, Cambridge, it became necessary to have a new bell, there being originally only three bells in the tower.

AMONG their forthcoming works, Messrs. Crosby Lockwood and Co. announce the following, which are likely to interest our readers.—"Tramways, their Construction and Working, with Special Reference to the Tramways of the United Kingdom," by D. Kinnear Clark, M.Inst.C.E., Supplementary Volume. "Tables, Memoranda, and Calculated Results, for Mechanics, Engineers, Architects, Builders, Surveyors, and others," selected and arranged by Francis Smith. "The Science of Building, an Elementary Treatise on the Principles of Construction, especially adapted to the Requirements of Architectural Students," by E. Wyndham Tarn, M.A., architect, second edition. "Practical Geometry for the Architect, Engineer, Surveyor, and Mechanic, giving Rules for the Delineation and Application of various Geometrical Lines, Figures, and Curves," by E. Wyndham Tarn, M.A., architect, second edition. "Lockwood and Co.'s Builder's and Contractor's Price Book for 1882, containing the latest Prices of all kinds of Builder's Materials and Labour, and of all Trades connected with Building, &c.," the whole revised and edited by F. T. W. Miller, A.R.I.B.A. Also, among new volumes and new editions in Weale's "Rudimentary Scientific Series":—"Foundations and Concrete Work," by Edward Dobson, M.R.I.B.A. (fifth edition).

CHIPS.

It is stated that, owing to the protests raised against the proposed desecration of St. Leonard's Priory, Stamford, the scheme for turning that beautiful example of Transitional work into a cart-hovel has been abandoned. The Rev. G. F. Crowther, M.A., of Market Harborough, writes, however, to say that the other day the Priory was being used as a stable, the interior being fitted up with stalls for horses.

The *Port Elizabeth Telegraph* of the 26th ult. reports the death, by his own hand, of Mr. John Hamilton Wicksteed, C.E., resident engineer of the Van Stadden's River water scheme, and engineer to the Town Council of Algoa Bay.

At the Norwich Consistorial church, last week, a faculty was granted for transferring the mural tablets and monuments and memorial window from the old church at Thorpe, next Norwich, to the new one, to take down the chancel and vestry, remove all fittings, including pulpit, gallery, and pews, from the old building, of which part of the walls and the tower will be allowed to stand as a "ruin."

The Devonshire hospital at Buxton is to be opened by Earl Derby on Tuesday, the 11th October.

The will of Mr. Frederic Ouvry, F.S.A., for many years hon. solicitor to the Royal Institute of British Architects and a life trustee of the Soane Museum, who died on June 26th last, has been proved, the personal estate amounting to upwards of £15,000.

An inquiry was held at the Council House, Birmingham, on Friday, before Mr. J. Thornhill Harrison, C.E., one of the inspectors of the Local Government Board, with reference to an application from the town council for sanction to borrow £127,000 for works of sewerage and street improvements, public baths, and fire-brigade purposes. No opposition was shown to the proposal.

A meeting was held at Weston-super-Mare on Friday with reference to a scheme for constructing a pier from the west end of Regent-street. Messrs. Munroe and Son, of Bristol, exhibited the plans, and stated that they represented a pier of cast and wrought iron 25ft. wide, the approximate cost being £10,000. Mr. Secones, of Bristol, said his estimate of the cost of pier, together with a tramway from the new railway-station, was £28,225.

The partnership between Messrs. Botham and Goodrich, of Brighton, architects and surveyors, has been dissolved.

The foundation-stone of the new hospital in Mills-road, Lowestoft, was laid by Sir Savile Crossley on Friday. Mr. J. L. Clemence, of Lowestoft, is the architect, and Mr. Arthur Bedwell the contractor.

The town council of Swansea have received a warning from the borough surveyor, Mr. E. Cousins, that no further weight should be placed in the upper floors of the free library buildings, as the walls show signs of bulging, and, in consequence, an order has been issued that no more than twelve persons be admitted to the art gallery at one time. The library premises consist of a series of metamorphosed houses in Goat-lane, and their threatening condition indicates that the proposed erection of suitable buildings in a central position for housing the school of art, free library, and fine-art collection, cannot much longer be postponed.

South Wootton Church, near King's Lynn, was struck by lightning on Sunday week; the tower at west end was split nearly to the ground; the timber roofs and seats, both in nave and chancel, greatly damaged, and the east window partially destroyed.

St. Paul's Church, Glws, near Llanshamlet, was opened for service last week. It is built of local stone with freestone dressings, and is Gothic in style. It measures 74ft. by 20ft., internal dimensions without apsidal chancel, and is seated with pitch-pine benches for 250 persons. Mr. H. F. Clarke, of Briton Ferry, was the architect.

The Local Government Board have sanctioned a loan of £3,000 for the purpose of erecting a sanatorium at Torquay. Mr. Ernest Turner, of Regent-street, London, is the architect.

A new mission church has been opened at Sunderland. Mr. Martin Greener was the architect.

The interior of Holy Trinity Church, Leamington, has just been considerably improved by the addition of a very handsome carved Caen-stone pulpit with marble shafts and elaborate oak choir-stalls. Brass gas standard and lectern, together with an embroidered altar frontal, have also been added. The whole of the work has been executed by Messrs. Jones and Willis, of Birmingham and London.

A fine-art exhibition has been opened this week at Leicester. It contains 256 pictures, the larger proportion being oil-paintings.

At a dinner held on Friday in connection with the fine-art exhibition at Cardiff, Sir E. J. Reed, M.P., presented the town with Vient Cole's "Noon: a Scene on the Surrey Hills," a picture valued at a thousand guineas, and which the donor remarked was the best in his collection. "Noon" was one of the features of the Academy Exhibition of 1873.

The annual distribution of prizes and certificates to the students of the classes at Chilworth, Surrey, took place on Wednesday week. The report was of a satisfactory character, except with regard to the elementary art class work.

Memorial windows have just been placed in St. Andrew's Church, Old Kent-road, Newington, S.E., and Christ Church, Mitcham, to Mrs. Ann Nobes. The work in both cases has been carried out by Mr. Charles Evans, of Fleet-street, E.C.; the Mitcham window, which was unveiled last week, contains a figure of "Charity" distributing gifts to the poor.

A new coffee-tavern was opened at Taunton on Tuesday. It has been erected, at a cost of £3,300, by Mr. Templeman, builder, from plans prepared by Mr. C. H. Samson. On the ground-floor are bar and buffet, kitchen, offices, &c., and on the upper floors ladies' clubrooms, commercial rooms, bath-rooms, and twelve bedrooms.

At Soham, Cambs, on Tuesday week, new Congregational Sunday-school buildings were opened. They adjoin the chapel, and have been erected at a cost of £500 by Messrs. Johnson, builders, of Soham.

The foundation-stone was laid on Monday last of a new school and classrooms for, and attached to, the Plymouth Brethren Chapel, at Yeovil, Somersetshire, from plans by Mr. Fred. Cox, of Yeovil, surveyor, who is also the contractor for the erection. The cost, exclusive of the old materials on the site, is £350.

Mr. Thomas Eva, borough surveyor of Helston, died on Thursday, the 15th inst., from the effects of a fall of 8ft. from a plank while inspecting building operations. The deceased, who was 78 years of age, had executed many important works in Cornwall as a builder, including the lighthouses on Godrevy and the Lizard; the Gyllys monument at Helston, and the Gilbert obelisk at Bodmin; Boscawen Bridge, at Truro; and a large number of houses at Helston and elsewhere.

Star-street Congregational Chapel, Cardiff, was reopened on Sunday week, after renovation, the lowering of pulpit and erection of new organ, the latter being built by Messrs. Isaac Cool and Sons, Bristol.

Dr. Alexander Carte, who had held the appointment of Director of the Natural History Museum of the Royal Dublin Society since 1851, in which he had effected great improvements in arrangement, has recently died and was buried with some public ceremony on Tuesday. From 1844 to 1851 Dr. Carte was Curator of the Royal College of Surgeons in Ireland.

An important railway-contract arbitration case was opened on Tuesday morning at Macgregor's hotel, St. Vincent-street, Glasgow, in which Mr. John Mackay, contractor, Wishaw, and the Caledonian Railway Company are the interested parties. The question has arisen in connection with the contract for the formation of the Wishaw line, under the Caledonian Railway Additional Powers Acts, 1873 and 1874, and is to decide what may be considered "extras." The contractor claims various sums, amounting in all to £171,246 6s. 7d., and after crediting £102,270, there is still a balance due which with interest amounts to £42,967 13s. Mr. John Strain, C.E., of Glasgow, is the arbitrator.

A Dundee journal states that, in the importation of timber, sailing-vessels, to which the traffic has hitherto been exclusively confined, are being superseded by steamers, and that there is a growing preference in the trade for deals over log timber. It is mentioned that a steam-vessel from the Baltic is now discharging, at Dundee, a cargo of over 20,000 deals for Messrs. Bell and Sime, saw-mill proprietors. A sailing-vessel from Quebec is unloading, for the same firm, 10,000 pine deals; and three other vessels are discharging, also for Messrs. Bell and Sime, 3,000 pieces.

The school-board of Beeston, Notts, have, this week, adopted plans, prepared by Mr. Bromley, for a school for 500 children.

A Masonic lodge is about to be built at Fowey from the plans and designs of Mr. R. S. Clunes, architect, of that town.

The Sheerness local board of health decided, last week, to reduce the salary of their surveyor from £120 to £110 a year.

The Plymouth school of art has just reopened, under Mr. Babb, for its 31st session in more commodious premises in York-street.

The reredos at St. Andrew's Church, Montpelier, was unveiled on Sunday, after having been decorated with paintings of the Twelve Apostles. The figures, which are painted two in a panel, are nearly full size; round the head of each is a golden nimbus, but the dresses are kept in neutral colours. In the centre is the Agnus Dei. The decoration is the work of an amateur, Captain J. H. Butt, R.N.

A memorial-window has been placed in the parish-church of St. Andrew, Shoeburyness, to the late Major Lambert, R.E. It is filled with subjects from the "Pilgrim's Progress" of Bunyan, and is intended to represent the Christian's path through life. It has been executed by Messrs. Cox, Buckley, and Co., of Southampton-street, Strand, W.C.

A new police-station and court-house are about to be built at Bamber-bridge, near Preston, Lancashire, for the Walton-le-Dale district, from the plans of Mr. Thomas Nevett, architect, Winckley-street, Preston.

A block of industrial dwellings has just been erected for Sir Edward Bates in St. Andrew's-street and Lower-lane, Plymouth. The block is of three stories, and is entered from a central open courtyard, approached through a covered archway. On each floor it is planned as two tenements of three rooms and two others of two rooms each, the upper floors being reached by flights of York stone steps. All living-rooms are 12ft. by 12ft. 6in., and bedrooms 12ft. by 9ft., and the uniform height of a room is 10ft. The internal walls are faced with Portland cement. The floors are carried by girders, and neither laths nor slates are used in construction. The Lambeth "flush-out" closets are adopted. Mr. Pethick, of Plymouth, is the builder, and will proceed now to erect for the same proprietor a second block of dwellings in Victoria-street and Victoria-lane.

Rodney Stoke Church, Somerset, was reopened after restoration on Wednesday.

Mr. Bottomley was on Monday appointed surveyor to the local board of Saltburn-on-Sea, at a salary of £60 per annum.

New school and classrooms, erected at the rear of the Wesleyan chapel in Wilton-road, Salisbury, were opened on Wednesday week. There are five classrooms, and above these a meeting-hall, 50ft. by 25ft. The architect was Mr. Hudson, of Gillingham, and the builder, Mr. E. Witt; the cost has been £650.

The Prince of Wales is expected to inaugurate the new sea-wall and promenade on the Seabrook Estate between Hythe and Sandgate, and also to lay the foundation-stone of the new harbour-works now in course of construction at Folkestone, on Wednesday week, the 12th prox.

A new Wesleyan chapel is about to be erected at Forrest, near Camborne. Mr. James Hicks, of Redruth, is the architect.

A two-light stained-glass window was last week placed in the chapel on south side of chancel in St. Mary's Church, Chelmsford. It represents the Feeding of the Hungry and the Visiting of the Sick, and has been carried out by Messrs. Clayton and Bell, of London.

Three pairs of polished brass plates have just been placed in St. Mary's Cathedral, Aberdeen, one pair in the centre, and one pair on either side, for the chapels of St. John and Patrick. The designs are Early English, and were executed by Jones and Willis, of Birmingham and London.

Mr. Alderman Ellis, who will be the new Lord Mayor of London, is an auctioneer, and is of the firm of Farebrother, Ellis, Clark, and Co.

The engineers engaged on the tunnel being constructed by the Great Western Railway under the Severn—a distance of two miles—to connect the Gloucestershire and Monmouthshire sides of the river, have effected communication, and thus united the headings driven from opposite sides. The lines were laid so accurately that the centre was struck within three inches.

Throat Irritation.—Soreness and dryness, tickling and irritation, inducing cough and affecting the voice. For these symptoms use Epps's Glycerine Jububes. Glycerine, in these agreeable confections, being in proximity to the glands at the moment they are excited by the act of sucking, becomes actively healing. Sold only in boxes, 7½d. and 1½d. labelled "JAMES EPPS and Co., Homoeopathic Chemists, London." A letter received:—"Gentlemen,—It may, perhaps, interest you to know that, after an extended trial, I have found your Glycerine Jububes of considerable benefit (with or without medical treatment) in almost all forms of throat disease. They soften and clear the voice—Yours faithfully, GEORGE HOLMES, L.R.C.P.E., Senior Physician to the Municipal Throat and Ear Infirmary."

Trade News.

WAGES MOVEMENT.

NORTH WALES SLATE QUARRIES.—After being partially closed for seven months, full time was resumed at Lord Penrhyn's extensive slate quarries in Carnarvonshire on Monday.

Lamplough's Pyretic Saline is refreshing. most agreeable, and the preventive and curative of FEVERS, RHEUMATISM, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by chemists throughout the world, and the Maker, 113, Holborn Hill. Use no substitute. See Medical Testimony.

Holloway's Ointment is not only fitted for healing sores, wounds, and relieving external ailments, but rubbed upon the abdomen it acts as a derivative, and thus displays the utmost salutary influence over stomachic disorders, derangements of the liver, irregularities of the bowels, and other intestine inconveniences which mar man's comfort.—ADVT.]

Boulting Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to **CHARLES TRASK,** Norton-sub-Hamdon, Ilminster, Somerset.

—[ADVT.]
McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates. General Repairs and Alterations Executed. Experienced Workmen always in readiness, and sent to any part of the country.—[ADVT.]

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE
CORSHAM DOWN
CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.
(See trade advt. on p. XXV.) ADVT.

TENDERS.

. Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ADDISCOMBE.—For the erection of a detached villa on the Whitgift Estate, Addiscombe. Mr. Daniel R. Dale, S. Union-court, E. C., architect:—
Marriage, Croydon £2,825 0 0
Hoare & Son, Blackfriars (accepted) 2,631 0 0

ACCRINGTON.—For forming, paving, branch sewerage, &c., the following streets. Mr. E. Knowles, borough surveyor:—

Arago-street:—Eatough, R., Accrington (accepted).
Cambridge-street:—Counsell, S., Blackburn (accepted).
Dowry-street:—Eatough, R., Accrington (accepted).
Mansion-street:—Counsell, S., Blackburn (accepted).
Jacob-street:—Clegg, W., Accrington (accepted).
Back-street:—Eatough, R., Derby street, Accrington (accepted).

ANDOVER.—In your last week's issue, among the list of tenders, you have an error. The repairs are at Andover Town-hall, but both parties tendering reside at Andover, not at Alton. My tender is the accepted one.—F. BEALE.

BATTERSEA.—For paving Belleville-road East, Belleville-road West, Bennerley-road East, Bennerley-road West, Cairns-road, Mallison-road East, Mallison-road West, Salcott-road East, Salcott-road West, and Wakehouse-road East, Battersea, for the Wandsworth district board of Works:—

Etheridge, Lewis (accepted).
[Lowest tender in every case.]

BELFAST.—For supply of 100 iron bedsteads to the work-house:—

Wiggies, W., Belfast (accepted), 13s. 6½. each.

BELGRAVIA, S. W.—For alterations, repairs, decoration &c., at 30, Lowndes-square, S.W., for Mr. Edmund B. Leibert. Mr. Augustus E. F. Spratt, architect:—
Curtiss, W. and E., Mayfair, W. (accepted).

BELGRAVIA, S. W.—For alterations, repairs, decoration &c., at 5, West Eaton place, S.W., for Mr. Clement Upperton. Mr. Augustus E. F. Spratt, architect:—
Trotter and Malcolm, 105, Seymour-place (accepted).

BETHNAL GREEN.—For public-house, Old Bethnal Green-road. Mr. C. W. Horne, Gray's Inn, London, architect:—

Scott	£2,994 0 0
Shnrmur	2,988 0 0
Marr	2,890 0 0
Forrest	2,853 0 0
Hayes	2,830 0 0
Johnson	2,573 0 0
Skipper	2,429 0 0
Young and Co.	2,395 0 0
Judd	2,385 0 0

Architect's estimate, previously to opening of tenders, £2,750, being within £50 of the average.

BLACKBURN (LANCS.)—For erection of a heating house adjoining the West Lodge in the Corporation Park. Mr. W. B. Bryan, borough engineer:—

Buildings:—Chew, L., Blackburn (accepted).
Heating Apparatus:—Hubberty, J., Blackburn (accepted).

BOOTLE (LIVERPOOL).—For the erection of a goods shed in the Canada Docks Goods Station Yard, Bootle, for the London and North-Western Railway:—
W. Harrison, St. Helen's (accepted).

BOURNE (NEAR ABERDEEN).—For mason, carpenter, and slater work of part of a steading of offices at Laverside, Bourne. Mr. J. Duncan, Turfite, architect:—

Accepted tenders:—
Mason's work:—M. Lead, W., Tyrie.
Carpenter's work:—A. and W. Hendry, Wastle.
Slater's work:—Milne, W., Inverurie.

BAIRNTHORPE.—For improving Bear-road, about 1,100 yards long, and constructing sewers, retaining walls, &c. Mr. P. C. Lockwood, C.E., borough surveyor:—

Buxton, W., Herne Hill, S.E. ...	£3,666 0 0
Marshall, J. G. B., Brighton ...	3,575 0 0
Cleesman and Co., Brighton ...	3,270 0 0
Woodham, H., Lewisham ...	2,997 0 0
Oliver, A., Brighton ...	2,895 0 0
Longley, J., Worth, Sussex ...	2,880 0 0
Homewood, W., Brighton ...	2,540 14 7
Harrison, J., Brighton (accepted) ...	2,650 0 0

CAMBERLEY.—For additions and alterations to Collingwood Park, Camberley, for Colonel Lempiere. Messrs. Harrison and Cooper, architects:—

Martin, Wells and Co., Aldershot ...	£1,205 0 0
Watson, W., Ascot Heath ...	1,193 0 0

COVENTRY.—For the erection of a pair of semi-detached villas on the Eaton-road, for Messrs. Beamish and London. Mr. William Tomlinson, Coventry, architect:—

Fox, G. J. and J., Atherstone ...	£3,593 0 0
Worwood, J., Coventry ...	3,280 0 0
Price, H., Coventry ...	3,222 0 0
Hallam and Co., Coventry ...	2,950 0 0
Smith and Son, Kenilworth ...	2,840 0 0
Haywood, C., Coventry ...	2,575 0 0
Makepeace, J. ...	2,550 0 0

* Accepted for slightly revised scheme.

CROYDON.—For painting the exterior of the Work-house, Queen's Road, Croydon. Messrs. Berney and Monday, architects, 61, North-end, Croydon:—

Wallace	£485 0 0
Smith and Son, Norwood ...	467 0 0
Kirk and Rudall, Woolwich ...	373 0 0
Franklin, Croydon (accepted) ...	275 10 0
Barker	267 0 0
Saker	244 0 0
Beadle	235 0 0
Stephenson	221 12 0
Huggins and Baldock ...	217 12 0
Mains, Croydon ...	175 0 0
Baker, Annerley ...	130 4 6
Stuart	117 0 0
Brown	100 0 0
M'Karsley	100 0 0

CAMDEN TOWN, N.W.—For pulling down and rebuilding the Stationers' Arms public-house, High-street, Camden Town, for Mr. Charles Smith. Mr. William West, architect:—

Wood, F. and F. ...	£4,605 0 0
Macey and Sons ...	4,238 0 0
Young, Cochrane, and Fraser ...	4,085 0 0
Turtle and Appleton ...	4,039 0 0
Patman and Fotheringham ...	3,960 0 0
Bowden	3,785 0 0
Williams and Sons ...	3,770 0 0
White	3,764 0 0
Toms (accepted) ...	3,643 0 0

CAMDEN TOWN, N.W.—For erecting new dwelling house in Pratt street, Camden Town, for Mr. Blomfield. Mr. Henry Jacques, architect:—
Tenders accepted:— £135 0 0

DANBURY, CONN.—For laying 17,000 ft. of 18 in. pipe for new waterworks for the Danbury Water Commissioner:—

The Connecticut Patent Water Pipe Company of new Haven, Conn. accepted:—
The pipe is the improved wrought iron and cement pipe patented by D. Gifford Phelps of New Haven.

DARLINGTON, YORKS.—For supply and erection of 400 yards of wrought iron fencing and 150 cast iron gates. Mr. T. Smith, borough surveyor.
For wrought iron fencing, G. Dethum (accepted), 5s. 3d. per lineal yard.
For gates, Ord and Madison, of Darlington (accepted), 8s. each.
Nine tenders, from 6s. 6d. to 2s. 11d.

DEWSBURY, YORKS.—For sewerage in Foundry street, Cloth Hall street, and Bridge street. Mr. R. J. Duff, borough engineer:—
Hart and Brier, Dewsbury ... 157 9 0
Slinger and Naylor, Cleckheaton ... 57 0 0
Schiffeld, J., Dewsbury ... 512 2 0
Roberts, B., Cleckheaton ... 495 0 0
Turner, T. W., Dewsbury ... 414 3 6
Bower, A., Batley ... 380 18 6
Kitchen, J., Bradford ... 397 15 1
Parkin, W. H., Ravensthorpe ... 341 0 0
Hirst, T., and Sons, Dewsbury ... 311 14 7
Accepted.

DEWSBURY.—For masonry in construction of a tool-house at the Whitley reservoir, for the Dewsbury town Council:—
Walker and Sons (accepted) £103.
DOVER.—For sinking new wells at the waterworks, for the town council:—
Stiff, H. (accepted) ... 29,500 0 0
[Lowest tender received; borough surveyor's estimate, £7,000.]
DOVER.—For construction of new pump well, with heading and foundation for new engine pump and house in connection with the borough waterworks. Mr. Curry, borough engineer:—
Richardson, H., Dover ... 2,241 0 0
Stiff, H., Dover (accepted) ... 41,955 0 0

FAVERSHAM.—For constructing a sewer in the Western district, for the Faversham pavement commissioners:—
Davis, A., Faversham ... 1,474 0 0
Streeton, W., Sittingbourne ... 837 0 0
Neve, J. W., London ... 797 0 0
Johnson, G., Faversham (accepted) ... 677 10 0

FEARNHURST, NEAL HASLEMERE, SUSSEX.—For erection of an additional schoolroom at the Fearnhurst Board School:—
Clapham, W., Shotter Mill, Haslemere ... 228 0 0
Gale, E., Fearnhurst, Haslemere ... 182 15 0
Saunders, C., Haslemere, Surrey ... 188 10 0
Slade, B., Fearnhurst, Haslemere (accepted) ... 188 10 0
Slade, W., Fearnhurst, Haslemere ... 185 17 6
Harding, T., Station-road, Haslemere ... 172 0 0

FOREST OF DEAN.—For new schools at Joy's Green, Lydbrook, for the Forest of Dean School Board:—
Foster, Abergavenny (accepted) ... 41,300 0 0

GAINSBOROUGH.—For emptying ash pits during one year, for the local board:—
Rose, T. (accepted) ... 200 0 0
[Three other tenders received.]

GOSPORT.—For the erection of a shop and residence for G. Cooke, Esq. Mr. W. Yearly, Gosport and Landport, architect. Quantities by Mr. E. J. Smith Landport:—
White, Landport ... 41,065 0 0
Lowe, Gosport ... 1,056 0 0
Ripley, Gosport ... 985 19 8
Tull, Landport ... 912 0 0
Dash, Gosport ... 934 0 0
Croad, Portsmouth ... 967 0 0
Butt, Gosport (accepted) ... 865 0 0

GREAT YARMOUTH.—For alterations to 100 house, Southdown, for Messrs. Morgan Bros. Mr. Wm. Cockrill, Telegraph House, Gorleston, architect:—
Kemp, R. ... 1110 10 0
Fuller, G. ... 130 0 0
Cooper and Rand (accepted) ... 115 10 0

GREAT YARMOUTH.—For the erection of seven houses, Gorleston, for Mr. R. Kemp, sen. Mr. W. B. Cockrill, Telegraph House, Gorleston, architect:—
[Total cost, £780.]

GREAT YARMOUTH.—For the erection of two houses, Camperdown-place, Great Yarmouth, for Messrs. J. W. and J. W. B. Johnson. Mr. W. B. Cockrill, Telegraph House, Gorleston, architect:—
Accepted tenders.
Excavator, bricklayer, and plasterer:—
Leggett, J. ... 250 0 0
Carpenter and joiner:—
Cooper and Rand ... 58 0 0
Plumber, painter, and glazier:—
Geddie, J. ... 98 17 0
Slater:—
Morton, J. ... 62 1 0
Found and smith:—
Bly, H. J. ... 61 0 0
Mason:—
Lydam, J. ... 50 10 0
Bell-hanger and gas-fitter:—
Ruiter, S. ... 25 10 0
Total ... 1,146 7 0

HARTSHILL.—For draining, road-forming, building lych-gate, and general laying out of a cemetery for the Hartshill Burial board, Warwickshire. Mr. W. Topitt, 15, Hotel-street, Leicester, surveyor:—
Ley, J. and Co., Leicester ... 625 0 0
Ratcliff, J. R., Leicester ... 637 15 0
Thorpe, R. B., Leicester ... 575 0 0
Harris, B., Hartshill ... 580 0 0
Fox Bros., Atherstone ... 519 8 10
Holland, W., Leicester ... 475 0 0
Trayne and Co., Moseley (accepted) ... 414 12 4

HOLLOWAY, LONDON, N.—For erection of mineral water factory, Holloway-road, for Messrs. Cooper and Co. Mr. G. Corfe, architect:—
Years ... 1,821 0 0
Cross ... 1,650 0 0
Macfarlane ... 1,498 0 0
Harper (accepted) ... 1,342 0 0

HORNDEAN.—For the erection of stores at the Horn-dean Brewery, for G. A. Gale, Esq. Mr. E. J. Smith, architect, Landport. Quantities by Mr. W. Yearly, Clarence-square, Gosport and Landport:—
Dye, Landport ... 5900 0 0
White, Landport ... 885 0 0
Croad, Portsmouth ... 875 0 0
Toad, Horn-dean ... 680 0 0
Farnices, Landport ... 680 0 0
Winslade, Landport ... 648 0 0
Taylor, Portsmouth ... 615 0 0
Boulton, Landport ... 608 0 0
Tull, Southsea (accepted) ... 593 0 0
Elsey, Horn-dean ... 492 0 0

HORNSEY, N.W.—For new roads and sewers on the Hornsey-lane Estate, for Mr. T. Denney:—
Bloomfield, Tottenham ... 1,440 0 0
Jenkins, Clapham ... 1,429 0 0
Keeble, Regent's Park ... 1,335 0 0
Pall and Sons, Bromley ... 1,239 0 0
Harris, Camberwell ... 1,251 0 0
Pizzey, Hornsey ... 1,227 10 0
Jackson, Leyton ... 1,200 0 0
McKenzie and Co., City ... 1,192 0 0
Dunmore, Hornsey (accepted) ... 1,145 0 0
Wilson, Walthamstow (too late) ... 1,005 0 0

HORNSEY, N.W.—For paving, kerbing, channelling, metalting, and repairing Blythwood-road, for the Hornsey Local Board. Mr. F. de Courcy Meade, surveyor:—
Pizzey, Hornsey ... 495 0 0
Aspinall and Son, New North-road ... 490 0 0
Strachan and Co., Wood Green ... 465 2 0
Jackson and Sons, Finsbury Park ... 420 12 0
Bloomfield, Tottenham ... 387 0 0
McKenzie, Williams and Co., Moorgate-street, E.C. ... 383 0 0
Dunmore, Crouch End ... 370 3 0
Total ... 4,495 0 0

HORNSEY, N.W.—For constructing a new road leading from Tottenham-lane to Spencer-road, for the Hornsey Local Board. Mr. F. de Courcy Meade, surveyor:—
Pizzey, Hornsey ... 298 0 0
Strachan and Co., Wood Green ... 943 1 7 1/2
Jackson and Sons, Finsbury Park ... 827 0 0
Bloomfield, Tottenham ... 824 12 0
Dunmore, Crouch End ... 783 0 0
McKenzie, Williams and Co. ... 719 0 0
Walker, Upper Holloway ... 699 0 0
Accepted.

HUDDESFIELD.—For construction of a new bridge over the river Colne at Bradley Mills, for the Huddersfield Town Council. Mr. R. Dugdale, C.E., borough surveyor:—
Charnock, J. and Sons, Halifax (accepted).

HUDDESFIELD.—For cleansing, painting, and decorating the council-chamber and other rooms in the Municipal Offices. Mr. R. S. Dugdale, C.E., borough surveyor:—
Stuttard, J. H., Huddersfield (accepted).

HYSON GREEN, NOTTINGHAM.—For five houses in Haulsley-road, Hyson Green, Nottingham:—
Cox, W., Lincoln (accepted).

KENTISH TOWN, LONDON, N.W.—For alterations, additions, repairs, &c., at the Mansfield Arms, Mansfield-place, Kentish Town, for Messrs. Meux and Co. Messrs. Gardner, Sons, and Theobald, architects. Quantities by Messrs. Selby and Rogers:—
Johnson ... 11,450 0 0
Thomas ... 1,340 0 0
Nightingale ... 1,197 0 0
Toms (accepted) ... 1,116 0 0

KINGSTON-ON-THAMES.—For the supply of 50 fathoms of yellow deal ends, for the Kingston Board of guardians:—
Bell, T., Ealing Dean (accepted) 6s. 5d. per fathom.

LANDPORT.—For the erection of a store, Baker-street, Landport, for Mr. Housel. E. S. Smith, Landport, Architect. Quantities by Mr. W. Yearly, Gosport and Landport:—
Crockerell, J., Southsea ... 125 0 0
White, Southsea ... 121 0 0
Tull, Southsea ... 120 0 0
Taylor, Portsea ... 119 0 0
Learmouth, Landport ... 113 2 6
Dye, Landport (accepted) ... 112 0 0
Farnices, Landport ... 101 0 0

LONDON.—For new warehouse, Lower Thames-street, E.C. Mr. E. N. Clifton, architect:—
Macey ... 25,324 0 0
Cooke and Co. ... 24,982 0 0
Morter ... 23,343 0 0
Lawrence ... 22,855 0 0
Ashby and Horner ... 22,530 0 0
Conder ... 22,490 0 0
Holland and Hansen ... 22,288 0 0
Peto Bros. ... 22,151 0 0
Brass ... 21,987 0 0

LEICESTER.—For brick channel, for the New Walk, Leicester. Mr. J. Gordon, M.I.C.E., borough surveyor:—
Major, F. ... 137 10 0
Clarke and Garrett ... 119 15 0
Jewsbury, J. ... 117 18 0
Hewitt, H. M. ... 113 10 0
Duxbury, T. and Son (accepted) ... 110 0 0

LEICESTER.—For supply of manhole covers, ventilating grates, &c., to the Highway and Sewerage Committee. Mr. J. Gordon, M.I.C.E., surveyor:—
Goodwin and Barby, Leicester ... 570 0 6
Hill and Smith, Brierley Hill, Staffordshire ... 543 17 4
Harrold, J. T., Leicester ... 522 6 4
Smith, Patterson and Co., Blaydon-on-Tyne ... 449 3 0
Stableford and Co., Coalville, Leicester ... 431 5 2
Jukes, Conkson and Co., London ... 365 7 3
Cort and Payne, Leicester ... 306 16 6
A. Delivered at Leicester Station. B. Delivered at Friday-street or Jarvis-street yards.

LEYTONSTONE (ESSEX).—For the erection of house at Leytonstone, for Mr. R. Tomlin. Mr. Henry Poston, Earham-grove, Forest Gate, E., architect:—
Hosking, G., Forest Gate ... 1887 0 0
North Bros., Stratford ... 818 0 0
Donaldson, Leytonstone ... 732 0 0
Jackson and Todd, Hackney-road ... 720 0 0
Accepted.

LLANELLY.—For laying pipes, for the town council:—
Jones, S. (accepted) ... 11,225 17 3
[At the previous meeting, the tender of Trayne and Co., of Birmingham, was accepted for same work at £865 17s. 6d.; but they afterwards wrote, amending their offer to £1,115, on account of error.]

MAIDSTONE.—For erection of stable for twenty horses at the Star Hotel, Maidstone. Mr. G. Friend, Maidstone, architect:—
Vaughan, Maidstone ... 11,922 0 0
Calland and Son, Rochester ... 1,080 0 0
Naylor and Son, Rochester ... 1,070 0 0
Walls and Clements, Maidstone ... 1,019 0 0
Wood, Boughton Monchelsea ... 818 10 0
Accepted.

MILTON-NEXT-SITTINGBOURNE.—For supply of 200 tons of broken Guernsey granite, at per ton, delivered in Milton, for the Improvement Commissioners. Mr. H. W. Clarke, surveyor:—
Chittenden, Knight and Co., Sittingbourne ... 20 12 6
Gabriel, London ... 0 12 0
Manuelle, London (accepted) ... 0 11 8

MOUNTAIN ASH (S. WALES).—For making up Penrhin-aceiber-road, for the local board of Mountain Ash:—
Williams and Lewis, Cardiff ... 11,936 6 9
Mackay, J., Treforest ... 1,862 1 2
Jenkins, C. and Son, Treherbert ... 1,855 18 6
West, J. and Son, Ebbw Vale ... 1,414 9 2
Williams & Jenkins, Pontypriid ... 1,283 16 9 1/2
Taylor, T. T., Mountain Ash ... 1,162 5 4
[Surveyor's estimate, £1,086 3s.] Accepted.

NEWTON-IN-MAKERFIELD (LANCS).—For construction of 850 yards of pipe sewers, for the Newton-in-Makerfield Improvement Commissioners. Mr. R. Brierley, engineer, Town Hall, Newton-le-Willows:—
Prescott, E., Wigan ... 2933 4 11
Pemberton and Kendrick, Newton ... 777 4 5
Adams, N. T., Ashton ... 750 2 10
Cowborn, S., Hindley ... 711 14 0
Thompson, Whittle & Sticher, Orrell ... 692 6 6
Winnard, W., Wigan ... 586 0 0
Fawkes Bros., Birkdale ... 552 6 3
Heaton, R., Warrington ... 500 0 0
Unsworth, J., Newton (accepted) ... 417 0 0

THE BUILDING NEWS.

LONDON, FRIDAY, OCTOBER 7, 1881.

LIGHT AND AIR IN THE CITY.

THE increasing demands made upon already overcrowded parts of the City, especially in the erection of lofty warehouses and blocks of chambers, daily call for the exercise of ingenuity and contrivance on the part of the architect. A site in a street, surrounded on three sides by houses, is cleared by the pulling down of old and comparatively low buildings, and a lofty factory or commercial house is erected thereon. "Ancient lights" abut on the vacant site, and the new structure has to be built to avoid the consequences of an action for damages for obstructing light. The new buildings generally occupy a larger area than the original houses, but the principal thing to be considered is the increased height necessary to be attained to give the accommodation required. With the most careful planning it is almost impossible to avoid impeding or obstructing the access of light to surrounding buildings which, before the pulling down of the old premises, had a court or open space of garden-ground in rear of them. The new buildings have almost of necessity a greater height as well as increased area, and, in short, encroachment seems to be almost the necessary accompaniment of rebuilding; the most careful contrivance of areas in the plan often fails to mitigate the grievance, and the light and air question, whether viewed as a legal complication, or as one of the greatest physical difficulties with which the architect has to deal, seems to grow in urgency every day. People must have light and air, and it seems to be a point for the intervention of the Board of Works, or some other recognised authority, to define more than they now do, the height and limits of depth of building in the metropolis, no less than they impose other rules for the keeping of a regular line of frontage in streets.

There is a section in the Metropolitan Building Act (18 and 19 Vict., 122) which provides that every building used or intended to be used as a dwelling-house, unless all the rooms can be lighted and ventilated from an adjoining street or alley, shall have in the rear or the side thereof an open space of the extent of at least 100 sq. ft. In other words, an area of about 10ft. square is required to be provided in the rear of every building used as a dwelling, irrespective of the height of the buildings, so that, in point of fact, the higher the houses adjoining the less the quantity of light admitted. It will be seen, therefore, that notwithstanding the rules about areas, the demand for lofty buildings is practically leading to a new difficulty which has to be grappled with. How to evade an action for infringing on the rights of adjoining owner is becoming more and more difficult as loftier and more commodious premises are required.

The practice of top-lighting shops, warehouses, and counting-houses, now commonly adopted, to a certain extent, reduces the difficulty; but top-lights are not practicable in all cases, and on hygienic grounds we have some doubt whether such lighting is so desirable for rooms occupied by a number of clerks or working people during the year, as side windows. There is a question among scientific men whether rooms lighted down narrow shafts or courts are not destroying the eyesight of those who have to sit in them, and even metallic reflectors have been objected to as injurious to vision. On this purely sanitary side of the question much might be urged in favour

of good areas in the rear as well as wide streets in front of buildings, and when we couple air with light, the evidence seems overwhelming for the old-fashioned mode of lighting by side windows. The subject from this physical point is one upon which much might be said; but the architect has enough to do, and will earn the lasting gratitude of city workers if he can by mechanical means contrive to preserve side windows wherever he can do so.

There was an ancient custom in London by which it was allowed to rebuild any house upon the old foundation, and to any height at pleasure of the owner, although by rebuilding on ancient foundations, the lights of his neighbours were stopped up. This custom was abolished by the Prescription Act, which materially affected the value of building land in the metropolis, for it operated to prevent the erection of lofty buildings. The judgment of Lord Cranworth, in "*Yates v. Jack*," and other early decisions, show the opposition the statute met with from those who desired to raise buildings. Yet there was a clear wrong in permitting the owner of a house in a narrow street to raise it to any height he thought fit; for only those who possessed a written agreement by which light was enjoyed were secure against encroachment. The objection entertained by Lord Cranworth to the Act which abrogated the old custom in the City, was based on the convenience of City landlords and wealthy capitalists, who did not scruple to diminish the light and air of their neighbours by erecting huge warehouses, in which were packed a crowd of workmen or clerks; nevertheless the new statute was a great gain to the inhabitants of London.

But the Prescription Act, while it certainly abolished the oppressive tyranny of capitalists and landlords, has little benefitted those whose enjoyment of light has been of less duration than the prescriptive period of 20 years. In several instances we may see buildings which occupy more land, built twice the height of the old premises, and, further, the use of windows, if not consecrated by the period prescribed, confers no right in a lateral direction. It is very true that a neighbour can obstruct (by hoarding, or by building a wall,) the light through any windows opened against him, or which overlook his property, at any time during 20 years after the building has been erected, so as to prevent the acquisition of an easement; but the new building obstructs the admission of the light, and both builder and adjoining neighbour are the sufferers. In innumerable instances, therefore, the Act is powerless to prevent obstruction of light and air, while the Metropolitan Building Act only requires the owner who rebuilds a party-wall to make good all damage occasioned thereby to the adjoining premises. There is nothing in the latter to take away the common law right of any individual to bring an action against the building owner for obstructing an ancient window. The Building Act does not sanction the insertion of fresh windows into party-walls, nor any encroachment on existing rights; but it appears powerless to stop the growth of lofty buildings which materially darken or obstruct the free access of light to the windows of the surrounding houses. A very common case occurs when two properties are contiguous to each other, and one of the owners erects a workshop or other building fronting the other's land. The division wall is afterwards condemned, and the owners at their joint expense erect a new party-wall, half on each land; the old window is reinstated, and the adjoining owner bricks it up on his side or builds a wall on his half of the fence so as to obstruct the window. An action is brought by the building owner, and the issue will depend on the right or easement he possessed, and

the amount of diminution of light. In fact, the principle has been confirmed by several cases, as in "*Wells v. Ody*," "*Crofts v. Haldane*," &c. It is necessary to show a right to the access of light, either for the 20 years prescribed by the Act, by common law, by consent or agreement, by the disposition of the owners, or by some other act; if this cannot be done there is no substantial relief for the aggrieved neighbours. These remarks apply chiefly to the erection of new premises with or without overlooking windows, by which the adjoining houses suffer a deprivation of light which their owners have no legal or acquired right to enjoy.

We may here briefly remind the reader of the law on the prevention of the right to light. This may be by the owner of the servient tenement raising a hoarding or wall so as to obstruct the light before it has been enjoyed by the dominant tenement for 20 years; but there is one exception pointed out by Mr. Roscoe in his useful digest. A., the owner of a house which has ancient lights, raises the roof and upper part of the window-frames, thus enlarging his windows. B. has no right to obstruct them, even although A. is thereby the gainer of additional light. It is also competent for the owner of an ancient light to alter it by making it horizontal, according to the ruling in the "*Natl. Prov. Plate-Glass Co. v. The Prudential Insurance Co.*" Another moot point about which lawyers and surveyors differ is as to the extent of the right to light. It is clear that a servient tenement owner cannot by any erection or alteration appreciably darken any room in the dominant owner's house; but the degree of obscuration, rendering a room or workshop substantially less useful or comfortable, is not so easily determined, and we may quote here a note from Mr. Roscoe's little book which may throw a little light on a rather vexed point.

"It may be pointed out that the impression founded on the words of sect. 85 of the Metrop. Amendment Act, 1862, and sustained by some cases, such as that of '*Beadel v. Perry*,' that the existence of 45° of light from the zenith is a test of the sufficiency of the amount of light, has now proved to be wrong. Such an amount of light may be some evidence as to the probability of a serious obstruction, but beyond that has no effect." Of course the burning of gas during the day may become useful evidence, and it is pointed out, stronger evidence is required if the obstruction is lateral than if it is direct. The actual subtraction of sky area, measured horizontally as well as vertically, by a new erection is the chief point in the quantitative view of the matter, and there are methods we have before pointed out in these pages for measuring the angles in both directions. The Building Act rule, which required the height of a building not to exceed breadth of street is a wholesome one, but does not always apply, while the amendment to the Act, 1878, which prescribes a distance for the walls of buildings from the centre of roadway, useful as it is, does not touch the evil. A more specific rule with regard to the height of new buildings on sites in thickly inhabited parts of the City is required, one which will apply to such cases as we have referred to, or to buildings over which the existing Acts have no control, or very imperfectly protect the rights to light and air not acquired by law. The architect's difficulties would be considerably lessened if there was a rule in force to limit the encroachment of new buildings on old sites, and to restrict their height, so that properties in the rear or at the side would not have to resort to litigation every time access of light to a window was threatened. As regards the practice of building lofty areas for light and air in the rear of pre-

mises, we can only say it is prejudicial to the healthful occupation of the larger warehouses and places of business in crowded streets, and we cannot avoid the reflection upon the probable effects in the future of this overcrowding in some the more congested localities in our cities.

CHLARING - CROSS HOSPITAL NEW MEDICAL SCHOOL.

LAST Monday afternoon the new medical school in connection with Charing-cross Hospital was opened with a conversazione. The school is built on a leasehold site granted by the Duke of Bedford, on the north side of Chandos-street, and has a frontage of 35ft., and a depth of nearly 100ft. On the east side the building is skirted by a narrow court known as Bedford-court; and the lighting has been mainly obtained by windows on this side. The ground-plan forms a long parallelogram with a slight projection on the west side in the rear, and comprises a spacious vestibule with officers' rooms on the right-hand side, a square staircase of stone, a library and librarian's room, and a long cross apartment at the end to be used as a museum, 41ft. by 21ft., and 18ft. high. There is a shallow gallery on each side approached by steps, and the room is fitted with cases of pitch-pine, and is well lighted by windows at each end, the main ones forming the gable end towards the court. Attached to the museum is a curator's room. The library is another spacious apartment, near the staircase, lighted from the court, and in communication with a librarian's room. It is approached from the main vestibule. The staircase is central, 20ft. by 18ft. square, with spacious straight flights of stone, lighted by a lantern at the top.

Ascending the first flight, we observe a similar division. In the front, well lighted by large sash-windows and casements above, fitted with Elsley's patent fasteners, is a physiological laboratory 33ft. by 21ft., and intended for microscopic work; the other rooms are devoted to a chemical theatre in connection with a chemical laboratory and a classroom 24ft. square; and a theatre for 170 students, with large and lofty windows, the centre one being carried up above the ceiling, is also obtained on this floor. The windows have sashes below and casements above; the lecture-table is placed below these windows, so that direct light is insured; and the seats are arranged tier above tier in nine rows, curved in plan. The doorways from gallery are arranged to lead from the stairs-landings. The second floor has a post-mortem theatre, 21ft. square, arranged, in front, with ample lavatory accommodation on one side, an upper theatre for anatomical purposes, 33ft. by 27ft., over the lower theatre, and a dissecting-room, 41ft. by 24ft., in the rear. These rooms are all admirably lighted by top lights, and are ventilated by pivoted frames in the skylights. The post-mortem theatre has a lantern-light along the ridge of roof, and forms the front gabled portion of the facade; the principals are queen-post, boarded between, below the skylight, the upright lights of which are actuated by Elsley's patent balance levers. The dissecting-room, which is behind (over the museum and laboratory), is lighted also from the roof by a long lantern, or ridge-light, with side ventilators; wrought-iron principals with elliptic ribs carry the purlins, the spaces below the lights being boarded and painted. The floor is paved with red and black tiles, and the heating arrangements consist of "hydro-caloric" coil cases at both ends, supplied by Messrs. Weeks, of Chelsea, on their new principle, admitting fresh warmed air.

The construction and details of the building have been arranged with strict reference to the use of the students. There

is a lift which serves each floor to convey subjects for dissection to the upper rooms, and is in connection with a subway, which connects the hospital with the basement of the new schools under Chandos-street; the walls are generally plastered with Parian cement, to prevent absorption, and are painted with suitable shades of colour; and the floors of the dissecting-room, post-mortem room, laboratory, and corridors are tiled with red and black tiles. The dados and woodwork are dark chocolate and green. The basement, used for stores and housekeeper's room, &c., is well lighted, and we find Hayward's prismatic lights have been introduced with much effect. Kaye's percussive locks have been used. In the roofs, lead flats have been adopted, to avoid encroachment on adjoining rights of light and air. We learn that Mr. Courtney (Messrs. Barkers) have generously foregone their rights in this respect, enabling the architect to avail himself of better lighting than otherwise possible. We have already mentioned that the system of warming is by Weeks' hydro-caloric coils. These, as our readers may remember, have a decided advantage over the ordinary coil in which the pipes are placed horizontally, and the fresh air, instead of passing over the hot-water pipes, passes through them. Open fireplaces recessed are also used, and the chimney-pieces of these, relieved by tile sides, are pleasingly designed in harmony with the style of the building. Mr. J. J. Thomson, A.R.I.B.A., who is the architect, has certainly made the most of the site, and the rooms for practical surgery on the upper floors, and the theatres and conveniences are carefully planned. With regard to the style, the treatment is of the simplest character in a sort of Free Classic, but in some of the external features partaking of Queen Anne. The front is of red brick, and is relieved by a gable on one side, which forms the external wall end of the post-mortem theatre. The surface of the gable is panelled. A deep enriched cornice of moulded brick separates this story from the next, and the treatment here consists of plain red brick pilasters between the large windows of the laboratory, a frieze of ornamental brick being obtained between, below the cornice. There is a rather ornamentally treated brick porch, with Ionic columns and a cut brick pediment, and the remainder of the lower story is rusticated in brickwork. It would have improved the effect of the gable if the curves had been bolder or a straight gable had been introduced. The difficulty, however, was to conceal the lantern, and this has been done by carrying up the centre part a little higher than the rest. The cost of the building has been about £11,000; the builder is Mr. W. Shepherd, of Bermondsey, and the architect's clerk of works, Mr. H. Elmes. The premises recently occupied by the school have been utilised in enlarging the out-patient's department of the hospital.

We noticed at the opening conversazione several exhibits of interest. Specimens of pharmacy, by Messrs. Burroughs and Wellcome, Messrs. Savory and Moore, and Mr. Martindale, and some surgical apparatus lent by Messrs. Weiss and Sons and Messrs. Ash and Sons, besides microscopes and other scientific instruments, were exhibited in the several rooms. The electrical apparatus and the phonograph of Edison, exhibited and demonstrated by the London Stereoscopic Company, elicited much attention and interest from the visitors; and we must not forget to notice several water-colour drawings lent by Mr. J. J. Thomson, of Westminster cloisters, Wells Cathedral, views in Belgium, and on the Loire, of special merit; also some art porcelain, metalwork, and sculpture, respectively lent by Messrs. Phillips, Messrs. Gardner, and Messrs. Bruceiani, which adorned the upper rooms.

THE NEW GALLERY AT THE BRITISH MUSEUM.

AN additional gallery is in course of construction at the British Museum, which is intended, we understand, to receive, among other objects, the colossal statues of Mausolus and Artemisia of Caria, which are well known to every student of archaeology and art. As the new gallery will form an important extension of the western wing of the museum, and as the design and construction, though they agree in all essential respects with the galleries adjoining, may be considered to be a typical study of a gallery for works of sculpture, in which good lighting is an element, we may give our readers a general idea of the structure from a personal inspection of the works. The British Museum, as our readers are aware, forms a spacious hollow quadrangle, the main Ionic facade towards Great Russell-street forming the chief entrance front. The wings which form the main galleries appropriated to classical archaeology are on the western side, and the building now constructing occupies a vacant parallelogram-shaped area at the end of the Hellenic Gallery, inclosed partly by the Elgin Gallery, and parallel to it.

The interior dimensions of the new gallery are about 150ft. in length and 40ft. in width, and its height to the coffered or panelled ceiling is 30ft. These dimensions are satisfactory, as may be seen by looking at the Elgin gallery adjoining. The lighting will be by three large skylights, the sloping sides of which are considerably raised, we should say about or a little higher than a square pitch. In this respect exactly the same proportions have been adopted as those of the skylights of the adjoining galleries. The entrance to the new gallery will be at one end by a descending flight of stone steps, and these flights of steps are designed as copies of the old ones, in which the capping or ramp is carried by small fluted columns of the Doric order. The building we find has made considerable progress; the roof is on, and is being covered with copper, a material which it appears is laid on all the flat concealed roofs of the museum, and from inquiry and inspection of them we find the material has well justified its use, as the old roofs are in a perfect condition, and quite watertight, the sheets having a coating of a greenish blue, which is known to preserve the metal from further corrosive action. As a few details of the construction of this gallery may be acceptable to some of our readers, as being a replica of the main parts of this vast structure, and as showing how museum galleries may be designed in accordance at least with the highest authorities of buildings of this kind, we give the results of an examination made with Mr. Pulman, the clerk of works. The walls of the new gallery are mainly the old ones, the windows of which have been filled in with brickwork. Nothing can surpass the solidity and durability of the old work, which has been cut down here and there for the new gallery. One cross-wall we saw, of about three bricks thick, showed brickwork of excellent quality, and the old concrete which has been broken up cannot be excelled. Sir Robert Smirke, the original architect, was noted for his substantial construction, and it must be remembered that architectural buildings of this magnitude were carried out without stint of money or material forty years ago. Thus, surrounded by the old walls, the main task of construction is the roof. About twelve wrought-iron plate girders, of 40ft. in the clear span, cross the new gallery, and upon these the roof is constructed. Each girder has a bearing on stone templates, and is of a depth of 3ft. in the centre, the top flange being slightly

cambered, so as to obtain a fall on each side. These girders, of which there are four to each skylight, are so spaced as to form one bay or panel between the lights, and, as will be seen, each skylight will be crossed below by two of these girders, or as they will appear below, architraves. Upon the upper flanges of these girders purlins are placed; above them are wooden joists, carrying 1½ in. boarding for the copper sheets. These sheets are laid with their edges turned up, each edge being covered by that of the adjoining sheet; with regard to the horizontal joints, these break in the centre of each run or half of roof, and are made of seven laps. The sheets are well turned up at the skylights, and spacious gutters are formed on each side to carry away the water. Each sheet measures about 4ft. by 2ft., and has a weight, we should say, of 20oz. per square foot. The value of copper as a covering we have before spoken of, and for the roofs of our public buildings which have flat pitches, its comparative lightness and appearance are points in its favour while the cost of copper does not greatly exceed 8lb. lead. As we have hinted, the old coverings show a coating of carbonate or verdigris, and this film forms a protective coating which prevents further oxidation. Copper, however, oxidises very slowly. Each of the iron girders which we have described, is cradled down with woodwork to the required level of the beams which cross the ceiling and divide it into panels; and the ceiling itself is also suspended from the roof, and presents one mass of cradling. This part of the workmanship reflects the greatest credit upon the carpenters employed, each of the coffer in the compartments being obtained in this manner. The new roof is not quite so high as some of the others, and is well protected on all sides by the walls and parapets of the adjacent courts. The new gallery is being carried out under Mr. John Taylor, the architect to the Office of Works, by Messrs. McLachlan and Sons, Mr. Charles Pulman is the clerk of works, under whose personal supervision the works are being executed. A glance at the roofs of this single wing of the museum gives one a general idea of the extent covered by it, and the economic conversion of the area. There is no other roof in London which presents so extensive an area of flat surface and skylights; and a view from the upper flats shows much that is interesting and instructive. People never see the roofs of the British Museum, and many, no doubt, wonder, as they perambulate the spacious courts of the interior, to find so much light in a building which, externally, is windowless and extremely gloomy-looking. The gigantic dome of the reading-room is inclosed between the four blocks which form the quadrangle, and the whole of the vast area is thus lighted by glass roofs hidden by the parapets of the buildings. We are not saying the plan is the best or most desirable for lighting sculpture and fragments seen under the most brilliant atmospheres in their original places, but the top light gives the nearest to perfection we can get in London. Round the inside of all stone parapets of every building runs a cast-iron main-pipe of 4 in. diameter, with stop-cocks and connections for hose, &c., by which, should a fire occur in any part, the whole of the roofing could be deluged with water at a good pressure in a few moments. It is needless to say a word in praise of this arrangement upon a building which is the national depository of our treasures.

Architecturally, the ceiling of the new gallery will be finished to correspond exactly with that of the present Elgin gallery, the treatment of which is strictly Greek of the Doric order, and the details in this respect are worthy of the taste of its original

architect, who seems to have followed the best examples of the Athenian Acropolis. An unrelieved wall supports the cross beams of the ceiling, and the whole effect of the panelling and mouldings will be heightened by polychrome decoration. The present walls of the Elgin gallery are of a rich chocolate or Pompeian red, and the ceiling is picked out in appropriate colours. The dark background is a good relief, though when the galleries are again painted, and they sadly need cleaning, a lighter key of colour may be found better suited to afford more light. As the galleries of the richest specimens of Greek Art, we hope the trustees will avail themselves of the best advice in any new decorations of these galleries, so that they may be in strict accordance with what we know of Greek polychromatic decoration, but of so simple and subdued a tone as not to detract from the value of the works exhibited. No mistake could be greater than to design the galleries of a museum in a rich or elaborate style of architecture, or finish it over-decoratively, and in this respect the severe and simply-treated galleries of Sir Robert Smirke have in them something appropriate to their use which will go a long way to redeem the expenditure on a façade, masked by porticos of detached columns, that has not found admiration in the eyes of many of this generation.

TIMBER ROOFING.

A GOOD treatise on roofing is one of the wants of which the literature of practical building is in need. We have, indeed, a number of works treating of the theoretical principles of the subject, besides several books and papers touching some of the more practical requirements of the builder; but these take little account of some matters which are constantly occurring in practice. The formulation of certain data respecting quantity of material in trusses of particular spans, with regard to cost, the material and weight of covering of different pitches, and the stresses to which ordinary types of roof are exposed, would be of considerable use to the architect and builder. These might be arranged in a tabulated form for reference, the spans being given every 5ft. of length and the approximate size and stresses given for each timber. With regard to the effect of the laminated rib roof very little has been published that would afford architects the means of comparing them with the ordinary framed kinds. No doubt the cost of a laminated roof is less than that of one of the ordinary types for wide spans, but it would be useful to know the comparative cost of their construction; and the same information would be valuable with respect to roofs framed on the Gothic principle, in which the truss is absent. With respect to all these varieties, which have no direct tie at the springings, the architect and builder are in some doubt as to their thrust on the walls. The collar is a doubtful tie, and the thrust of such roofs must be left to the stability of thick walls and buttresses.

The cube timber in ordinary trussed roofs, and the cost of labour are questions which are repeatedly asked by the architect and surveyor; and if, in addition, he knew where to turn for scantlings of timbers of different forms of truss and collar roofs, many useless inquiries would be saved. A certain kind of open roof is required, and it is often a question what form is the best or the most economical. The sizes or scantlings for timbers might easily be obtained from knowing the total weight on one bay of the roof, and the calculation need not be a long or tedious one. Having the total weight, each of the pieces of the framing would be represented by a certain multiplier

suited to the angle of roof; in fact, the size of each timber would be found by using a certain constant representing the stress in terms of the weight. Tables of safe loads for timber exposed to compressive, transverse, and tensile strains, would then furnish all that was required. Thus in a trussed roof the strain on tie-beam would equal the weight multiplied by a decimal number or constant representing the stress, and then assuming a certain thickness of framing, and the length to be given, the size of timber is at once obtained. A similar process would enable the sizes of struts, rafters, king- and queen-posts, &c., to be easily found. What the architect requires is a series of typical roofs, for which all these particulars have been worked out, assuming, of course, a certain total weight on each bay. Tables and graphical diagrams would be sufficient to furnish all the cases likely to occur. The span and the angle of pitch would be the chief varying quantities in each kind of roof. The merits of different kinds of roof-covering are imperfectly known to young architects, and the market sizes and thicknesses of lead, zinc, galvanised iron, and copper sheets, the weight of each of these per foot, and their comparative durability, are questions constantly demanding solution. How often have our "Intercommunication" columns contained questions respecting the advantages of certain kinds of roof, their thrust, and the scantlings required; or asking information on the method of laying felt, zinc, and other materials. There is ample material for data of the kind we have indicated: tables and textbooks on materials abound; but the misfortune is the information is fragmentary and scattered, and one has to turn to half-a-dozen textbooks for the particulars, and even then the information is not exactly the kind or exhibited in the form required for practical builders, who have little mathematical knowledge.

Viewed in an artistic sense, the subject of timber framing is especially interesting; but few works have been published which are of much general interest to the architect. Palladio has published four designs of timber framing, and it is worth mention that to him we owe the principle of diagonal framing, with radiating pieces joining the upper and lower ribs, and which has been used on a large scale in many of the timber bridges in America. A similar design has been carried out over the Schuylkill, near Philadelphia, with a span of 340ft., and a rise of 38ft., having radiating pieces. The ribs are braced together by diagonals. Bridges with polygonal arches are common, the roadway being level at the top, and these constructions are always more or less artistic, however liable they may be to derangement from the number of pieces composing them. The Mediaeval architects have furnished us with several admirable instances of artistic framing, examples of which in England have been published by Mr. Habershon, in his work on the "Roofs of the Middle Ages."

THE CHURCH CONGRESS.

THE twenty-first Church Congress was opened on Tuesday morning at Newcastle-on-Tyne. Yesterday the following paper was read by Mr. G. F. Bodley:—

MODES IN WHICH RELIGIOUS LIFE AND THOUGHT MAY BE INFLUENCED BY ART.

The subjects given for the papers this evening are "The Modes in which Religious Life and Thought may be influenced by the Arts of Architecture, Painting, and Sculpture." It has fallen to my lot to bring before you a few thoughts on the subject as connected with the first of these sister arts—that which is, indeed, the queen and mistress of all. First, let me say that while religion can be independent of art, in its highest phase, can hardly exist, cer-

tainly cannot thrive, without religion. So that I could wish our subject had rather been, "The Media in which Art may be, and has been, influenced by Religion." For there has been no great school of art that has not drawn its origin and impulse from religion, and been inspired by it. I am not speaking now only of Christian art; it is true of all great art, Pagan as well as Christian.

Man's greatest and most lasting works show his highest ideal. He will express these in the noblest way he can, and make them durable; a monument of his highest thought and faith "for those that come after." It was so with the Pagans; and while their houses, with few exceptions, have perished, so that we know them not, their Temples, though in ruin, still stand as monuments of the religion out of which they rose. That religion has long passed away, but its symbols can still be seen. But while religion can live without art, it is only natural and reasonable that art should be employed in its service. We are complex beings, with sense, intellect, spirit. We have reason; but imagination is just as much a part of ourselves. Both should have due play in our religious worship. And surely for our Christian faith—the Gospel of the Son of Man—it is especially reasonable that art should lay its services at her feet. If, then, it is true that the highest art has had its spring in religion, so, in an especial way, is it true of architecture. Architecture is in some respect like music, the expression of abstract ideas. It is eminently expressive and symbolic, and fitted for the use of religion. Christian architecture shows one long effort to reach after the ideal, to aspire. You know the history of Gothic architecture in Christendom. It had its rise from Roman buildings of the later time, and in our own country the rude Saxon Church is presently supplanted by the more stately Norman edifice—that giving place to the Gothic creations of the middle ages, when a great church was, as Lord Lindsay said, "the very embodied idea of the spiritual Church," instinct with symbolism, not merely in details, but in the whole structure soaring upward to heaven. And here let me say that few of us have any adequate idea of the beauty or the full teaching of a great church in the best times of ecclesiastical architecture. We see our old churches denuded by the ruthless hand of revolution, starved by the coldness of a worldly age, and, often now empty, swept, and yet garnished by so-called restoration. Those only who have the eyes of knowledge and imagination can conceive the glory of a large church of the middle ages. It was a great school for art, as well as for religious aspiration. And consider how full of teaching these churches were; first in their ideal character as a whole, as shrines in which Faith offered God her best; and then in all their detail of carved and painted subject and imagery—not cold and bare, as we see them now, but glowing with the glory of colour, and full of saintly figures and painted Christian story. Westminster Abbey, beautiful and solemn as its tone is still, was very different once. As all our old churches, it was painted richly. Even in the west doorways of Tintern Abbey were coloured and gilded, and that with only a pent-house roof over them.

Few, indeed, are those whose hearts have not been moved and uplifted by the great churches of Christendom. And, apart from this impressive character, there is the silent witness for religion which every religious building bears; a witness in which the rude wayside chapel, the simple village church, and the stately cathedral alike share. It is a true instinct of this witness for religion that has made Churchmen protest against the destruction of ecclesiastical edifices in the City of London; and a true artistic feeling has in the past. Wren's churches took the place of those existing before the great fire. The memory was perpetuated; is it now to vanish? If the City is deserted by night, is it not covered by day? Or are we to be Christians on Sundays only? In our more religious age these churches, allowed to remain, may be turned to better use. It is to be hoped this example may be followed in our other great towns. If church monuments are to be destroyed, let them be destroyed elsewhere, and not destroy these symbols of the piety and faith of earlier times.

But I must offer a few practical remarks on architecture, as it can best serve and assist our Christian worship. I need not discuss the style in which our churches should be built. It is wisely settled that Gothic should be employed. Coleridge expresses the moral influence he found in a great church, and the difference of feeling wrought by the Gothic and Classic styles. "When I enter," he says, "St. Peter's at Rome, or St. Paul's in London, I feel how great a man; but when I enter Westminster Abbey, or a great Gothic church, I feel how small man I am." I would say on style, that I think we should more frequently employ the later manner of the 14th century. That, and the work of the early part of the 15th century, have been too much neglected. The artistic history of the middle ages was one of advance and increasing refinement. The drawing of the figure, in wall-painting or on glass, if not in sculpture, was continually improving. We have been too ready to call the later Gothic work "debased." I would say, on this point of style, that we are getting too far away from ancient examples and models. In the earlier stage of the Gothic revival these were more taken as guides; guides, at any rate, in their spirit. This is an age of science, not of art, and it is not ripe for any new style. Certainly the attempts to form a "Victorian Style" have not been successful. Style is, after all, only a language. New things may be said in an old tongue; and we need not invent a new language to write a new book. Our beautiful old English Gothic will serve for all our requirements, and is capable of infinite variety and freshness of design. Let us keep to our own manner of English architecture. There may, of course, be exceptional reasons for the use of other styles. For example, a private chapel attached to a house of Renaissance architecture may be probably best carried out in that style.

Next I would urge that we should build larger churches. To be impressive in scale is of more value than detail; though detail is of great importance to give the impression of size and mystery to a building. It is surprising how the skilful use of detail can produce an effect of vastness; and how largeness and coarseness of detail dwarfs a building of considerable dimensions.

It is an important question how far fewer but larger churches would not be better in our great towns than the churches we build of the regulation size, holding, it may be, some eight hundred people. Would it not be better to build in such places for two or three thousand souls, and have outlying chapels associated with the great mother-church of the district? Surely such churches could be more effectually and economically worked. We lose the force of the "sympathy of numbers" felt in the "great congregation." Mr. Beresford Hope, more than twenty years ago, advised larger churches being built; buildings more cathedral-like in dimensions and design.

In great cities, like this in which we are met, churches should be erected more monumental in character and more spacious. Our domestic buildings are growing, and our ecclesiastical edifices should grow also. How striking is the view of a great city seen from afar, with its church in its midst, towering above the houses, and stamping a character on the whole place and country, a silent witness for the Faith. I would plead, then, for churches with ample floor space and height. In architecture nothing is so impressive as height. That can be attained even if the site of a town church is cramped. It should be almost a rule, that every town church should be as large as the site allows of. A practical piece of advice is, not to try and get everything done at once, and so cramp the whole. Let us design on a dignified scale, and have the work carried out as time and funds allow. We may well leave some unfinished great conceptions for the future to mature. We are not without examples of old buildings, of most dignified proportions, in some of our parish churches. But it is true, as Mr. Ruskin has said, that here in England we "have built like pigmies." It is time we built on a larger scale. Our churches should not be crowded with fixed seats; more space should be left for ample gangways, and around the entrances. There are those who, entering to gaze, may "remain to pray." For such these spaces would be of much use. Our church building societies should make their grants on the area of the floor, not

on the numbers that can be crowded into fixed seats. It would be a good plan for a town church to screen off one bay at the west end with a high and defensive, but open iron grille. The doors of the church might stand open all day, and passers-by could enter and use that part for their devotions. Such a part of a church, thus screened off, might be all but open to the street. To thus see, from the glare of the noisy street, the long perspective of a dim interior, solemn in its repose, with altar and high reredos gleaming in the distance, would, I think, be at once edifying and certainly artistic.

I pass to other practical points. Our town churches should be more frequently vaulted. This feature, so seldom adopted in England, lends dignity, impressiveness, and solidity of effect. As compared with a handsome open roof, it does not very materially add to the cost of a church. Again, I would urge that the interior of our churches should be more considered; be better and more fully furnished, and have more care and thought spent on them. An exterior is of far less importance, so long as the proportions are good and dignified. For the most part, in our great towns, there are few places where it much matters what the exterior may be; the situation is destroyed by the ugliness of modern surroundings. It is of no avail to be harmonious with discords all around. But it is not so in the interior of a church. There the architect is in full possession of his audience, and what he has to say of noble thought, or religious expression, cannot but be heard. Our churches should be treated much on the principle on which we treat our houses; it is on their interiors we spend most thought and adornment. We want more sculpture and painting; our old churches were full of them, though some brackets or corbels, and some marks of colour under white-wash, may be the only signs remaining. Would not sculptured figures of those who have been great in the story of the City of God teach and edify? Would not the representation of Christian events be especially useful for the poor, and bring objective truth more home to their minds? Dr. Arnold wrote of what he saw abroad: "The open churches, the varied services, the beautiful solemnities, the processions, the Calvaries, the appeals to the eye and ear through which the heart is reached, have no natural connection with superstition." "It is idolatry, bowing down to fallible men; not to bend knee and heart to every thought and image of Him Who was manifested amongst us." Only the other day, a country labourer, seeing a chancel cross that had been restored with the figure of our Lord, said, "You don't tell me they treated Him in that way?" He had never before realised the fact of the Crucifixion; never, I suppose, having seen it represented. That is, I think, a striking fact, and a strong plea for such representations in a Christian land. Our ancient churches invariably had the figure of our Lord on the Cross at the entrance to the chancel. A central fact of our Faith was thus evidently set forth. "Sic Deus dilexit mundum," "Thus God loved the world," is an inscription I have seen under such a representation of our Lord, with outstretched arms, embracing the whole world, as it has been said. Would not such representations fix the wandering thought, help aspiration, and deepen reverence?

Another point is the need of more private and quiet places in our churches. The side-chapels of old churches afford places of retirement for private devotion. Might it not be well to revive these chapels, using them for early celebrations, and other services, when the worshippers are few? Have we not suffered from the violent reaction in these matters that swept over the 16th century? We need every help in religion; let us avail ourselves wisely of all. In former days in our land, and now in many places abroad, the churches were and are the very homes of the devout poor. In the early morning, before the labours of day, and in the evening, before the rest of night, the poor frequent the great and solemn churches, and seek silence and repose, there to pray for the rest that remaineth and the House that is eternal. What a change and repose to them, after their cramped and squalid homes, and the noise and hardness of the day's work, to find privacy and dignity in the great silent darkening church, and there pour out their hearts to God. Let us build and adorn our churches for God and His poor. It was to the poor "the Gospel was preached."

Another point is *concentration of ornament in the interior of our churches*. Concentration of richness is a great artistic principle, now too much neglected. In all our work let us reject what is frivolous or tawdry. As in ritual, so in architecture and its ornaments, our aim should be *solemnity and dignity*. A noble reserve and restraint in ornament is a high quality in all art. Nature teaches us this; its jewels and finest metals are rare. The fabric of a church may be simple, even to severity; but if there is concentration of beauty and richness, the result at once satisfies.

That concentration of ornament in a church should, I need scarcely say, be in the choir and sanctuary. The simplest edifice, with a well-raised and dignified altar and reredos, will at once have a religious and impressive effect.

We live in a time when Puritan prejudices, as far as externals go, are passing away: and we should avail ourselves of all aids to devotion, so long as they are manly and noble. I think we may do so fearlessly. Hooker says: "Certainly Almighty God has nowhere revealed that He desires to be served meanly." He was writing with Puritan prejudice around him; and one detects the latent satire. There are few things more singular than this prejudice against dignity and beauty in the worship of God. The Puritans took their phraseology from the Old Testament, and would smite their enemies with a text from the Book of Joshua. They turned the first day of the week—the glad echo of Easter—into a Jewish Sabbath, tinged with gloom, instead of brightened by praise. But there was one leading idea of the Old Testament they did not imitate: the honouring God with their substance. Strange to the Puritan mind must have seemed the directions for the work of the Tabernacle and the Temple! Strange must have seemed "the gold and blue and purple and scarlet" of the Tabernacle, words coming in continual refrain; or the carved cherubim wrought by him "who was filled with the Spirit of God in wisdom and all manner of workmanship"! Strange that House of God, of hewn stone, which rose in silence, lined with cedar or beaten gold; its doors carved with flowers; their hinges of gold! Certainly God did not then desire to be served meanly. And yet it is with such prejudices, however sincere, that the religion of our land has been saturated. Happily the blight is passing. It is a prejudice, I believe, alien to the English mind, and one from which it will break free.

Let me conclude with the words of two writers of opposite schools. James Martineau says: "What is falsely called a purely spiritual worship is an attempt to evolve and sustain devotion from isolated powers of the spirit, that are never meant to act alone. That God is a Spirit has not hindered Him from shaping the vault of night and hanging it with stars, or from clothing the earth with its beauty." "They are the works of His creativeness; the appeal of His beauty to our hearts." Lord Lindsay wrote: "The Church of England does not exalt Imagination, and repudiate Reason; but includes them both, harmoniously opposed within her constitution, so as to preserve the balance of truth—thus approximating, in degree, to the ideal of human nature, Christ incarnate, of Whom the Church is the Body, and ought to be the Likeness and Image."

Papers on kindred subjects were also read yesterday by Prof. W. H. Monk, and Mr. T. Gambier Parry. The last paper, together with the discussion on the general question, in which Mr. Beresford Hope and others took part, we may probably give next week.

THE ECCLESIASTICAL ART EXHIBITION.

The Ecclesiastical Art Exhibition has been held in connection with the Church Congress at the Northumberland-rooms, Pilgrim-street, Newcastle. Close to the entrance-door on the right is the stand of Messrs. Jones and Willis, of London, upon which is displayed a large collection of church furniture and articles of decoration. The speciality of the stand is the "Hesperus Lamp," made for lighting small country churches and mission-rooms where gas is dear or difficult to come by. Each lamp of the "Hesperus" kind gives a light of 45 candles, and, as it burns petroleum or any other kind of mineral oil, it is quite easy to manage. Nearly opposite to this collection is the space occupied by the display of Messrs. J. Wippell

and Co., of Exeter, who show brass altar vases, together with such church fittings as gaseliers, lamp and gas standards, &c., &c. An interesting object placed for inspection on the opposite side of the hall is the last of the Newcastle sedan chairs. This relic is the property of Mr. Elgee, of Pilgrim-street. Middle-aged men still remember seeing the sedan chair with its bearers in the streets of Newcastle, some three or four ladies of the old school continuing to use it as a means of conveyance up to about thirty years ago.

In the gallery at the west of the building an entire section is set apart for the exhibits of Mr. G. J. Baguley, artist in stained-glass, Carlisle-street, Newcastle. First we come to a series of cartoons representing subjects for stained-glass windows of various styles.

In one of the side rooms of the gallery which encircles the hall are the exhibits of Messrs. Cox, Sons, Buckley and Co., London. Noticeable amongst the objects of art shown by this firm is a carved oak reredos, constructed for the church of Kelsale, Suffolk. In the same department is a reredos, less important in size and in art value to the one just described, but still of good design. The central panel is divided into two sections, each of which are occupied by paintings on a gold ground, the higher of the two containing a representation of the Crucifixion, with St. Mary and St. John at the foot of the cross. The lower section contains a faithful copy of the picture of St. Phillip of Assisi. At the east end of the large gallery this firm shows a design for a stained-glass window placed in Leatherhead Church, to the memory of the late Bishop Utterton. The subject is the Last Supper. Close to this design is a cartoon of the east window in St. Mark's Church, Leamington, the design for which has been furnished by this firm. The firm have also upon view a photograph of the pulpit originally executed by them for the church of St. Nicholas, Great Yarmouth. Messrs. Cox, Buckley and Co., also show a series of church vestments. Ecclesiastical plate also forms a large portion of the exhibits of this firm. At the end of the room is an altar fitted up with proper furniture. The altar-cloth is well worth inspection. It has been designed for the Church of St. Matthias, Kensington.

The stand of Messrs. Doulton and Co., of Lambeth (whose representatives in Newcastle are Messrs. Walker and Emley) contains four Scriptural pieces in terra-cotta, being "The Entry in Jerusalem," "The Times of Solomon," "Christ reproving His Disciples," and "The Judgment of Solomon." "The Times of Solomon" are represented by two sets of seven figures each, showing the time to keep silence, represented by the figure of Miriam watching Moses; the time to speak, represented by King Ahasuerus; the time to read, Job reading his garments; the time to sew, Adam sewing fig-leaves; the time to get, Delilah counting money; the time to cast away, Judas casting away the price of treason; the time to embrace, the Shunammite woman and her son; the time to mourn, Naomi refusing to be comforted; the time to heal, the maniac among the tombs; the time to dance, Miriam at the Red Sea; the time to be born, Virgin and Child; the time to refrain from menace, Joseph in Potiphar's house; the time to refrain from embracing, Joseph running away from Potiphar's house; the time to lose, Samson finding that his hair had been cut off; the time to die, Samson overthrowing the pillars. The designs are by Mr. George Elinworth. Messrs. Walker and Emley, of Newcastle, occupy a stand close to Messrs. Reid's station, and the most striking object in their portion of the exhibition is an elaborate marble floor, the squares of different-coloured marble being solidly inlaid in a body of cement.

Close to it is located the stand of Mr. Thomas Harding, Stokenchurch, Oxon, who shows some excellent specimens of church furniture. Chairs such as are now in vogue for seating cathedrals, minsters, and other large churches, are here to be found in all known shapes. Especially noticeable is a design for a church chair with a sliding kneeling-board at the back. This convenience can be drawn out and replaced at a touch, and in many churches would supply a want that is greatly felt. A peculiar chair of this construction is shown in a design supplied to the Hook Memorial Church, Leeds. The chair is rush-bottomed, of Gothic outline, and the back so constructed as to furnish a back-sled for the worshipper behind. The kneeling-board

works upon a hinge, and can be taken down and replaced at pleasure.

THE LOAN COLLECTION.

The section known as the Loan Collection contains a large number of articles of extreme beauty and rare workmanship. A small case lent by Mr. C. Watkin Williams Wynn, contains a carved ivory diptych illustrating some of the chief events in the life of our Saviour. The object is of about the period of 1350 or 1400, and is probably Nuremberg work. It was purchased in Paris during the short Peace of Amiens in 1802. The diptych is divided into four panels on each side. The incidents in the life of the Saviour, which are cut in high relief, commence with the Annunciation, and carry on the sacred story through the Adoration of the Magi, the Slaughter of the Innocents, the Flight into Egypt, the Presentation in the Temple, the Last Supper, and the Crucifixion and Interment of Our Lord. By the same lender is displayed two ancient missals printed in Paris in the years 1501 and 1503 respectively, which are worthy of inspection.

A collection of articles, displayed in a large glass case set up on the side wall of this room, has been lent by Mr. William Bragge, of Birmingham. The case contains no less than 124 "Icons" or religious pictures used in the Greek Church in Russia. These are chiefly in brass, and many are enamelled, but some are painted and mounted in silver gilt and in silver, whilst one or two are in gold leaf. There are twenty-four crucifixes in the case, many of them plain in workmanship, and of small intrinsic value; whilst others are encrusted with jewels. There are a larger number of diptychs, triptychs, and other religious emblems carried about by the Russian peasantry.

A case, lent by Mr. Thos. Wm. Usherwood Robinson, F.S.A., is well worth an inspection. It contains an autograph of the celebrated Apostle of the North, Barnard Gūpin, the rector of Houghton-le-Spring, and the Ecologist of the district of the North Tyne and Reed-water, who flourished between the years 1558 and 1585. Scarcely less interesting and more attractive is a silver chalice, made at York in 1590. This article, which is of the usual dimensions, has been hammered out of a single piece of silver. It is a unique specimen of the silversmith's art as it existed at the latter part of the 16th century. Rich ornamentation is very sparingly displayed upon it; but the geometrical figures with which its stem and foot are decorated are very curious and fine. A unique silver reliquary makes up the collection lent by Mr. Robinson. This article has a silver chain attached to it, and was apparently worn round the neck by some devotee, apparently of the 16th century, to which period its ornamentation belongs, and it was found suspended round the neck of a skeleton exhumed in the churchyard of St. Dunstan's Church, in Fleet-street, when the old church was demolished in 1831. The reliquary bears two figures—one of St. George in the act of piercing the Dragon, and on the other is the Empress Helena bearing the cross in her right hand and a book in her left, whilst in the background are the buildings of Jerusalem. The workmanship appears to be of Eastern design, and of the period above stated, and is probably copied from more ancient representations. The reliquary is in splendid preservation, and the work upon it appears as fresh as on the day it was suspended round the neck of its first wearer.

In this section of the exhibition is a collection of the badges of the several guilds in connection with the Anglican Church. The decoration of the Guild of St. Alban is very conspicuous in that respect. It has a bright blue ribbon, from which is suspended a straight cross, surrounded by a well-known emblem of the first martyr of the English Church. The badges are carefully mounted on cardboard, and each is marked with the guild to which it belongs.

One of the most striking objects is a jewelled processional cross, at present in use in St. Augustine's Church at Kilburn. In the centre of the cross is a jewelled Maltese cross, set in precious stones. In this decoration the jewels used are emeralds, one of which figures on each of the four points of the cross, with a large opal in the centre, surrounded by several kinds of stones in which rubies are conspicuous. At the four points of the cross are the emblems of the Four Evangelists.

Interesting in another way is a medieval relie

placed upon one of the side tables, and lent to the exhibition by the Rev. L. E. Owen, vicar of Farnham, near Chester. This instrument is known as the S. O. B. Bille, and, curious to say, it is known to have been in use since the commencement of the present century; the churchwarden of the parish of Farnham having led a woman, a notorious sinner it may be supposed, through the village and parish church during the time of divine service, with his bridle hooked up in her head.

Mr. C. Hodgson Fowler sends a chalice and paten of the fourteenth century, German work. The chalice is massive, but plain in design, and displays no jewel of any kind in its ornamentation. The base carries six bosses, on which are letters. The paten is simply a plain plate, without ornament, engraving, or chasing of any kind. There is also a chalice and paten enriched with enamel, fifteenth century, Italian work. The chalice is a silver bowl, gilt in the inside, standing upon an elaborately ornamented stalk, which bears six enamel. The base is also beautifully carved and worked. The paten is very plain, the only ornament being an enamel in the centre. A Spanish chalice of the fifteenth century is exceedingly curious, on account of the elaborate decoration of the stem which supports the bowl, and of the shape and mode of fixing of the bowl itself. Quite as interesting is an enamel, of Italian workmanship, dated 1670. The receptacle for the frankincense is covered in at each end, and the lid is in the centre. The whole of the surface is elaborately ornamented, while the stem is quite plain, and is little in character with the superincumbent part of the vessel. Along with this collection are a couple of objects lent by Mrs. C. Hodgson Fowler. The more striking of the pair is a cross of mother-of-pearl, brought from Jerusalem, and minutely carved. The Crucifixion is represented in the centre, with emblems of the Trinity above, and the weeping Marys at the two points of the cross. Below is a skull and cross-bones, and the figure of one of the saints. Very beautiful is a baptismal shell, from Bethlehem. The concave surface of the shell is quite plain, but the back is ornamented with elaborate carving, the principal subject being the birth of Christ, the Infant Saviour being shown in the manger, with St. Mary and St. Joseph kneeling beside him. The Star of the East is seen shining in the distance.

The collection of ecclesiastical plate and pen-and-ink sketches lent by the Superior of St. Dunstan's House, Plaistow, Essex, is on view in the case on the left, as the visitor enters the room in which the loan collection is on view. The chalice and paten used in the Brotherhood oratory, were designed by the Rev. E. Geldart, and executed by Messrs Barkentin and Kraal. The chalice is of "parcel gilt," enriched round the base with jewels, which are set in massive bosses, and which lend an effect of extraordinary richness to the sacred vessel. The base, knob, and stem are counter-chunged, with a view to secure variety of outline. The style of the whole design is "Late Decorated." In the same case is a silver tankard presented by Thomas Wentworth, Earl of Stafford, to an ancestor of the gentleman who lends it for exhibition. The tankard is massive in outline, and is an excellent example of the silversmith's work of the period. It bears the inscription "En dono Earle de Stafford, 1623."

The Rev. A. W. Headlam, of St. Oswald's, Durham, contributes some remarkable specimens of ecclesiastical work. The most interesting of these is decidedly the Processional Cross of 11th-century workmanship, now in use at St. Oswald's Church. It was found amongst some old brass purchased by a Durham ironmonger, who discovered its value and interest, and retained possession of it until his death. His widow then presented it to St. Oswald's Church, where it was restored, and a base and staff added to it. The cross itself is of elaborate workmanship, presenting silver figures upon a brass frame. The centre figure of Christ is full of interest to art connoisseurs, the work being just as it left the hands of the medieval artisan, except for the small number of brass which has been fixed over the head. The base of the cross is ornamented by trifoliate and is very open and light in treatment. On each side of it are stands, which carry respectively the figures of the Virgin and St. John. At the points of the cross are lozenge-shaped spaces,

bearing the emblems of the Evangelists. The orb at the base of the cross shows the inscription, "Fulguit crucis mysterium." An old offertory basin still in use at St. Oswald's is also full of interest. It is a massive piece of plate, of silver gilt, and is elaborately worked over its whole surface. In the centre is a cross, with the letters I. H. S. and the conventional representation of the hammer and nails of the crucifixion. Upon lozenge-shaped spaces round the edge are four inscriptions, one of which reads as follows:—"The gift of John Sedgwick, Esquire, A.D. 1699, to St. Oswald's Church in Durham." Two alms basins, one the gift of Mr. David Dixon, and the other of Mr. E. Lambton, to St. Oswald's Church, are also shown by Mr. Headlam. They are plain in design, and comply literally with the rubrical injunction that the alms should be collected in a decent basin. Last of Mr. Headlam's contributions is a silver gilt chalice with cover, of elaborate workmanship, and interesting on account of its shape and beautiful finish.

THE SOCIAL SCIENCE CONGRESS.

THE business of the Social Science Congress commenced at Dublin on Tuesday morning at 10 o'clock, in Trinity College.

ART EXHIBITIONS.

The Art Department was presided over by Sir Robert Stewart in the absence of Lord Powerscourt. Papers on the special subject of the influence of annual exhibitions of contemporary pictures and sculpture on art and public taste were read by Sir Thomas A. Jones, Mr. T. C. Horsfall (Manchester), and Mr. W. Cave Thomas. The consideration of the question commanded a good audience, but the remarkable consensus of opinion expressed in the papers as regards a question which cropped up in two of them as a secondary consideration had the effect of almost obscuring the special subject of the contributions. The discussion turned almost exclusively on the question of the propriety of opening public museums and art galleries on Sunday, and all the speakers except one supported the Sunday opening movement. The feeling of the Art Department has always preponderated in favour of Sunday opening, but such a oneness of opinion on the proposal as was shown this morning is said not to have been manifested at any previous Congress. In the afternoon Mr. J. Howard Pentland read a paper on æsthetics and false art considered in connection with the æsthetic movement, and the prospects of the English schools.

STATE SUPERVISION OF HOSPITALS.

The meeting of the Health Department, presided over by Dr. Cameron, M.P., was rather thinly attended. Mr. Henry C. Burdett read a paper on the desirableness of hospitals being placed under State supervision.

He adduced a great mass of evidence in favour of this course being adopted. He thought that the appointment of a Royal Commission to investigate the subject would secure the adoption of adequate measures based upon the reliable data which would then be forthcoming. He placed first among the circumstances which have produced so active and unanimous a desire for inquiry the many anomalies of the present system of hospital administration. The administration of the hospitals as at present conducted is so uncertain and unsatisfactory that inquiry is needed to secure amelioration in the interests of the poor. To facilitate a right judgment and furnish reliable data, Mr. Burdett had prepared a variety of elaborate and carefully-compiled statistical tables, based upon the published reports and statements of the various institutions. These showed that the cost of management in 61 general hospitals varies from 21 per cent. at Cork, to 27½ per cent. at the Metropolitan Free Hospital; the cost per patient per week from 28s. 1d. at the Cork County Hospital, to £3 0s. 1d. at the Leeds General Infirmary. A difference of 25 per cent. in the cost of management, and of nearly 700 per cent. in the cost of maintaining the patients would alone warrant the appointment of a Commission. The special hospitals show equally startling discrepancies. As to the distribution of hospital accommodation, nearly nine-tenths of the bed accommodation in the London hospitals is situated within a radius of a mile and

a half from Charing cross. North London, with a population of nearly 1,000,000, possesses but one hospital, the Great Northern, with 33 beds; the East-end, with its riverside and manufacturing population of 1,100,000, is dependent upon the London Hospital with 750 beds, and the Metropolitan Free Hospital with 20 beds, both of which are inconveniently situated for a large proportion of the inhabitants. The West-end, with a population of 950,000, has but two hospitals—St. Mary's with 190, and the West London with 60 beds respectively. A population of nearly one-and-a-half millions on the Surrey side of the Thames has to rely upon Guys, with 700 beds, and St. Thomas's with 400 available beds, both of which, though largely endowed, are situated miles away from a portion of the district to the wants of which they nominally administer. The unsatisfactory condition of the present out-patient system, and especially of that in force at the large metropolitan hospitals, demands reform. About 400,000 people come annually to 13 of the best hospitals in London for medical advice and assistance, at an annual cost of £15,000 in medicine alone. The average attendance of these patients is from three to seven hours before each can be attended to, and the rash is so extreme that the medical advice they receive is almost perfunctory. It is desirable that every hospital and medical institution for the poor should be administered by a board of management, subject to periodical election by the governors, upon which board the medical staff of the charity should be adequately represented. An authoritative supervision over the administration and a public audit of the accounts of all such institutions is needed. The absence of organisation and combination among the medical institutions throughout the country materially lessens their usefulness. In the administration of the wards, so far as it affects the treatment of the patients, and especially in the management of the nursing arrangements, the medical staff should have an authoritative voice. Unfortunately, in the majority of the large hospitals the nursing arrangements are under the control of a matron, are unaided by a nursing committee, and only indirectly, if at all, assisted by those alone qualified to direct—viz., the medical staff. Out of 22 hospitals having medical schools, there are but seven where this important department is superintended by a nursing committee upon which the medical element is represented. The importance of medical education, and the adequate training of the members of the medical profession, require an intelligent recognition of the relation of the hospitals to their medical schools, to insure an improvement in such relations. Mr. Burdett left it for the Congress to decide whether or no it was desirable that our hospitals should be placed in some sense or other under State supervision. He claimed to have produced enough evidence to show that the time was ripe for an exhaustive inquiry by a Royal or other Commission.

It was resolved, on the motion of Dr. Cameron, Chief Medical Superintendent of Health of Dublin, seconded by Mr. Darby, of Bray, that the council of the association be recommended to take measures for a prompt and practical inquiry, with a view to securing independent supervision for all public hospitals.

PERSEPOLITAN AND ROMAN ART.

On Wednesday the following paper was read by Dr. Phéné, F.S.A., F.R.G.S., "On the Refining and Humanising Influences of Art. Persepolitan and Roman Periods."

The author drew attention to the fact that, as in former papers he had selected periods, for comparison, in which the national features treated of were either coeval or consecutive, and in which contrasting effects were most prominent, and as his object was to examine the influence of art in forming or swaying national character, the periods now selected exhibited parallel effects from similar causes, though at a greater interval, and with powerful intermediate nationalities, hence leading to more decisive conclusions.

His last paper, on the Asiatic and Roman periods, might be supposed to have included the present one; but in that he had treated of Asian art during the time of the existence of

* See Transactions, 1877, p. 765; 1878, p. 729; 1879, p. 781; 1880, p. 806.

high-class art schools, established after the period he was now considering.

It might be thought that so little was known of Persian art, so little of Persian character, that there was but a slender foundation for evidence. That, he urged, was the evidence; the very little distinctive Persian art, and the flimsiness of Persian character, bearing a marked relationship. The Roman character was firm and vigorous, and the area of Roman arts extensive; but the parallel lay in the complete want of original art in both nations, and with the final similar result of annihilation. Indeed the parallel was even more marked, for, in its earlier history, Persia assimilated to Rome in the primal temperance of its citizens and soldiers, simplicity of manners, dress, and customs—through which both countries achieved their conquests and established their solidity, and at which periods in each, art was unknown. Both also succumbed under a false appreciation of art, from its debasement to bodily and physical enjoyment, rather than the mental and philosophical refinements its culture produces, with their consequent far higher and more intense enjoyment. Although a momentary digression, he could give no better example than the following:—When it was sought to introduce the Asiatic mysteries into Greece, the Greek leaders long resisted them as degrading to the morality of the people. When it was sought to introduce the gladiatorial shows of Rome into Athens, a cry was raised by the populace, "First throw down the altar erected by our ancestors to MERCY" (Lucian).*

Here was true refinement from true appreciation of art; and it would be difficult to show that it proceeded from any other cause, as they were nations of a similar faith, and the Greeks even surpassed the others in military acquisitions and courage, though numerically less powerful, while of the three, they alone understood and cultivated art. They alone had artistic originality which taught them to reject alike sensual effeminacy from the East and the cruel spectacular revels from the West. Greece and Greek fine art alone still live in fact. Rome and Persia but in history.

The effects upon existing nations have been widely different through the Asiatic and the Roman sway, notwithstanding their parallelism in deficiency of original art; for Rome had a period of utilitarian art, in which Persia was wanting.

Both plagiarised to the fullest of their ability; both raised their palaces, and enriched their capitals, not only with the wealth, but the mental powers of the nations they conquered. The stupendous remains at Persepolis, combining the materials and dimensions used by Egyptian architects, with the beautiful fluted columns and the capitals of quasi Grecian art, attest this, though, with an Oriental supremacy and appropriation, the capitals were surmounted by an Indo-Assyrian ornament and shrouded with meaningless fretwork by Persepolitan artists, like the Eastern kerchief thrown over a captured beauty, to indicate that a place would be found for her in the harem. Even the gorgeous apparel of the Persians, and their costly tents and equipments, were borrowed from the Medes; the introduction of which, by the great Cyrus, was a folly of age inconsistent with his youthful chaste severity; when satiated with conquest, and with the world at his feet, he resolved to fix his residence at subjugated Babylon,† he attired himself and his retinue, for the first time, in bejewelled and gold-embroidered Median robes, and with this was changed the retirement of the Persian women, who were thenceforward companions of the march and bivouac. The Persian is the effeminate feature of art.

The curious plan of Oriental enrichments on the sides of the great staircase leading to the celebrated hall of 10 pillars, at Persepolis, though having evidence of the Greek chisel, was also shown not to be original, but to have been borrowed from Chinese design.

Greatly different, the author pointed out, were the ruins of Rome, worked less in costly marble than useful brick, in which she stands pre-eminent. Her edifices tell, not alone of places, temples, and triumphs, but of aqueducts,

factories, shops, and highways—all borrowed from the Greeks of Europe or Asia, it is true; for Asiatic and Egyptian bricks, and (as we now know, from the recent discovery of that at Siloam) the aqueducts of the East also existed before Rome was; but wonderfully adapted and beneficially widely spread. At the very time that Rome was sinking from the influx of sensual luxury that came in with the spoils of Asia—from her citizens not understanding the exquisite perfection and chaste purity of Greek art—at that moment western Europe was being enriched in utilitarian works by her paternal Government, soon to be polluted and withdrawn. But long as was the lapse and recoil into inactivity and darkness, those nations have recovered what she has not, and what Italy is now only slowly beginning to feel—a reascendency, not only of all imparted by that great civilising mother, but with a picturesque and delicious charm arising from what Rome had not—the peculiar originality of each. So that whether in the useful or higher and refined art; in music, painting, or literature, national originality, and national mind and genius ennoble modern countries, while not despising the useful Roman foundation of art established in each. If the Italian fine art school rose first, it should be remembered that Italy was the sole place of deposit for the sculptures and paintings brought as spoils from Greece, some of which paintings remained till the time of Púny, and probably long after.

ART.

The special question considered in this department on Wednesday had reference to the relations of painting and sculpture to architecture, on which papers were read by Mr. H. H. Statham and Mr. Cave Thomas.

It was remarked by Mr. Thomas Drew, R.H.A., in the discussion which followed, that the relations in question were admittedly unsatisfactory, and he ascribed the fault to the extravagant pretensions on the part of some architects to be masters of sculpture and painting, and to design the adornments for their own buildings. Dr. Todhunter read a paper on the prospects of the higher drama in England.

HEALTH.

The Health Department was unusually well attended throughout the day, and a very animated discussion was carried on for several hours with regard to the question of the compulsory notification of infectious diseases by medical attendants.

Papers were read by Mr. W. H. Michael, Q.C., Dr. J. W. Moore, and Dr. Stewart Woodhouse. In opening the discussion, Dr. Jacob, editor of an Irish medical journal, who said he spoke with some authority on the part of the medical profession in Ireland, offered an uncompromising opposition to compulsory notification. He was followed by Mr. Hastings, M.P., who stated that local Acts for compulsory notification in various parts of England and Scotland had worked advantageously, and that it was his intention to reintroduce next Session his Bill to provide for a general system of notification of infectious diseases throughout England and Scotland.

WIMBORNE MINSTER.

THE central tower of Wimborne Minster has recently given signs of failure, and prompt and decided measures will have to be taken to arrest the mischief. Wimborne, says the *Saturday Review*, though not one of our grandest minsters, and much inferior in size to the neighbouring churches of Sherborne, Romsey, or Christchurch, scarcely yields to any of them in architectural and historic interest. Its remarkable outline, presenting a low massive central lantern, and a tall western tower, reproducing on a miniature scale the outline of Ely, and that of Hereford till a hundred years back, cannot fail to attract attention. These two towers indicate the double destination of the church. The central tower, of Transitional date, was that of the collegiate church; the western, of a thoroughly parochial type, was added by the parishioners in the middle of the fifteenth century, as at Blyth, and Christchurch, and elsewhere, to hold the peal of bells. It is the earlier of these towers, that standing in the centre of the fabric, that is in danger. Serious cracks, we are told, have shown themselves in the

north-eastern pier of the crossing. The other three piers also afford ominous indications of internal movement; and, as the fractures are slowly but surely increasing, it is no longer a matter of doubt that the tower is, in builder's language, "alive," and that nothing but a process of underpinning and strengthening the supports of the lantern will save this chief ornament of the fabric from eventual, perhaps speedy, ruin. The foundations of the tower appear to be sound, which is not always the case in Norman buildings, and give no indications of settlement or weakness. The source of the mischief lies in the piers themselves. These, like the works of Norman builders generally, with all their seeming solidity, are so inartificially constructed that the wonder is, not that they should be falling now, but that they should have stood so long. Their huge bulk and apparent strength are simply deceptive. Norman pillars are really nothing more than outside cases of ashlar, or cut stone, inclosing a core of rubble brought into something like cohesion by a vast quantity of mortar, but with no real bond, either in its own incoherent mass or with the external shell. For a long time, longer or shorter (and certainly some of these Norman structures may boast of a tolerably extended existence), these vast bulks stand by the sheer force of dogged resistance. But they carry the elements of their own ruin within them. In the lapse of centuries, the cohesion of the core, small at first, weakens; the rubble becomes more and more friable, and is kept in its place merely by the strength of the outside case, from which, when an aperture has been made, it has been known, as in the central tower of Hereford, to gush out in a continuous stream of powder for several seconds. As long as the shell is able to resist the outward strain the structure will stand. But when once, as at Wimborne, the skin begins to burst, its fate is sealed. The ruin may be more or less gradual, but it is inevitable.

At Wimborne, from the smaller dimensions of the fabric, and the less formidable weight of the tower, the difficulties will be less alarming and the work less costly than elsewhere. It is, however, a task which imperatively calls for the best architectural skill, and for that courage, united with discretion, which nothing but large experience can supply. We earnestly hope that local or diocesan claims will not be allowed any undue weight, but that those with whom the responsibility of the restoration rests will not scruple to take counsel with the first architectural engineers of the day, and will place the actual work in the hands of one who has elsewhere proved his ability to cope with the difficulties and dangers inseparable from such an undertaking. The seat of the evil lying within, in the originally faulty construction and the subsequent disintegration and decay of the masonry, no measure can prove really effectual but the taking down of the defective pier or piers, and their rebuilding with the utmost solidity. All patching or piecing is to be deprecated. It would merely hide the mischief temporarily, deferring, but in no sense arresting, the downfall. Such a course was at first adopted at Chichester. New stonework was built up round the rotten core and bonded with its mass, and with what result we know only too well. The old fissures spread into the new masonry, and new ones soon began to open. The outside casing exhibited only too plainly the hopeless state of disintegration of the mass behind, and, before many months were over, the tower and spire collapsed, and the whole work had to be begun where it ought to have originally commenced—from the foundation. The only true policy in such cases is Stratford's "thorough."

We must, at the same time, express our hope that the restoration of the tower will not extend beyond the necessary reconstruction of the failing piers, and the resetting of any portions of the external work which are actually dangerous. The pyramidal pinnacles and heavy battlements added after the fall, in 1660, of the spire which once crowned it, for the removal of which some are clamouring, though coarse in detail and out of harmony with the beautiful Transitional arcades beneath them, are by no means bid in effect, and are of great value as marking an epoch in that history of the fabric which is so distinctly written, century after century, on its walls, and which would be falsified by their destruction. The re-erection of the spire, however much we may regret its loss, would certainly

* Lucian in Vit. Democriti, p. 1, 214

† Xenophon, Cyropædia, 1-7, p. 193; S, p. 213 to 220 and 246.

type, in 3 spans of 100ft. each, that received the first prize in the recent competition for the proposed Liverpool Exchange Station. The Blackfriars Passenger Station of the London, Chatham, and Dover Railway, 87ft. in span, the New Lime Street Station, Liverpool, of 212ft. span, and the Woodside Station, Birkenhead, of over 90ft. span, are good examples of trussed roofs, with curved ribs. A useful and economical form of rigid arch is to be found in the Bristol Joint Line Station, of 125ft. span, and a good example of a roof forming a continuous girder may be seen at the Liverpool-street Terminus of the Great Eastern Railway, which is divided into two spans of 109ft. each, with two side spans of about 45ft. each. The tied arch, with the tie bar suspended, was another excellent form of roof. This type has been adopted at Victoria Station (London, Chatham, and Dover Railway) in two spans of 127ft. and 129ft. respectively; also at the Central Station, Liverpool, of 160ft. span, and at Queen-street Station, Glasgow, of 170ft. span. While the latter was the largest span of this class, the Central Station, Liverpool, was the boldest design, the principals being at the unusually great distance of 55ft. apart. In both these roofs the tie-rods are of steel, which commends itself for large spans as lighter in appearance than iron of equal strength. The Bridge-street Station and the Central Station, Glasgow, are recent examples of ridge and furrow roofs, running longitudinally, and carried on transverse girders. The former is divided into two spans of 114ft. and 49ft. respectively, and the latter of 213ft. 6in. clear span. It is evident that deep girders of this span need longitudinal bracing, and in the Carlisle Station, consisting of two spans of 128ft. 3in. and 154ft. 6in. respectively, the slope of the roofs are carried by cantilevers, which connect the transverse supporting girders longitudinally, the ridge being placed on the top flange of these girders and the gutter carried midway between them. The author proceeded to describe sliding roofs, noticing the Canterbury Hall, where a roof 36ft. by 18ft. was made to open laterally for purposes of ventilation, and the Paris Circus, where a roof, 17ft. by 57ft., divided in the centre, opened longitudinally by the half portions sliding in opposite directions. The roof over the Royal Observatory of Vienna was alluded to as an example of a revolving dome of 42ft. diameter. The Albert Hall was interesting as elliptical in plan, dome-shaped, and producing no horizontal thrust, the feet of the ribs radiating from the centre of the figure, and being tied in at the wall-plate, which is continuous all round. The roof is 219ft. by 185ft. across.

The proper way to calculate wind-force was to estimate the effective normal pressure on the various bays in a roof. In providing for expansion, it is more economical to fix the roof on the leeward side, and leave it free to expand on the windward side. In the Cannon-street Station roof the connection over the rollers is hinged, to obviate the effect of vertical wind-pressure depressing the roof, and producing unequal strain on the rollers. The merit of rollers may be much disputed, as they are often found to rust in their bearings. In the Earl's Court Station roof, which consists of two inverted queen-post trusses, with vertical members braced together, the wind bracing is confined to the two end bays, the lateral stiffness of the intermediate bay being secured by their purlin connections, which are here placed vertical, it being considered that the dead load and weight of snow act vertically. It was unnecessary to spread the wind ties in all directions over a roof if certain bays at intervals are secured. The author proceeded to describe the best means to prevent corrosion, and the importance of all parts of a roof being accessible to the painter's brush.

PHOTOGRAPHS BY AN ARCHITECT, FROM WORCESTER, HEREFORD, SHREWSBURY, AND CHESTER.

FEW towns could be named as possessing more choice examples of Old English half-timbered buildings of equal practically suggestive character to the architect than Worcester, Hereford, Shrewsbury, and Chester. Photographs illustrating some of the more notable of these specimens must, therefore, be of more than

ordinary interest, specially when taken entirely from an architectural point of view. A visit to the Royal Architectural Museum at Westminster will repay the reader who may care for illustrations of this kind, inasmuch as a collection of about 140 photographs from the above-mentioned places is now on view there. The prints are all carefully named, mounted, and numbered. The greater part of them show the numerous Courts and Manor Houses, as well as abbeys and churches, visited by the Architectural Association excursion party in August last, whose trip we have already described. The remainder illustrate similar buildings seen by Mr. J. L. Robinson, of Dublin, when continuing his autumn holiday after leaving Worcester-shire, and we may here say that to this gentleman is entirely due the whole series under notice, which, although taken for his own use chiefly, have been kindly placed at the disposal of the excursionists in order that they may obtain copies. Glancing at the sheets as numbered we have, in groups 1 and 7, a very complete set of studies of Worcester Cathedral, showing, not only the new work of Sir Gilbert Scott in the choir, and Mr. Perkins' restorations throughout, but also the untouched details of the Refectory, Guesten-hall, and Elgar Tower. Prince Arthur's more than lovely chantry-chapel in the choir is also carefully illustrated, giving each ornamental feature in every minute particular. The half-timbered remains in Lich-street, Friar-street, and New-street; the Guildhall and Worcester Commandery-hall are likewise grouped on the sheets 7 and 8. Turning again to numbers 1 and 2 we have remarkably good views from the highly-interesting court-house of Severn End, with its quadrangle-like wings in brick on the entrance side built by Judge Lechmere in Queen Anne's time, and its earlier timber gables on the garden front; the garden-house and unique old chests there are also illustrated with some useful details of a veritable "Queen Anne" door in stone having a pedimented head and cushioned frieze. The same page includes the fine square tower of same date from Hanley Castle Church hard by. The old stone house of Woolas Hall figures well from several carefully considered points of view in set No. 3, which same sheet is graced by two large portrait groups of the Excursionists. Huddington Court House and the much neglected, but beautiful, little 14th-century church at the same place have some four or five good views recording their ancient time-worn condition, and on this account are all the more interesting to the student as well as to the antiquary. The Pershore Abbey photographs admirably comprise the several periods of its architecture both inside as well as out, not forgetting the unfrequented parish-church adjoining. Tewkesbury also has been well recorded, some of the best of Mr. Robinson's photographs being from this place, notably prints 70 and 71, giving architectural details from the roof of the big central tower, almost in line elevation; and the unique Norman west pinnacles or towers. Members will also be glad to have secured to them a portrait of the verger here and also some timbered "bits" throughout the town. Norton Manor House Gateway (No. 83) is among the present most successful examples, as it was the only erection of its kind seen on the Excursion. Of porches there are several views, including Mr. Street's new one in timber at Hanley Castle (65), the old ones at Huddington, both from the Court House (82) and Church (87), the debased-charactered one at Mere Hall (90), with a valued portrait of the host, and Mr. Hardwick's well-designed entrance at Newlands, 101. The larger and somewhat pretentious gatehouse at Westwood is more than once given, and the mansion itself is the fit subject for three or four views, embracing in some the garden-houses. An interior or two gives the big gallery and staircase, while the really most valuable part of the building, architecturally considered, is beautifully photographed in print 21, which gives a detail of the entrance porch. Maddresfield Court, the seat of Earl Beauchamp, is photographed from both sides, and No. 103 in a too small view, records a parting glance at Mr. Norman Shaw's characteristic entrance lodge to the same grounds. The iron work at Mere Hall and the Queen Anne summerhouses, 91 and 92, are even more interesting than the quaintly timbered mansion itself, 19. Both Great and Little Malvern are by no means overlooked; the

peep of the towers in each instance, the former from over the Pool (105) and the latter from the manor-house grounds (107), being specially pretty. The timbered Court-house at Salwarpe has three good photographs 100, 101, and 102, the best being the foreshortened view second named. Ledbury, one of the last places visited, occupies a good space of group sheets, 5 and 12, where the church both inside and out, the market-house, and grammar school are more than once given.

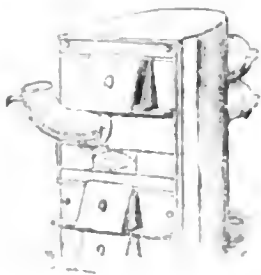
Hereford Cathedral, from the S.E., obtains a fine view No. 39, but the detailed photographs, showing the north porch, the cloisters and the market house, are more interesting. A general view of the building from the south-west is given with the river in the front, and the singular groining of the porch is illustrated by Plate 126. Chester contributes several views, showing Sir Gilbert Scott's work of restoration at the Cathedral, and well illustrates Mr. Blomfield's schools. Of half-timbered work, several old examples are of course included, and none the less interesting are two specimens of modern Chester work in this style of building. We refer to Mr. John Douglas's really clever cocoa-house, built two or three years ago, and illustrated by us at the time, and some houses next a well-designed church in the Grosvenor-road, by the same hand. Mr. W. H. Lynn's Town hall comes out abruptly in View 40, the new markets adjoining by the same architect, just being included in the Plate. Of the old Rows No. 30 gives an elevated prospect, and includes the hardware warehouse, with its oversailing timbered gable, built we believe from the designs of Mr. T. M. Lockwood, of Chester. The old rough-east houses at the corner of Shipgate-street figure in No. 30 with the elaborately-detailed front of timber under one wide gable near the bridge.

The Grammar School and the massively-arcaded Market-house at Shrewsbury, which have been the source of inspiration for more than one recently-conspicuous design, form the very interesting subjects for photographs 31 and 117. The uncomfortable way in which the arches of the Market-house come upon the eaps is very unfortunate. Else the building presents a suggestive type of a design for modern uses, and our regrets that a small photograph only was on this occasion devoted to its illustration. The Feathers Hotel, Ludlow, and some other old timbered houses are given, as well as a charming photograph of the south porch from St. Mary's, Shrewsbury. This well-known church is also given by a general exterior view (32) and by an interior (33) looking east, showing the fine open arcaded wall-space over the chancel arch, and the curious semicircular arches of the nave arcade of Late Early English date. The singular way in which the large roll corbels back on to the pier eaps is specially worthy of note, the effect as seen in perspective being rather good. The west front of the Abbey is illustrated by print 116, and the timbered church of Besford, as restored by Mr. Hopkins, is not forgotten, a view from the north-west being recorded by photograph 85. The collection of photographs we have thus briefly enumerated will be on view during the next fortnight at the Museum in Tufton-street, Dean's-yard, Westminster. Admission free.

THE "LOUGHBOROUGH" BOILER.

MESSRS. MESSENGER AND CO., of Loughborough, have just brought out a new boiler for heating greenhouses, harness-rooms, coach-houses, coils in halls, &c., which is worth attention. The advantages claimed are that no heat is wasted, the boiler standing in the house, the whole of the heat from the boiler itself is utilised; economy both in first cost and maintenance; there being no brick setting or iron casing required; and consequently none to get out of order. Not being set in brick-work, or attached to the freehold, it forms a "tenant's fixture." No stokehole is necessary; the front of the boiler being flush with the greenhouse, and on the level of the ground. It may be fixed either in the brick or boarded front of a greenhouse, and is absolutely safe from risk of fire. Being on the slow-combustion principle, it is very economical in fuel, and no night-stoking is required. The joints to the hot-water pipes are put together with elastic rings, and can be fixed by any handy person. The hot-water pipes are connected immediately to the sockets of the boiler, so that the necessity

for mains is done away with, and the pipes circulate through an open-feed siphon fitted with a lid, so that there is no need for any siphon and supply-pipe. Simplicity has been



studied in all such parts is these, that an efficient apparatus may be produced cheaply without sacrificing any essentials, or the quality of the materials. The fuel consumed is 16lb. in 12 hours, and the apparatus is capable of heating, including the boiler itself, the equivalent of 4000 ft. of pipe.

PRACTICAL NOTES ON PLUMBING.—
XVI.

By P. J. DAVIES, H.M.A.S.P., &c.

TRADE MARK.

DAVIES' PATENT SELF-CLEANING POT TRAP (FOR LEAD PIPE).—FIG. 95.

THIS trap, bearing my name and being my own invention, it is just possible that I may be charged with egotism for recommending



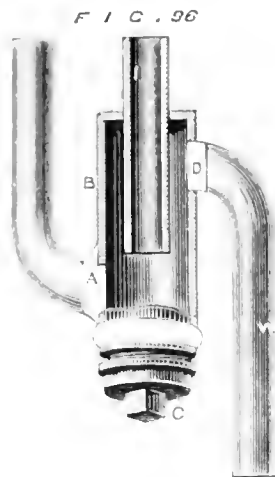
it. I think, however, those who test its qualities will agree with me that it is one of the best and most simple traps yet introduced to the trade, both on account of its self-cleansing properties and its cheapness.

It can be made, as shown, with a rounded bottom B, a piece of lead soldered on to the bottom as a flange. It will be found very convenient for fixing under "Smith's" or "Shank's" cast-iron baths. I is the inlet which may be a piece of, say, 2in., about 2in. long, which in many cases only a 1in. pipe is required. W is the waste-pipe, which for "Smith's Bath" should be 1 1/2 in., and can be soldered within 2in. of the bottom, as at S, and fixed to the S plug as per dotted line D, then fasten up in the usual manner. It will, of course, be understood that when this trap is in use, the water level is as shown, and the trap and outlet are kept clear in the usual manner. If the trap is used for washing-basin or sink, the trap and outlet should be fixed in the wall, which is a trap, ought to be selected for its purpose, and the bottom of the pipe or trap should be a flange as shown at the bottom.

I have also shown a diagram of this trap in a cross-section, showing the matter of the trap and outlet being kept clear by the action of the water level, and the outlet W.

SOAP-TRAP (Fig. 96)
Represents the so-called soap-trap, which has long been used for washing-basins.

The first made to this pattern was in 1863, made and fixed by myself at 19, Portman-square, London. The following is the mode of

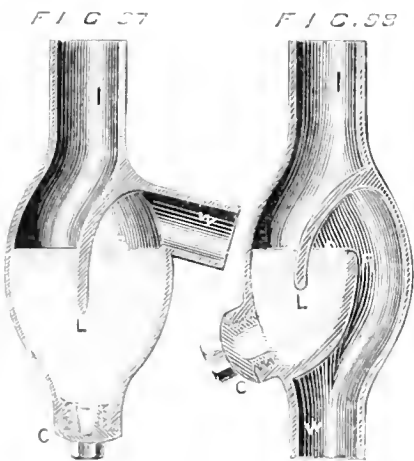


construction: B, the body 2in. pipe; I, the inlet and dip pipe, soldered to unit; O, the overflow-pipe soldered on at A; W, the waste-pipe soldered on at D; C, the cleansing-cap and screw.

In fixing all traps of this description (or, indeed, if the truth be told, any traps that are required to be self-cleansing) always fix them not less than 18in. below the washer and plug of the basin or strainer of the sink. Then if the washer and plug, or grating, is large enough to admit sufficient water to fill the pipe full bore, the weight of the water falling upon the bottom of the trap will send all sedimentary matter before it. I have fixed these traps upon the floor-line, in order to get a good fall from a washing-basin, and for the purpose of cleansing it out, fixed the cap and screw, C, on the side or in front.

OVAL LIP TRAP (Fig. 97).

The principle of the oval lip trap is very similar to that shown in Fig. 95,



except that in Fig. 97 there is the lip L, answering the same purpose as that marked by the dotted line D in Fig. 95. The following is an explanation of Fig. 97:—C is a cap and screw; W, the outlet or waste-pipe; I, the inlet; S, the water-line and seal; B, the oval body. Thus, as a small trap, is very useful, and will answer every purpose where plenty of water-seal can be given.

STRAIGHT FIG. 98. OV. LIP TRAP

Is the diagram of the straight oval lip trap, which works on the same principle as the last described, the only difference being that the outlet W of this trap is made to run in a line with the inlet I, answering the purpose of A.

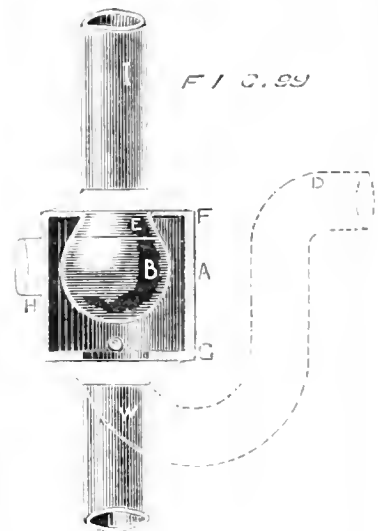
Fig. 99, and A, Fig. 88. L is the lip to prevent the gases passing from W to I, and R the lip for holding the water. It will at once be seen that if this trap is fixed upside down it is exactly the same in action.

BALL-TRAPS.

Seeing that of late much has been said, pro and con, as to the merits of ball-traps, I presume I shall not be out of order in saying that, after many careful experiments, I fail to see in what way they are useful, excepting in some isolated cases where traps become dry or lose their water-seal.

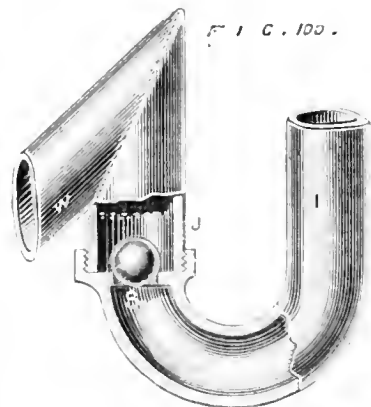
Following I give you specimens of these traps, with the most simple methods of making them:—

Fig. 99 represents one of these traps as I made them many years ago, and is very easy of construction. A is a piece of 2in. lead-pipe,



worked over so as to receive the pipe I, which may be the inlet or outlet. This pipe is first shaved clean, then dropped through the flanged part F, and, with a turn-pin, opened a little, as shown at E, to receive the ball about one-third. This forms the seating, which must, of course, be true. Solder the joint at F. Put in an indiarubber ball (hollow if you choose, but if you can get a pure rubber solid ball it is better, as pure indiarubber always floats), wrap the ball in four or five thicknesses of tissue-paper, or even more; then work over the bottom flange G and fix the pipe W, which can afterwards be bent to the trap, as per dotted lines. If you wish the ball to float, you must take the pipe up high enough accordingly; on the other hand, if you require the ball to be at all times independent of floating action, you must turn the trap upside down and load the ball. In this case, you will have to form your trap in the pipe I, and can take the outgo off the side at H. In fact, this ball-trap can be worked in almost every conceivable way.

Fig. 100 is a simple ball-trap, as shown in



one of my patents of 1876, attached to the overflow of a valve-closet. This trap, which is

shown upside down, is made as follows:—It was cast in one piece, as also the pipe I, but straight; this had the seating S cast upon it. It was cast in a mould something like a Coumburge mould, the ball dropped in, and the trap sometimes soldered at J with a copper bit, &c. If the ball were required to float, a light ball was used, the pipe, I, left straight and the other way up; but on the other hand, if the ball is too heavy to float, the trap is formed in the pipe I.

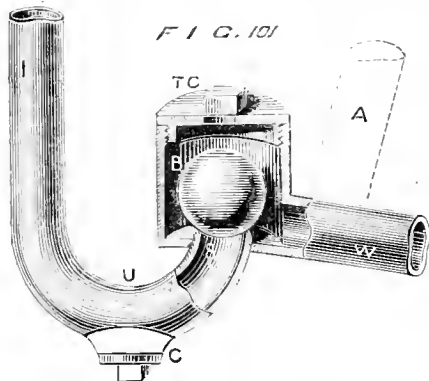
In any case I is always the inlet.

To understand the action of these traps, suppose the pipe W, Fig. 99, to be bent up as shown by the dotted line D; that is above the ball-seating. It will be seen that water would lie in the bend and form a trap; consequently, if the ball is lighter than the water it will float, and as a further consequence, be forced up against the seating E, according to its buoyancy, and thereby cutting off all chance of sewer gases passing through this pipe. When the water is set running down the pipe I on top of the ball, it will send it whirling away from the seating, but when released from this pressure, it naturally again rises to its original position.

Now turn the trap upside down and bend the pipe I, as you did W, so as to form a trap, and wipe in the stump out-go H, so that the ball will be above the water-line. Now the action of the ball will be reversed, inasmuch as the ball will of its own gravity close the seating, and thus cut off all gas from passing between I and H.

MR. BUCHAN'S BALL TRAP.

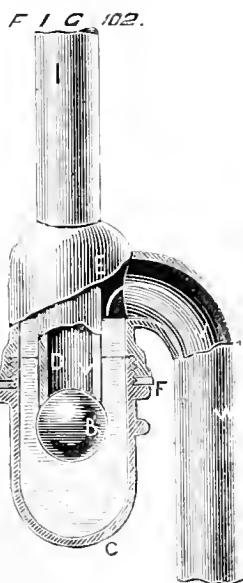
This trap in principle is the same as the last described; but, as shown at T C, has a cap and



screw, also at C and the vent-pipe A. The manner of making this trap is the same as described in reference to Figs. 99 and 100.

POWER TRAP (Fig. 102).

The Bower-trap has lately had some little run upon it, which I imagine is owing to it having



been "pushed" into the market; but, be that as it may, the following is the description of it.

The top part, I E and W, is cast in one piece of lead, and the bottom C is made to screw on at F. C is generally made of glass, which I venture to suggest is very much against the efficacy of the trap, as under extreme temperature of either heat or cold (for instance, careless persons throwing down hot water in very cold weather) glass is very apt to break, and the glass once broken the trap no longer exists.

The shell of this trap possesses no advantages over Fig. 96; neither is there any superiority in the trap, if a small, solid india-rubber floating-ball is dropped through the cap and screw, and the overflow-pipe O branched into the pipe I.

(To be continued.)

THE NEW SCHOOL-BOARD OFFICES IN LEEDS.

LAST week the Leeds Board-School held its first meeting in the board-room of the new building, which has just been erected in Calverley-street, from plans prepared by Mr. George Corson, architect. The structure is in the Palladian style, freely treated. The principal entrance is in Calverley-street. Carving has been employed in adornment, and this front, with its fluted pillars and pilasters, its Corinthian capitals and detail work, its cornices and balustrading, and its lofty pavilion, is harmonious in design and treatment. A similar remark will apply to the Great George-street façade, though it is not so ornate, the pilasters being plain. The requirements of the site necessitated this side being broken up. It has been skilfully managed, the pavilion at the end being brought forward and made a prominent feature. The basement is rusticated, and is built with stone from Burley-in-Wharfedale, the superstructure being of Pool Bank stone. The frontage to Calverley-street is 65ft.; to Great George-street 119ft., and to Alexander-street 126ft. The building is arranged in three floors—the basement, which contains offices for the attendance officer, store-rooms, care-taker's house, heating apparatus, meter-rooms, &c.; the ground-floor, on which are the board-room, the committee-room, and general offices; the first floor, on which there are large and small examination-rooms, and private rooms for the use of the members of the board; on a partial fourth floor are cloak-rooms, lavatories, and store-rooms. A double staircase of stone, approached on one side from Great George-street and on the other side from Alexander-street, gives access to the whole of the floors. The object of this arrangement is to afford separate entrances for males and females to the different examination rooms.

Entering by the principal doorway in Calverley-street, it will be noticed that in the jambs of the archway are carved full-length figures, emblematical of School Board work. They represent a boy and girl on their way to school. The work has been executed by Mr. Matthew Taylor, of Leeds. At night the entrance is closed by a wrought-iron gate, which descends during the day into the basement. The main corridor, which is 10ft. 6in. in width, and 18ft. 6in. in height, runs the entire length of the building, and joins the corridor through which access is obtained by the door in Great George-street. It is treated architecturally. The walls are built with ornamental and plain bands of terra-cotta, and divided into bays, with moulded and fluted pilasters. The ceiling is arched, and divided into bays with pannelled ribs, and the floor is tiled. The corridor is lighted with wrought-iron lamps, suspended from the centre of the vault. The first room on the left of the corridor is the Board-room, which is 48ft. 6in. by 22ft. 6in., with a height of 20ft. It is lighted by two windows in Calverley-street and three in Great George-street. These are glazed with double sashes, in order to prevent the business of the board being interrupted by the noise of passing vehicles. The room is pannelled to the height of 12ft. in black walnut. Above a bold dado are plain panels, and at the top is a handsomely carved frieze containing shields, some of which bear the names of the chairmen of the board, the dates of the election of the different boards, the date of the passing of the Education Act, the name of the architect, together with the date of the commencement and completion of the building, &c. Several of the shields are left blank, and will be

filled up with the names of future chairmen. At the top of the panneling on the side facing Great George-street there are three arched recesses, and within these are three brackets intended for busts. At the east end of the Board-room is a gallery, capable of containing about sixty spectators, access to which is obtained by a staircase from the main corridor. Under the gallery is an ante-room for the use of the members or for deputations in waiting, and in connection with it there is a lavatory and cloak-room. On the right-hand side of the main corridor, occupying a corresponding position to the Board-room, is situated the committee-room, which is 23ft. 6in. by 20ft., and the same height as the Board-room. The chimney-piece is of good design. It is formed of St. Anne's marble and black walnut. In the upper frieze are figures emblematical of the Four Seasons. These have been modelled in Doulton ware by the artist, Mr. George Tinworth. At the east end of the building the double staircase is situated, by which access is obtained to the examination-rooms. The principal examination-hall occupies the entire width of the Calverley-street frontage, and has standing accommodation for about a thousand persons. It is 69ft. wide and 73ft. long, and the height to the crown of the arch of the roof is 43ft. At the west end of the hall is a raised and railed platform, and at the opposite end is a gallery which will accommodate about a hundred people. The hall may be described as a nave with narrow aisles, divided into bays having detached cast-iron pillars carrying the arched ribs of the roof. The ceiling is of pitch-pole, and is divided into panels with moulded ribs. The hall is lighted by top-light windows on three of its sides, and for night there is a large sunlight in the centre and three-light brackets round the dado. It is intended to use this large hall for examinations, for exhibitions of the works of the children, for scientific lectures, and for educational work of various descriptions. A private staircase is provided in close proximity to the platform. It is in direct communication with the committee-room and clerk's office, and is intended for the use of members of the board or lecturers. At the south-east end of the large hall is a smaller examination-room, 45ft. by 24ft., which will be devoted to examinations and sectional lectures. On the top floor are several store and classrooms. In the basement-floor there are a number of well-lighted store-rooms. There is a receiving-room, into which all the boxes are taken from the wharries outside. They are there unpacked, and lesson-books, copybooks, slates, pens, pencils, ink, &c., are stored in a suite of rooms adjoining. The demands of the different schools for books, &c., are sent to the offices every Friday, and the parcels are ready for delivery on the following Tuesday. The scheme of ventilation has received careful consideration. A hot-air furnace, situated in the basement, is connected with every room in the building, either by flues formed in the walls or under the floors. Fresh air is also admitted independently, so that there is a continual inflow and outflow of air. Generally speaking, each department is treated, with respect to gas and heating arrangements, as a separate building, which can be dealt with entirely independent of the others. The fumes of the gas are carried into the foul-air flues. The building is fireproof throughout.

The work has been executed by the following Leeds firms:—Messrs. Wm. Wilson and Son, bricklaying and mason work; Mr. Britton and Mr. James Wood, carpenter and joiner's work; Messrs. Braithwaite and Co., plumbing and glazing; Mr. J. P. Mountain, plastering; Mr. Rawlins, slating; Messrs. Wood and Sons, painting; Messrs. Jackson and Co., decorative work; Messrs. Cooper and Dawson, fireproofing; Messrs. J. and L. Horsfield, wrought-iron roof work; Mr. Jos. Bedford, cast-iron work; Mr. J. Lindley, sunlights; and Mr. Benjamin Paler, stone-carving. The tile work has been executed by Webb's Worcester Tiles Company. The ornamental wrought-iron work, gas-fittings, locks, &c., have been supplied by Messrs. Chas. Smith and Sons, of Birmingham. The total cost is under £21,000.

The Kensington vestry decided at their last meeting to rebuild the bridge over the canal at Kensal-green, in accordance with plans prepared by Mr. Vignoles, engineer.

CONTENTS.

Light and Air in the City	449
Thames-Cross Hospital. New Medical School	450
The New Gallery at the British Museum	450
Timber Building	451
The Church Congress	451
The Social Science Congress	451
Wimborne Minister	455
The Uses and Fireproof Properties of Asphalt	456
Iron Roofs	456
Photography by an Architect, from Worcester, Hereford, Shrewsbury, and Chester	457
The "Loughborough" Belfry	457
Practical Notes on Plumbing. XVI.	458
The New School Board Office in Leeds	459
Our Lithographic Illustrations	460
University College, London	460
Chips	460
Brettell's Provincial Price-book	473
The British and Foreign Junior Architects' Society	473
The Art Season of 1881	474
The Artisans' Dwellings Act in Operation at Huddersfield	474
Royal Architectural Museum "Sketching Club"	474
Prize Drawings	474
Building Intelligence	475
Competitions	475
Architectural and Archaeological Societies	476
Archaeological	476
To Correspondents	477
Correspondence	477
Intercommunication	478
Stained Glass	479
Local Intelligence	479
Our Office Table	480
Meetings for the ensuing week	481
Tenders	481

ILLUSTRATIONS.

LITTLE HOLLAND HOUSE, KENSINGTON.—SOUTH PORCH AND DETACHED DEPENDENCY, ST. MICHAEL'S, BECCLES.—HOUSE AT BATTLE—WESLEYAN CHAPEL, HOLLY PARK—TAVERN, ROYAL ALBERT DOCK.

OUR LITHOGRAPHIC ILLUSTRATIONS.

LITTLE HOLLAND HOUSE, KENSINGTON.

Our Little Holland House being pulled down, where Mr. Watts had established himself for upwards of twenty years, he engaged the late F. P. Cookerell in 1871 to design him a house, which he had built in Melbury-road, and gave it the title of his old habitation. The new house, which covered a site of about 80ft. by 46ft., was, like its owner, unpretending and mostly devoted to work, for besides the kitchen and servants' departments there were only two bed-rooms and a sitting-room, but there were four studios and a lumber-room for artists' properties, and even these four studios did not suffice, for an iron studio was afterwards added in the garden. The house, though unpretending both inside and out, was not without some signs of Cookerell's artistic hand, and of his resources in planning. A screen, a baluster, a wood chimney-piece, or a moulding told the practised eye that an artist had been at work. But gradually the studios were filled with canvases and properties, and in 1879 Mr. Watts determined to rearrange his house, to build a picture-gallery and a porch, a lumber-room for his sculptor's models, and a look-out from the basement, from which he could see his sculpture at a proper level. He engaged Mr. G. Atchison as his architect, under whose directions the small studio by the entrance was turned into a waiting-room, and the west end of the house a picture-gallery was added, about 58ft. by 24ft., to which the waiting-room and a lumber-chamber. The roof of the picture-gallery was made wholly of glass, so that no wall-space might be lost. The double studio on the first-floor was turned into one large studio, about 14ft. by 24ft., with a recess at one end for canvases and at the other for colours and properties; the gallery was shifted from the south side to the east end, a porch was built to the front door, and a few minor alterations were made. Mr. Watts has thrown open his picture-gallery on Sunday afternoons, and the public may now see some of those masterpieces of art which have added a lustre to the British school, the "Orpheus and Eurydice," "Cleopatra and Antony," "Diana and Erycinus," the portraits of the distinguished men and two women of the day portrayed with that authority of observation and that insight into character that his sketches his work; his portrait of his wife, his sketch of a man in common life, and the sketch of a woman, his fancy has depicted the countenance of an arch and of a temper, cloud, or forest, and perhaps some landscape in the garden of his house, and the sketch of the first Fair Ground, and the sketch of the Welsh marches.

ST. MICHAEL'S CHURCH, BECCLES, SUFFOLK.

THE church of St. Michael is a very fine Perpendicular building, of which the south porch and belfry are the most conspicuous features. The porch, which is still very rich, must have presented an exceedingly elaborate appearance when the numerous niches were full of sculptured figures, and the greater part of the work was painted and gilt—no traces of which now remain, though it is on record that a few years ago a great quantity of lapis-lazuli was scraped from the niches. The majority of these niches are enriched with an imitative groining, which is so minute as to require very close inspection; no doubt these portions were brought out more prominently by the judicious application of colour. The bell-tower, which stands on the south side of the church, near its east end, was commenced in 1500, but never finished, probably owing to the dissolution of Bury Abbey. The lower portions of the tower are somewhat dilapidated, though the structure generally is in good preservation. Owing to the way the churchyard is surrounded by buildings, the accompanying view is the only one that can be obtained, showing the whole of the tower.—W. H. W.

HOUSE AT BATTLE.

This house is in course of erection near Battle. It stands on an eminence, in a well wooded country. The materials are brick, stone, and timber. The work is being carried out from the designs and under the superintendence of Mr. W. H. Oakley, architect.

WESLEYAN CHAPEL, HOLLY PARK, CROUCH-HILL.

This building, tenders for which appeared in the BUILDING NEWS on 6th May last, is now in progress. The nave is octagonal, an aisle being carried round it, except at the eastern side, where a chancel is formed. The benches are arranged so as to face the pulpit, the passages to these in the aisle being in the shadow of the columns, so that there are no seats from which the preacher cannot be seen. The slope of the ground necessitating an ascent by steps to the nave floor, a porch was formed on the ground level under this floor at its western end. A north porch gives access from a side road to the chapel without steps. Provision is made for a gallery, which can be added whenever required, and will be carried on segmental stone arches springing from the nave piers. Without the gallery, the accommodation is for 650 persons, and with it for 1,000. The materials used are red brick and Bath stone. These will appear in the internal facing also, as the walls are to be unplastered. A wooden vaulted ceiling will cover the nave, the aisle and chancel ceilings being panelled, and the space thus gained between ceiling and roof will be used for ventilating purposes. Air will be admitted through vertical flues formed in the external walls, and will be extracted by ventilators in the ceiling. Messrs. Perkins' hot-water apparatus will be used for warming the building. Messrs. Lathey are the builders, and Mr. E. Hoole, of 30, Russell-square, the architect.

TAVERN, ROYAL ALBERT DOCK.

Our illustration shows one of the taverns proposed to be built at the Royal Albert Dock by Mr. W. H. Lascells, Bunhill-row, from drawings by Messrs. Vigers and Wagstaffe, for the London and St. Katherine Dock Company. The walls of basement are to be of cement-concrete, faced on both sides with Potter tiles. Above this the walls are to be brick, and the roofs covered with plain tiles. The bay-windows, caryatides, consoles, cornices, &c., are to be of Mr. Lascells' concrete. Our view is taken from the drawing in this year's Royal Academy Exhibition.

Staff-Paymaster Wethered, of the Royal Artillery, Woolwich, has invented a simple form of fire-escape, which was tried before the members of the Derby Corporation and fire brigade on Saturday. It merely consists of a rope, to be attached firmly inside the room from which escape is contemplated, and a handle and swivel loosely attached to it, with bands to support the body of the person descending. The cost was stated to be £1, and the experiments are reported as having been successful.

A barrow on Blandford Road, Dorset, was opened last week and disclosed several skeletons.

UNIVERSITY COLLEGE, LONDON.

THE programmes of classes for the study of Architecture, Construction, and Modern Practice, at this College, under Professor T. Roger Smith, F.R.I.B.A., have just been published. Three courses of evening lectures are to be given during the session, at the College, Gower-street, the aim being to render the lectures useful to students preparing for the Associates' examination at the Royal Institute of British Architects, or the district surveyors' examination, as well as to pupils and other students of architecture. Course A—Architecture as a Fine Art (about 30 lectures, on Mondays, at 6 p.m.): "An outline of the leading peculiarities of the principal styles of architecture," historically and analytically treated. In each session some lectures will also be devoted to a fuller examination of "the special characteristics and history, the mouldings, features, and ornaments" of some one style. Greek architecture will be so treated in the coming session. Course B—Construction and Materials. (About 30 lectures, on Tuesdays, at 6 p.m. The first week in each month on Wednesday.) "The nature and properties of building materials, including their decay, preservation, quality and strength, and their application to building. The principles of construction, as applied in practice to foundations, walls, arches, vaults, roofs, floors, and partitions. Drainage, sanitary arrangements and requirements. The application of formulas for calculating the strength of materials. Shoring and underpinning; and dealing with ruinous and dangerous structures." Course C—Modern Practice. (Not less than 15 lectures, on Tuesdays, at 7.10 p.m., except the first week in each month.) "Planning for special purposes and sites. Specifications and the mode of estimating cost. The general conditions usually appended to a building contract. Quantities. The conduct of works. The adjustment of accounts. Professional charges. The London Building Act. The modern by-laws. Light and Air. Litigation. Arbitrations. Professional evidence. Dilapidations. Surveys. Valuations. Miscellaneous professional duties." A public introductory lecture, explanatory of the course and with suggestions as to modes of study, will be given at the College, by Professor Roger Smith, on Monday next, at 6 p.m. Admission free, and without tickets. Architects and students of architecture are invited to attend.

CHIPS.

The rural sanitary authority of St. Austell, Cornwall, adopted on Friday plans by Mr. John Samble, for a water supply for Mevagissey, and resolved to apply to the Local Government Board for sanction to borrow £1,150 to carry the scheme out.

A double gas-holder, 86ft. by 24ft., and a single gas-holder, 56ft. by 24ft. 6in., are about to be constructed for the joint gas committee of Denton and Haughton, near Manchester. The engineers are Messrs. Veevers and Wharm, and the consulting engineer is Mr. Harrison Veevers, of Dukinfield.

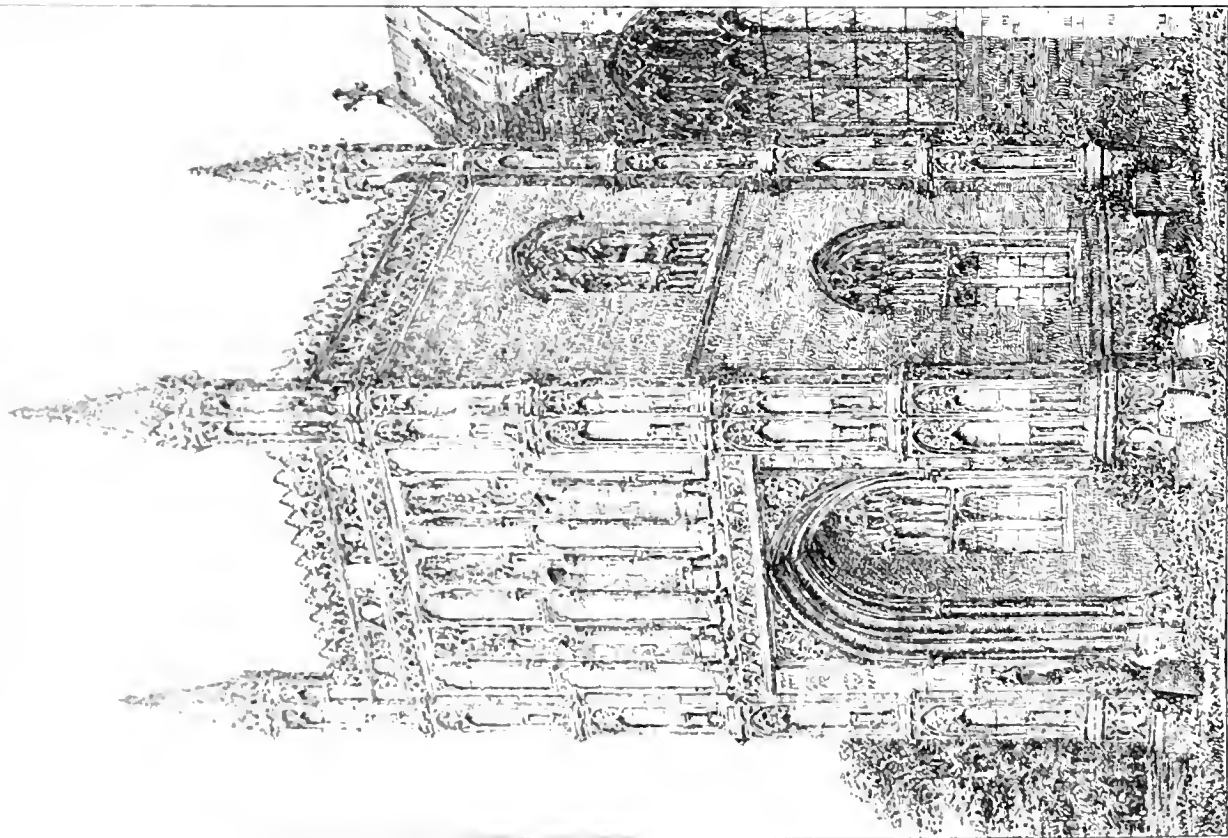
The School-board of Barton St. Mary, Gloucestershire, have accepted the tender of Mr. Nicholls for the erection of a new school. Mr. Moore, of Barton, is the architect.

The Holborn board of guardians, at their last meeting, instructed Mr. H. Saxon Snell to prepare plans for a new swimming-bath at the boys' school, the cost to be about £350.

The Chapel Royal in Prince's-place, North-street, Brighton, is undergoing restoration and enlargement from the designs of Mr. R. W. Blomfield, M.A.

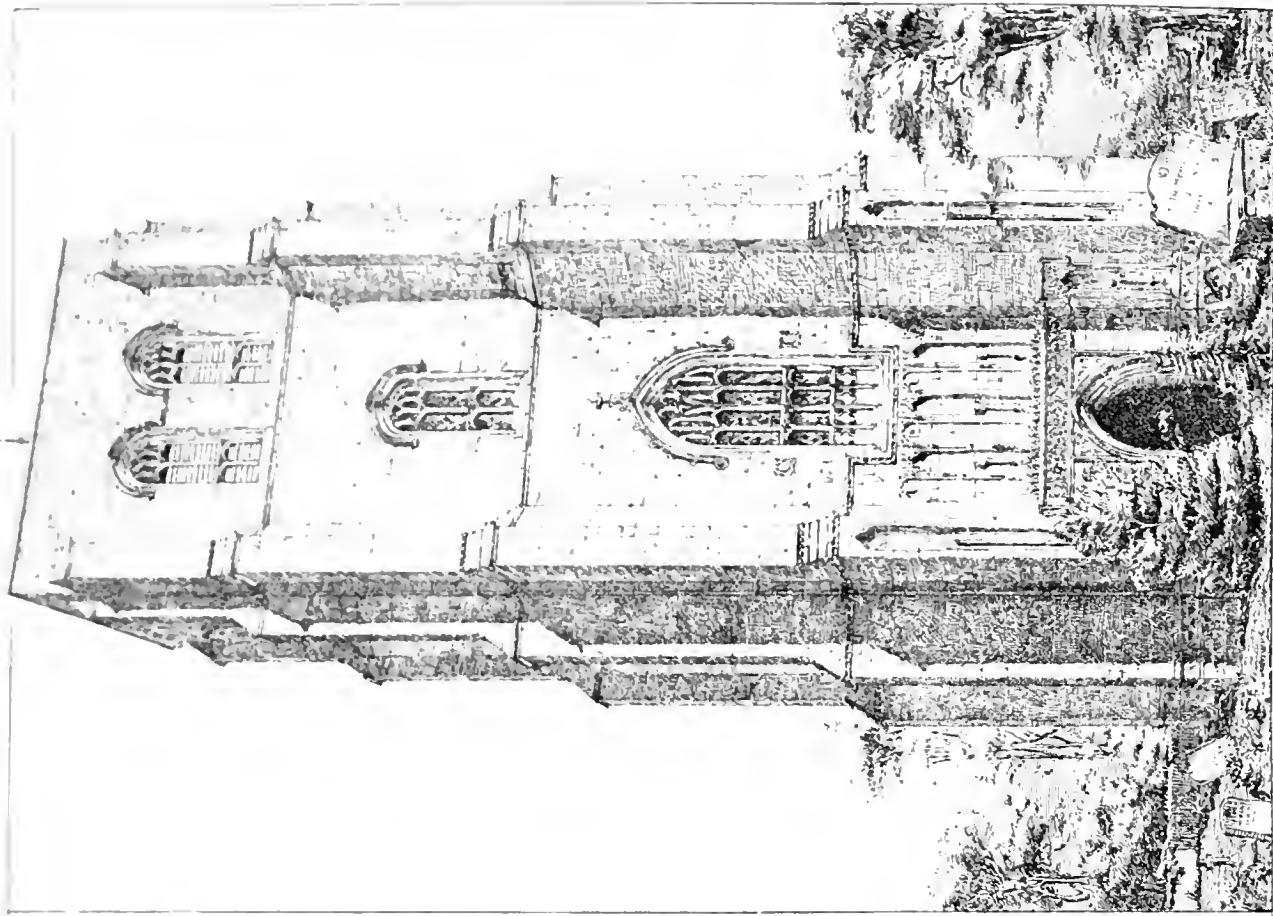
The town council of Bolton have resolved to apply for Parliamentary powers to construct works in connection with the brooks and watercourses feeding the Entwistle and Weych reservoirs; the construction of filtering-beds at those reservoirs; the borrowing of £100,000, and the extension of water supply limits.

At Dundee gasworks on Wednesday week a new gasometer, the second in size in Scotland, was formally brought into use by the provost. It is made on the telescopic principle, rises to a total height of 150ft., and is surrounded by eight iron pillars, each 3ft. in diameter and 62ft. high. The cubic capacity is about one million cubic feet. The tank was constructed by Mr. Councillor Gentle, of Dundee, and the gasometer by Messrs. Clayton, Sons, and Co., Hunslet, near Leeds; the total cost was £17,000.



South Porch, St. Michael's, Bellry.

W. H. Wood, Del.

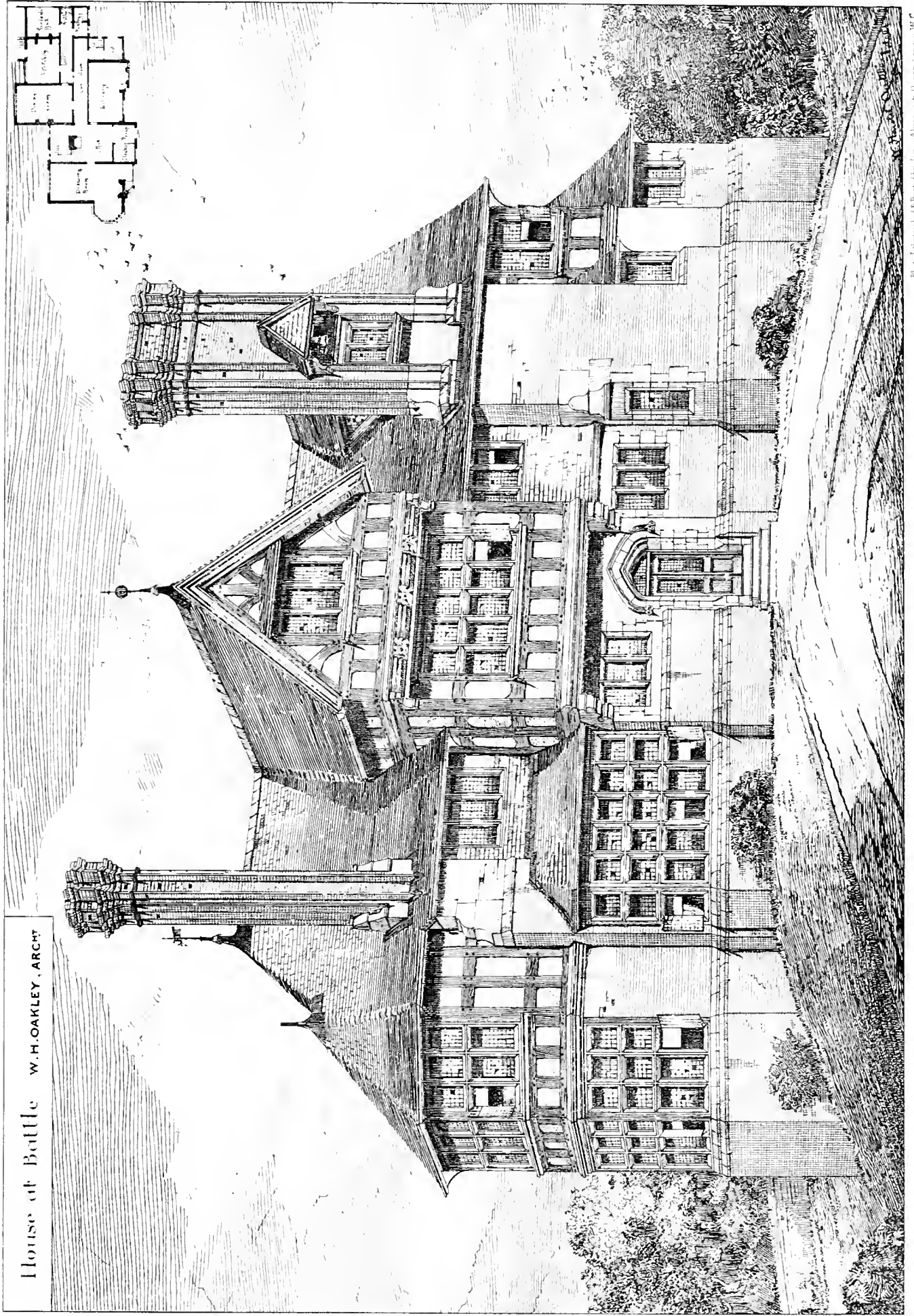


Detached Belfry, St. Michael's, Bellry.

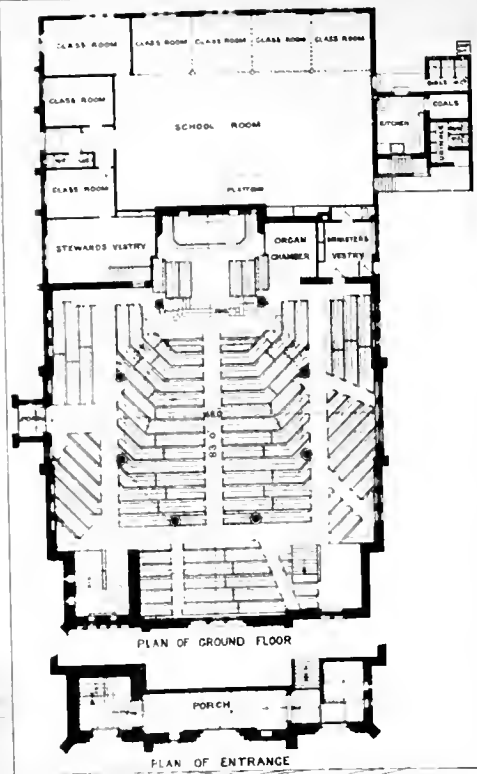
W. H. Wood, Del. Oct. 1889.

THE BUILDING DEWS, OCT. 7, 1881.

House at Battle W.H.OAKLEY, ARCHT





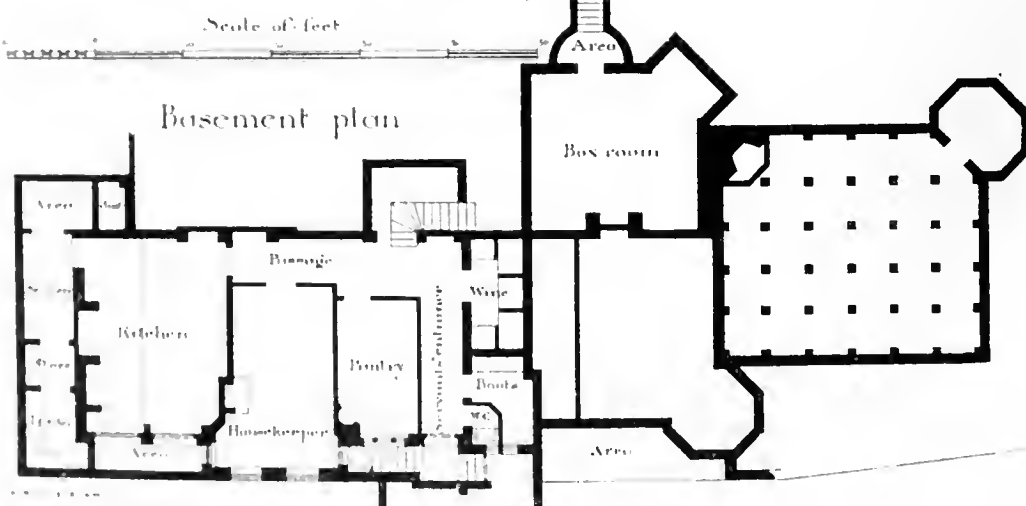
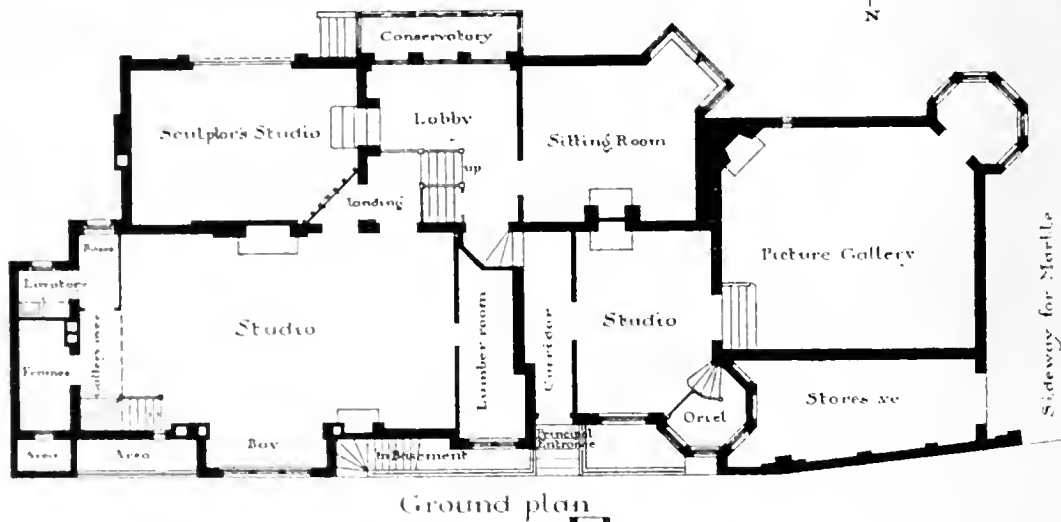
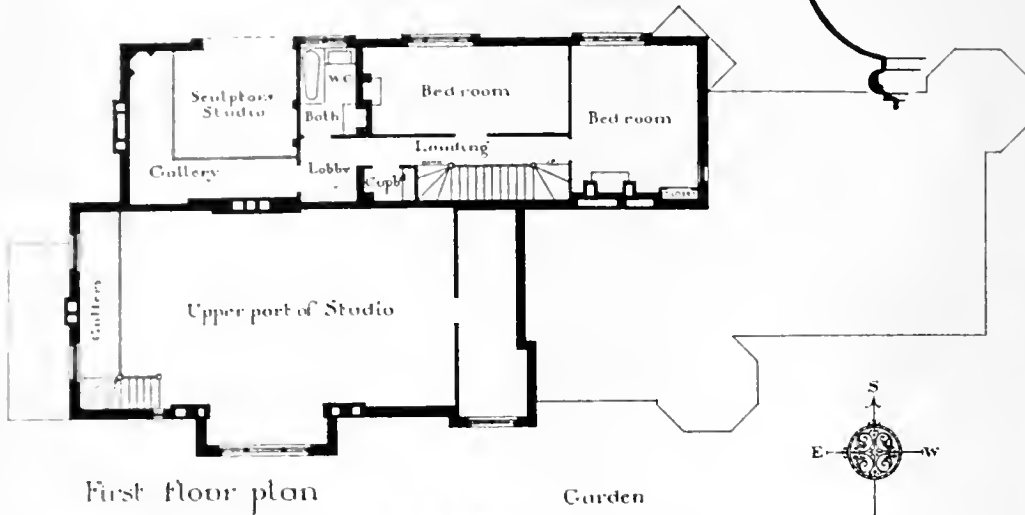
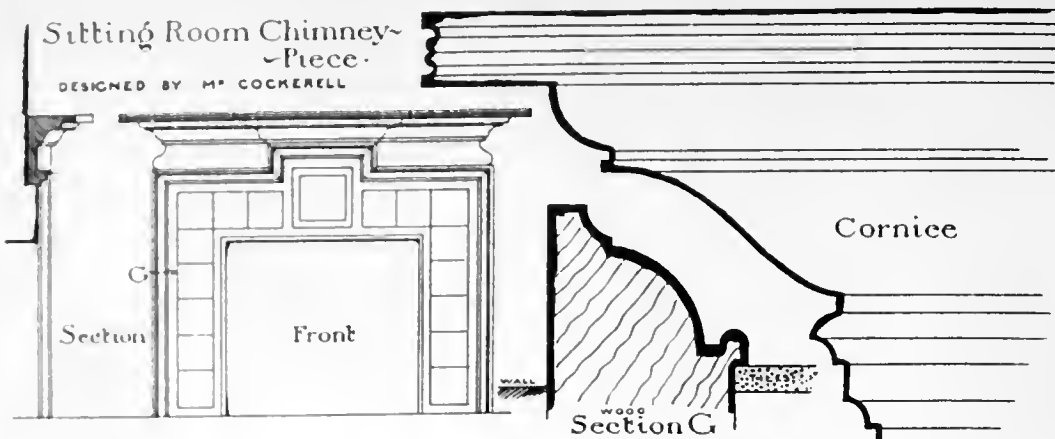


WESLEYAN CHAPEL, HOLLY PARK, CROUCH HILL, N. E. HOOLE, F.R.I.B.A. ARCHITECT. 1881



Sitting Room Chimney-Piece

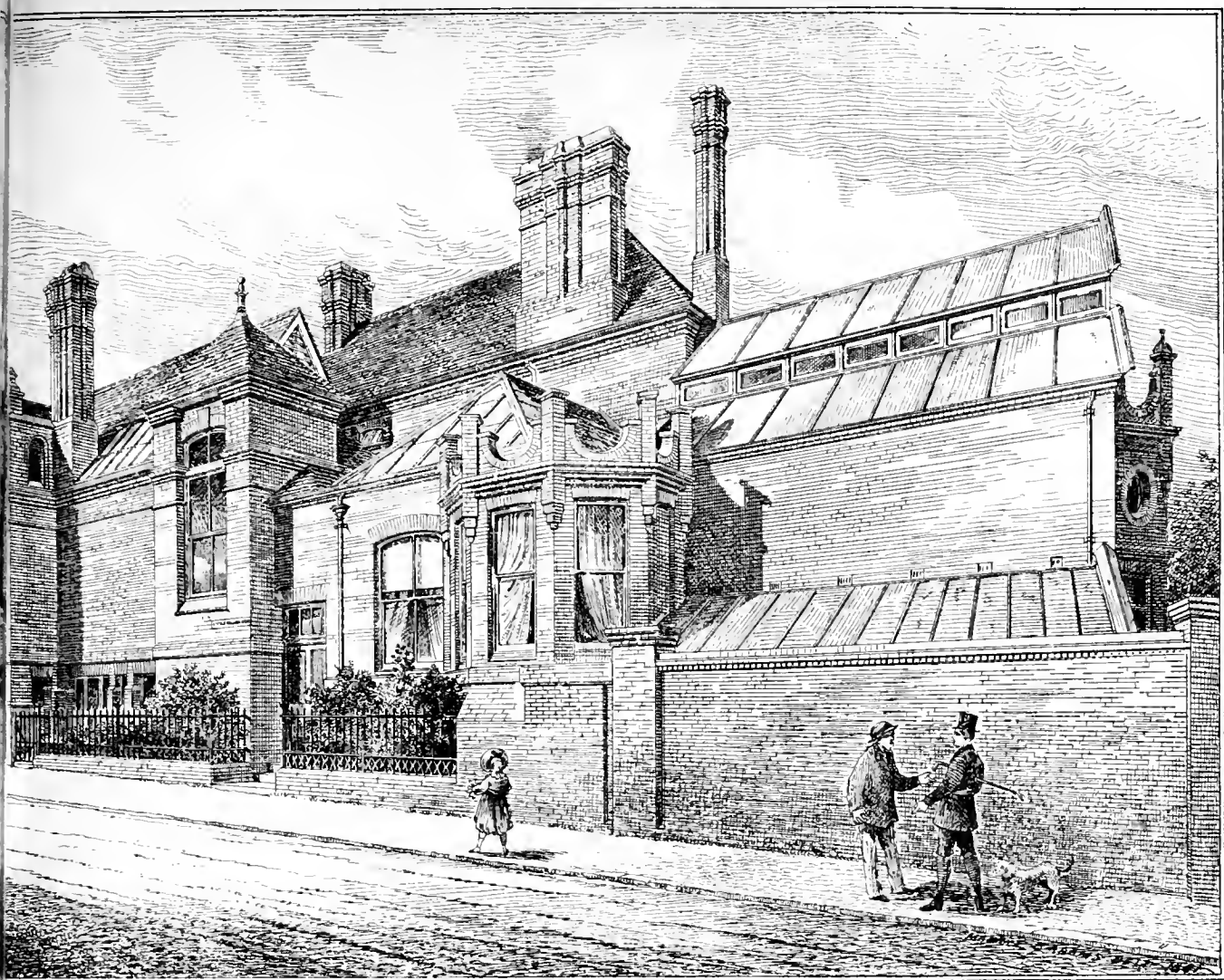
DESIGNED BY M^r COCKERELL



Arch

Front

Section BB



THE FIREPLACE IN PICTURE GALLERY
DESIGNED BY MR AITCHISON

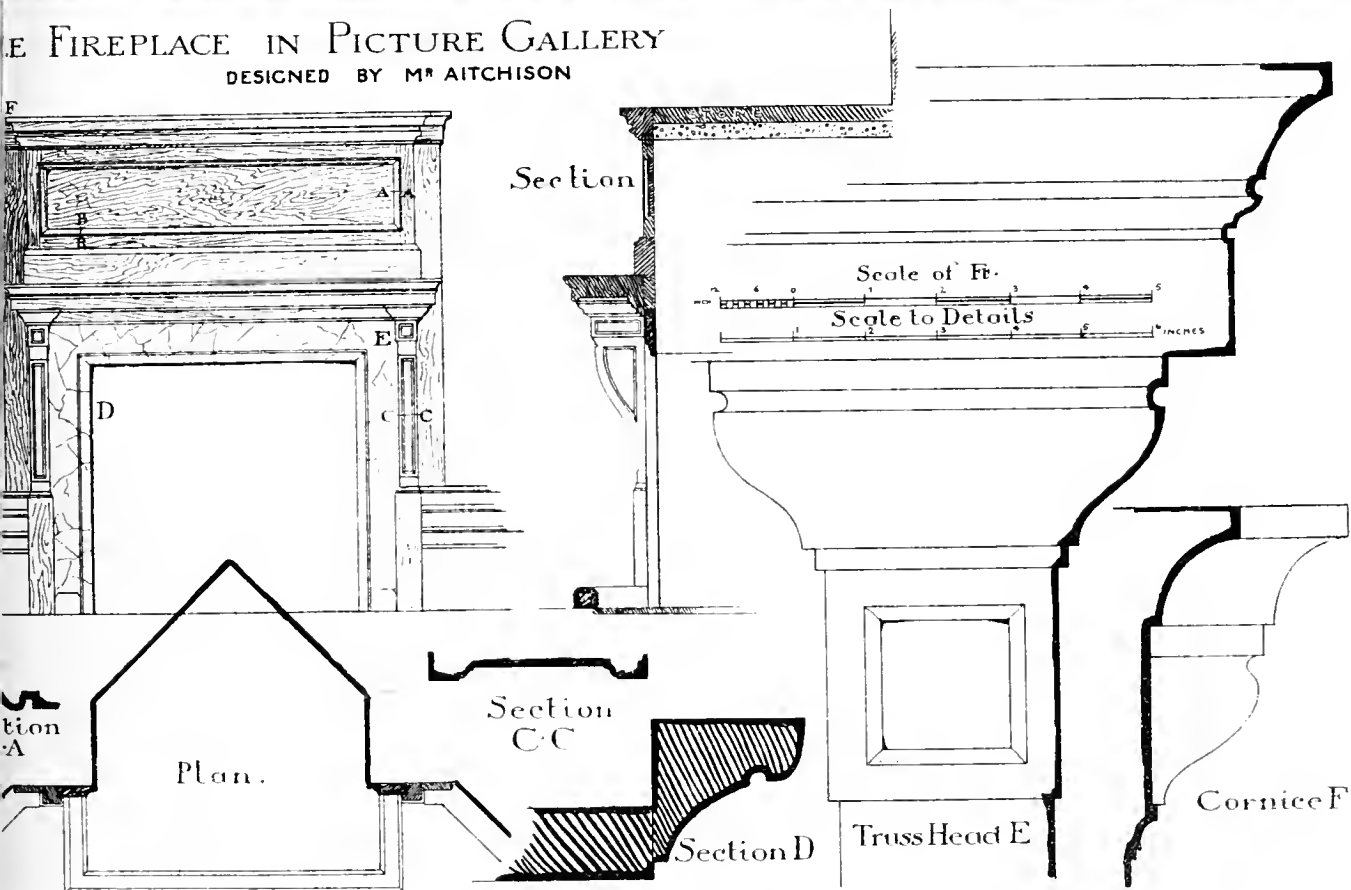
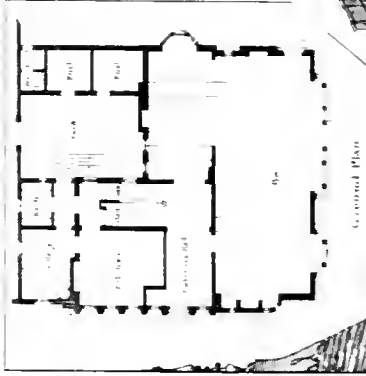


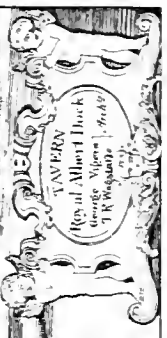
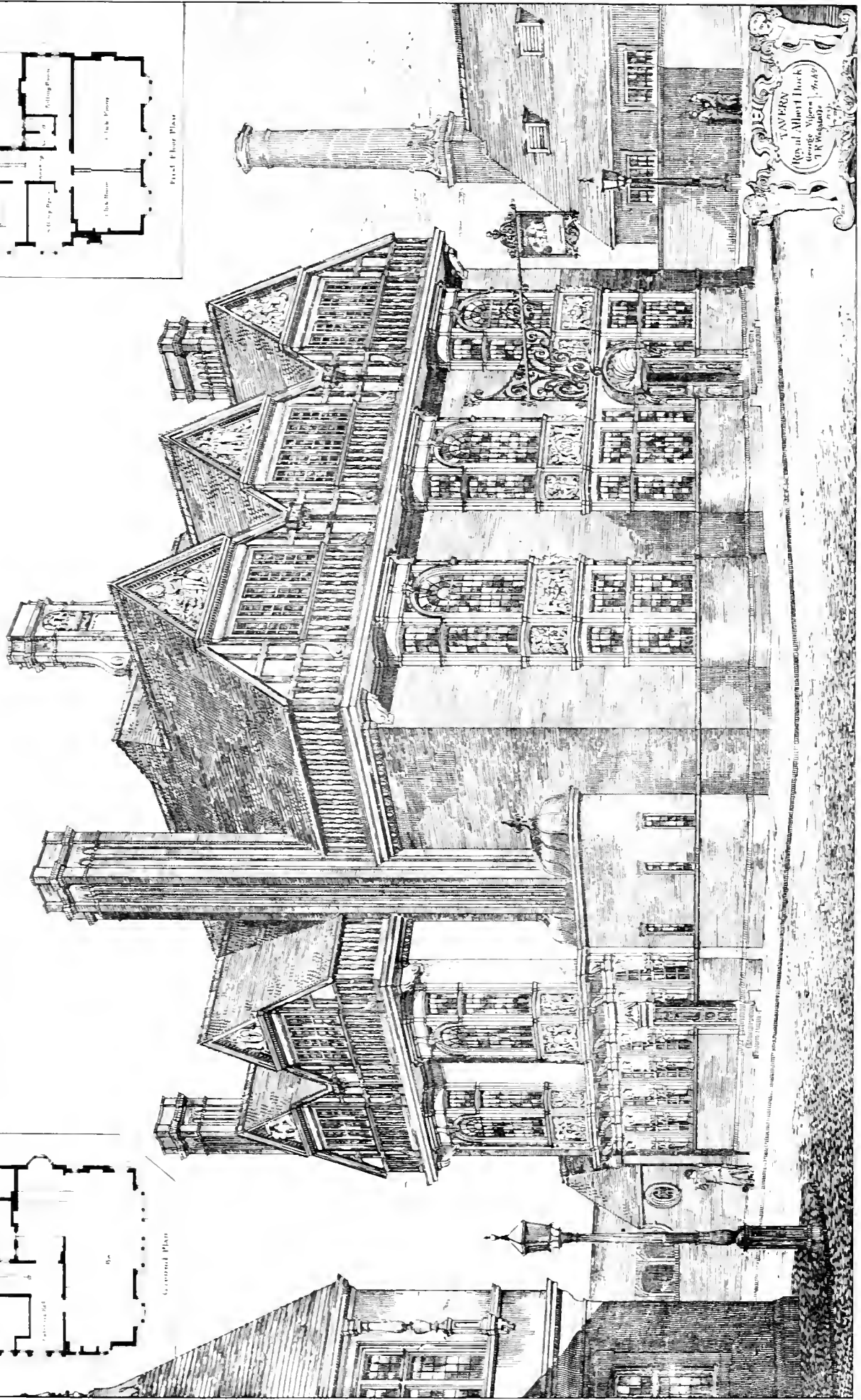
Photo-Engraved & Printed by James Acland in Queen Square W.C.



Ground Plan



First Floor Plan



and
require
as are
as Mr
tion, s
provi
mode
es, d
mat
the p
scin
Eng
rich
ther
act
spe
the
Loc
an
to
v
e
e

KETT'S PROVINCIAL PRICE-BOOK.*

PRICE-BOOK, for the use of architects and builders in the provinces, has long been required. The present excellent prices are prepared and published in London, as Mr. R. Beckett, the author of this publication, says, they are generally inapplicable to provinces, "where not only the definitions of modes of measurement, but still more, the rates, differ widely from those prevailing in metropolis." All those who have practised in the provinces will endorse these remarks, and especially architects and surveyors in the North of England. One qualification, if it be one, which the author of this price-book possesses which cannot be claimed by the compilers of other books of this class, is that he is a contractor and builder of practical and lengthened experience in Cheshire, and as such ought to be the best judge of the requirements of the trade. Looking at the performance of the work, we can only say that the author has carried out his task in a practical manner, and has endeavoured to promote uniformity in the measurement of work and the pricing of work by prefixing to each trade the rules recommended by surveyors, and giving the particulars of prices. The methods of measurement have been extracted from those recommended by the Manchester Society of Architects and by the master builders of Yorkshire. If, for example, we take the carpenter and joiner, the rules for measurement are clearly stated in 66 different items, each numbered. The first of these states that "unless a special provision be made that timber and joiners' work must finish nett to the dimensions given (the waste being calculated then in the price), it must be understood that all work will follow the original marking or 'pricking' for sawing; thus each sawn face would reduce the scantling by nearly 1-16in., or half the width of saw-cut, and each wrought face would entail a further reduction of about 1-16in. A 12in. by 6in. scantling would thus measure 11½ by 5½ in full, and a 2in. door would finish 1½ in. full. With respect to measuring the labour of principals, the rule is given that the labour framing is to be measured, the length or span with wall-hold, separating the different kinds, and the framing of trussed partitions the same. Some of the rules will be found to differ from those adopted by London and Southern surveyors, but they are at least reasonable. The prices for carpenter's work are headed by the price of timber in logs at seaports, the Baltic red being put at 1s. 4d. to 1s. 7d. per cubic foot; pitch-pine 1s. 7d. to 1s. 9d., and yellow pine 1s. 9d. to 2s. 6d. per foot. Yellow pine deals and battens are priced at £15 10s. to £23 per standard of 65 cubic feet, and red wood, £10 10s. to £15 10s. After this an analysis of the cost per cubic foot, including carriage and cartage, sawing, profit, and waste risks, interest, &c., is furnished, which is summed at 2s. 9d. per foot, without labour. These preliminary calculations are a useful guide to the provincial surveyor and builder, as he can then adopt the cost of materials and labour of his own locality, while the calculation gives the basis of the prices which follow. The classification is clear and easily read, and the prices follow in a natural order, beginning with timber in bond lintels, roof-trusses, and then the labour and nails only in flooring, joists, partitions, roofing, &c. Perhaps the most generally useful price list, and that repeatedly referred to, is the joiner's. That here given is clearly and distinctly arranged in columns, and under the usual headings, sufficient for all ordinary requirements. The floors and various descriptions of skirtings, doors, windows, and architrave mouldings, are readily referred to according to their several thicknesses, heights, No. of panels, girths, &c.

The mason's trade is treated in the same full and explicit manner. There are several methods of measuring stonework: one being to take out all the labour upon it, and another to include material and labour, but separating the items according to the kinds of labour, and in nearly every locality some particular usage prevails. By Mr. Beckett's method, the stone and labour are kept separate. Plain ashlar walling and parapet is measured super. nett work for "stuff and work,"

giving the kind of face and average sizes and bed of the stones. Again, No. 14 rule states, "in measuring the labour, the necessary operations of the workman to be followed. The beds and joints of each block to be measured and kept under that head; and it will conduce to more easy pricing of the work when these can be given in lineal feet with the average width, particularly for strings, cornices, architraves, jambs, &c." No measuring requires more practical acquaintance with the method of working than that of stonework. Each operation must be taken into account, and minute division is necessary. Full directions for measuring that most difficult of all operations, "labour" are given, and the lineal feet measurements are specified. A table of approximate prices for stone at the quarries, with the several kinds of labour upon it, is compendious and useful. We find in the bricklayer's rules, that "cavity walling" is directed to be measured the actual thickness of the bricks, and the superficial dimensions of wall measured across all openings under 100ft. square as "extra labour and materials for bond forming cavity." This is a mode usually followed by good surveyors. The prime cost of bricks, labour, mortar, scaffolding, profit, &c., is priced at 4s. 5d. per yard of one brick length walling. Many useful data and directions follow this and other trades, such for example as Minton's directions for laying tile floors; Craven's method for keeping them clean, cleaning cement off brickwork, &c.

A large portion of the book is taken up with printed matter of a generally useful kind. The Employers' Liability Act, 1880, is given in full, and will be found of value to contractors, after which follow the sections and schedules of the Liverpool Building Act, 1842, which may be taken as a well-studied code of building regulations, and upon which others have been based. The by-laws as to new buildings, &c., in force in Manchester; the rules and instructions respecting parsonage houses required by the Ecclesiastical Commissioners and the Governors of Queen Anne's Bounty, and the form of contract agreed to by the R.I.B.A. and National Association of Master Builders, will be found serviceable. Tables of timber measure, and a wages table on the hour system, besides the usual summary of stamp-duties, are given, and a few useful notes on disinfectants, and several recipes, including remedies for damp walls, &c., are appended to the work. Mr. Beckett has striven to meet the general wants of provincial builders, architects, and surveyors, and if his work serves in any way to establish a more uniform mode of measuring and valuing builders' work, his labour has not been thrown away. A good price-book is a valuable aid to the provincial builder in enabling him to take contracts upon a fair measure and value schedule, and we believe if buildings were undertaken on a just method of measurement, and the prices were regulated by a proper estimation of the cost of materials and wages, a more just and equitable system would take the place of modern contract work, and its pernicious results.

THE BRISTOL AND CLIFTON JUNIOR ARCHITECTS' SOCIETY.

THE first half-yearly meeting of this Society has been held at Rupert Chambers, Rupert-street. Mr. John C. Moncrieff (vice-president) presided. Messrs. George E. Ford and Wm. E. Hill (hon. secs.) presented the report as follows:—"In presenting our report of the first half-year's proceedings of our society, we deem it advisable to give a brief history of the society, so that its position here to-night may be fully understood. Our society was first instituted on February 8th of the present year, and the following gentlemen composed the preliminary committee:—Messrs. Cridland, Fawn, Fudge and McPherson, with Messrs. G. E. Ford and W. E. Hill as honorary secretaries. The first meeting of the committee was held at 31, Clare-street, by the kind permission of Mr. W. L. Bernard, and Mr. C. F. Hanson, F.R.I.B.A., was chosen president, and Messrs. W. L. Bernard and J. C. Moncrieff vice-presidents. The thanks of the members and committee are due to these gentlemen for so readily consenting to fill these offices. The secretaries deemed it advisable to obtain a list of patrons. The programme of the society contained in its

list of patrons no less than 14 noblemen and gentlemen. This list, however, we have now increased to 32, which comprises six peers of the realm and other noblemen, members of Parliament, &c. The list also includes the President of the Royal Institute of British Architects. Since the first meeting of the society at All Saints Church, on March 12th, meetings have been held and visits taken place at various times. During the months of March, April, May, June and July we have held eight evening meetings and 15 Saturday visits. Lectures have been given during the session by Mr. Henry Masters, on "Sanitation;" by Mr. J. C. Moncrieff, on "Art;" and by Mr. W. E. Hill, on "Apprenticeship." The committee have observed with much pleasure the interest taken in these meetings and lectures by the members, but regret to add that the attendance of the local professors of architecture had been so small—indeed, they were conspicuous by their absence. But we feel sure that by arranging an attractive programme for next session this discouraging feature will be removed. Prize competitions have already been started amongst the members, and the committee appeal to the members of the profession for donations to the prize fund. The pleasure we have taken in the progress of the society has been somewhat marred by the indifference exhibited by the junior members of the profession to the advantages to be gained by joining the society; but we trust that by persevering we shall at last include as members those whom we have hitherto failed to reach. In order to press the advantages of the society before our fellow students, we think that the question of prize competitions opened to non-members should be considered. The society consists at present of 52 members. The expenses of the half-year have been somewhat heavy, but the greater portion of the expenses were incurred in the formation, and the rate of expenditure is rapidly decreasing. A detailed account of the expenditure accompanies the report. We have pleasure in noting that the society has already assisted in promoting two good objects—viz., the new St. Saviour's Church and the Bristol Benevolent Institution, for at the bazaars in aid of these objects the society exhibited large collections of drawings. The past half-year has been the formation period of the society: the following will witness the first results of the formation, and we are sure these will be such as to give cause for congratulation to all concerned. We take this opportunity of heartily thanking those noblemen and gentlemen who have become patrons. Our thanks are also due to the committee of the School of Art for the use of the room in which we have so often met, and in which, by their kindness, our progress may still further increase; to the Press, who have so readily and kindly given publicity to our reports; and lastly, to all who have taken any part in the formation and progress of the society. May we here remind you of the connection which existed some years ago between the Fine Arts Academy and the late Bristol Society of Architects? This connection, we think, should be still kept up by at least the young architects, with the aim that the arts of architecture and painting, as practised in Bristol, and which have been to all appearances so long severed, should once more be found side by side and working in unison; and it would be a matter for general rejoicing if, at some future time, not only the sister arts, but also every allied art, such as drawing, modelling, carving, &c., may act together as one body, mindful only of the honour and well-being of the fine arts. It is, moreover, greatly to be desired that the connection already formed between the Academy and our society should increase, and that our members should look on the Academy not only as a place to meet in, but as a place to acquire learning and knowledge; for the advantages to be derived from the study which the Academy affords are not to be underrated. We also trust that our society may in time become linked to the Academy, as was the old society, and that the privileges enjoyed by the old society may now be enjoyed in some part at least by our society. This, however, is a question for further discussion. In conclusion, we hope that this society may, by attractive programmes and increased advantages, so demand the attention of the junior architects that the aim in future of every student of architecture in Bristol and neigh-

* Beckett's Provincial Builders' Price-Book and Surveyor's Guide, &c. Compiled by RICHARD BECKETT, contractor and builder. London: E. and F. N. Spon, Charing Cross.

Building Intelligence.

BIRMINGHAM.—The inscription-stone of the new Central Fire Brigade Station was laid on Friday last. The building will be faced with red brick, and ornamented with stone and terracotta dressings. To the right of the house is a wide gateway leading to the drill-ground, which is about 153ft. long and 40ft wide. Between the gateway and the house is an entrance to the superintendent's office. Beyond this is the firemen's waiting-room, and still further at the rear, running at right angles from the street, a row of houses for the firemen is being erected. The houses are planned according to the flat system. On the ground-floor there are to be three residences, each having a living-room and two bedrooms. The engine-house lies to the right of the yard, facing the houses, and will afford sufficient space for six engines. The architects are Messrs. Martin and Chamberlain, and the contractor Mr. W. T. Bennett, Mr. Clapp is clerk of works. The cost of the work is estimated at £10,000.

BIRMINGHAM.—After renovation the parish-church of All Saints', Birmingham, was reopened on Saturday. The side galleries have been judiciously removed, while the recess at the east end has been enlarged into a chancel, with a compact organ-chamber and choir-vestry on the north side. The pews have been taken away, and the church is re-seated with open pews of pitch-pine. A new pulpit has also been provided. The work has been carried out by Mr. W. Robinson, builder, of Five Ways, under the superintendence of the architect, Mr. J. A. Chatwin. The heating apparatus was provided by Mr. Henry Hope, of Lionel-street, and Mr. Roddis has supplied the pulpit and font, from the designs of the architect. The total cost of the alterations is about £1,500.

BRADFORD.—A new school which has been erected by the Bradford School-board in Wondroyd-road, West Bowling, was opened on Friday by E. L. Spencer. The school is of three departments, each consisting of a main schoolroom, four classrooms, and a teachers' with entrance-lobby also fitted up as a lavatory and cloakroom. The schools are on the wide principle, being 35ft. across. The classrooms are about 20ft. square. All the rooms are lofty and lighted by square-headed mullion-d windows; the rooms have each an open fireplace, in addition to hot-water pipes. Each classroom is divided from the main rooms by open glass screens, for the free supervision of head teachers. There are a heating chamber and storage rooms in the basement. The buildings have been erected of local stone, with ashlar dressings, dark Westmoreland slates, red deal roofs, and pitch-pine floors and fittings. The accommodation is—Boys, 312; girls, 326; and infants, 354; total, 992. The architecture is plain and substantial, with Early Perpendicular detail. The cost of the building is £9,000. Mr. E. P. Peterson, F.S.A., F.R.I.B.A., is the architect, and Messrs. John Moulson and Son the contractors. Mr. J. Johnstone has acted as clerk of works.

CREDITON.—The parish-church of Crediton, Devon, which has gradually been restored during the past few years, has just had its nave re-roofed. It has been executed from designs of Messrs. Hayward and Son, architects, of Exeter, by Mr. Wm. Dart, of Crediton. The new roof is of English oak, in the open style of the 14th century—a style that is now and again to be found in perfection in some Western churches. It is divided into thirteen bays, with curved ribs to every alternate tie-beam; panels of pierced tracery fill the space between rib and tie-beam. The sloping bays of roof are divided by moulded purlin ridge, diagonal rafters intersecting each. Carved bosses are placed at the terminals and intersections. The whole of the carving has been executed by Mr. Dart's staff. Crediton Church is well worth a visit from the archaeologist, having been the cathedral see of Devon before its removal to Exeter. There are still to be found the remains of a very beautiful sedilia and other interesting "reliquies," among which is some old armour and suits of mail, carefully preserved in the edifice. The work has been executed from designs by Messrs. Hayward and Sons, architects, of Exeter, by Mr. William Dart, of Crediton.

EAST ARDSLEY.—Last week St. Michael's Church, East Ardsley, was reopened after complete restoration. The old church having become seriously dilapidated, and repair being impracticable otherwise than at very great expense, it was decided to erect a new building. A design founded upon the old lines was prepared, and plans for building a new church were adopted, which admitted of the following arrangement. At the west, the tower is 13ft. square inside, the walls averaging 3ft. thick. The nave, the north and south aisles are 51ft. long and 41ft. wide. Projecting from the western bay of the south aisle is a large porch, which is the entrance to the church. A Norman doorway, which was originally in the south wall of the old church, has been carefully taken down, and with equal care rebuilt in as nearly as possible its original position. The chancel is 25ft. 9in. long and 17ft. wide. On the north side is placed the organ in a bay, with wide arches opening both into the chancel and the north aisle. On the south side are clergy and choir vestries, with entrances from the churchyard to both the chancel and south aisle. The style of architecture shown in portions of the old church was that of the latter part of the fifteenth century, which has been followed as closely as possible. Mr. W. S. Barber, of Halifax, has been the architect during the restoration.

HEREFORD.—A new Baptist chapel has been opened at Hereford. The structure will cost about £4,500, including site, and it has been erected from the joint design of Mr. John Johnson, of London, and Mr. George Cowley Haddon, of Hereford. The plan of the building is a parallelogram, consisting in the immediate front of a vestibule 8ft. wide, from whence the two chief entrance-doors to the ground-floor are approached, leading to the aisles right and left. The main building is 40ft. wide and 60ft. long inside, exclusive of apse for organ, and recess for end gallery. There is a minister's vestry, deacon's vestry, &c., and a spacious heating-apparatus chamber, with accessories in the basement, which is fitted with Grundy's patent hot-air apparatus. There is accommodation on the ground-floor for 400, and on the gallery-floor for an additional 250 persons, making a total of 650 sittings, allowing 20in. for each, but when put to the full test the building will accommodate a greater number. The facade is executed in special-made white bricks, with Beer (Devonshire) free-stone dressings. The amount of the contract was £2,665, and the work has been carried out by Mr. William Bowers. The flooring of the chapel is laid with Godwin's encaustic tiles.

LOSTWITHIEL.—The private chapel of the Lostwithiel House of Mercy, erected some time ago from the designs of Mr. George Edmund Street, R.A., has just had an addition made to it in the shape of a reredos of alabaster and Devonshire and Cornish marbles. The reredos has been designed by Mr. R. Medley Fulford, F.R.I.B.A., architect, of Exeter. The sill of the eastern window being high up, plenty of wall-space has offered good scope for design, and hence the reredos has been carried to a considerable altitude. There is a broad retablo of white marble, upon which the main structure rests. This consists of a triple arrangement, separated by massive buttresses and terminating with gables. The central one of the three is the largest and most dignified. The arches within the gables are cusped, and the gable copings are deeply moulded and enriched by crockets, terminating with carved pinnacles. The buttresses are panelled, and finished with sealed terminations which carry shafts of serpentine marble. The central gable has a similarly arranged finial, and upon these five elevated bases, it is intended, when funds permit, to place as many sculptured figures. The greater part of the reredos is of polished English alabaster; but warm red stone, from the quarries of Dumfriesshire, is also introduced with excellent effect. The shafts at each side of the recessed panels are of polished Cornish serpentine marble. These panels themselves contain some tile paintings. The reredos has been made and placed *in situ* by Mr. Harry Hems, of Exeter.

MANCHESTER.—The memorial-stones of two schools now being erected by the Manchester School-board were laid last week. The first ceremony took place in Smedley-road, Cheetham, where a school is being built to accommodate 900 children. The buildings are to be in a simple

Gothic style. The works are being carried out by Mr. J. L. Ward, of Manchester (the contract price being £7,000), from the designs of Messrs. Potts, Pickup, and Dixon, architects, Manchester and Oldham. Another ceremony of a similar kind took place shortly afterwards at Ross Place, near Hyde-road, Ardwick. The building will provide accommodation for 1,000 children. The schools are to be in the Gothic style of architecture. The fronts will be faced with selected grey common brick, which will be relieved by masses of red stock brick and stone dressings. The work is being carried out from the designs of Mr. Henry Lord, architect, by Messrs. Robert Neill & Co., for the contract sum of £7,384.

MIDDLESBROUGH.—A new Wesleyan chapel and school rooms were opened at South Bank, Middlesbrough, on Tuesday. The buildings are constructed of local bricks and roofed with Welsh slates. The chapel measures 79ft. by 44ft., and is 28ft. high from floor to ceiling. It is provided with a gallery on three sides, and with a pulpit platform, and all the internal woodwork is of pitch-pine. Accommodation is provided for 720 worshippers. The main school is 54ft. by 33ft., affording room for 247 scholars; the infant-school is 27ft. by 19ft., and is provided with kitchen and cooking-range; the four vestries average 16ft. by 14ft. each. Mr. F. R. N. Haswell, F.R.I.B.A., of North Shields, is the architect; the contract was let to the late Mr. John Clark, of South Bank and Saltburn-by-the-Sea, and Mr. John Sturdy, of Middlesbrough, has acted as clerk of works.

NORTHAW.—On Monday week the foundation, or memorial, stone of a new church for the parish of Northaw was laid. The original church was probably built by Llanfranc, Archbishop of Canterbury, in 1070, and was a chapel of ease belonging to St. Peter's, St. Alban's. The new church was commenced some seven weeks ago by Mr. John Bentley, of Waltham Abbey (who also built the new church at Enfield), from the plans of Messrs. Charles Kirk and Sons, Sleaford. The edifice, erected of Ancaster stone, will consist of nave, chancel, north and south transepts, south aisle, and porch with open tower at western corner of the south aisle. The tower will form the baptistery, and the upper part will be finished with four pinnacles. Mr. Bentley's contract for the building is £1,630, but the total cost of the church when completed and fitted for service is estimated at £7,000.

PENZANCE.—The new church of St. John the Baptist, in Trewartha-terrace, Penzance, was consecrated on Tuesday by the Bishop of Truro. It consists of a chancel 34ft. long by 10ft. wide in north and south aisles each 13ft. wide, and transepts each 22ft. by 20ft.; and a nave 73ft. by 23ft., with aisles each 54ft. by 11ft. and north porch. A tower 20ft. square and 66ft. high will hereafter be built on the south side. The style is Early English, the windows being double lancets in the aisle walls and triple lancets at the east and west ends of church. The walls are faced with Cheltenham Down stone, with Hamble dressings, from the quarries of Mr. Charles Trask. The internal stonework is of Douling stone, also supplied by Mr. Trask, and the internal woodwork is of varnished pitch-pine. The transepts and crossing are seated with benches, and the remainder of the church with chairs, the total accommodation being for 600 persons. The roofs are open and plastered, and are covered with Delabole slates. The sacarium is laid with encaustic tiles by Messrs. Goodwin, of Hereford, and the remainder of the floors with plain tiles by the Architectural Pottery Company, Poole. Beneath the chancel are two vestries, one 31ft. by 20ft. for the choir, the other 18ft. 6in. by 13ft. for the clergy; these are connected with the church by a flight of 19 granite steps, and have roofs of brick arching supported by wrought-iron girders and cast-iron pillars. Mr. J. Piers St. Aubyn, of the Temple, London, is the architect; Messrs. Carah and Edmunds, of Crowan, are the contractors. Mr. Hofman, Penzance foundry, supplied the ironwork, and Messrs. Willey and Co., Exeter, the gas-fittings. The cost has been about £7,000. Mr. John Trousoun, of Penzance, superintended the work.

POLEGATE.—The London, Brighton, and South Coast Railway have built a new station at Polegate. The new buildings, although not so handsome as those just finished at Hassocks-gate, are equal in accommodation, arrangement, and comfort to

any station on the system. The works were commenced in July last year. The buildings are Italian in style, and faced with Portland cement. The station is approached from the Pevensey-road, and has three entrances, one right and left of building, and following between back, front, and a massive retaining wall, the centre one, which communicates directly with the booking-office, through which we reach the subway and meet the other two passages, being under a carriage porch constructed with ornamental iron columns, brackets, girders, and covered with a wood and glass roof. On the ground-floor there is a cloak-room 15ft. square, a ticket and telegraph office of the same size, booking-office 10ft. by 10ft., waiting-room 10ft. by 12ft., ladies' room, lavatory, &c., &c. The station-master's residence, which is above, consists of sitting-rooms 15ft. by 12ft., three bedrooms, and a kitchen, each about 12ft. square. The subway is 10ft. long, 9ft. wide, and 8ft. 3in. high, lighted with Hayward's patent lights, and leads from booking-office to the entrance on south side of the station. The platforms are each nearly 65ft. long by 7ft. wide, and have light roofs, part glass and part zinc, supported by iron columns, which are bolted down to concrete piers about 2ft. deep by 2ft. 6in. square. The arrangements comprise ladies' room 15ft. by 11ft., general waiting-room 10ft. by 12ft., refreshment-rooms 24ft. by 11ft., fitted with marble counter tops on panelled framing, which is grained Italian walnut and oak to match the doors, and the mouldings are finished black. The kitchens are 11ft. by 10ft., station-master's office 13ft. 6in. by 11ft., ticket collector's office 15ft. by 11ft., porters' room 12ft. by 11ft., lamp-room 11ft. by 8ft., coal-closets, &c., &c. The platforms are lighted by spherical gas lamps. The new portions of the line and the station was designed by Mr. E. D. Bannister, C.E., engineer in chief to the Brighton Company. The works were carried out under the superintendence of Mr. H. J. Munnering, assistant engineer. Contractor, Mr. J. Anson, Queen's-road, Brighton, foreman of works, Mr. F. Chettleburg, Company's resident inspector, Mr. F. Hards.

REVELSTOCK.—A new church at Revelstoke is nearly completed. The church has been designed by Mr. James Piers St. Aubyn, F.R.I.B.A., and is in the Perpendicular style. There is a fine western tower, which will be embattled, and carried up at its north-west angle by a still higher turret, the tower is strongly buttressed. The building on plan presents a nave, north and south aisle, and chancel. It is to be built of local stone, raised in the immediate neighbourhood, while all the dressings and worked masonry inside and out are of Dartmoor grey granite. The roofs will partake of the local West-country character known as barrel or wagon-roofs. They are being framed of British oak, and the various intersections of rib and purlins will all be covered by carved bosses in the same material. The pulpit will also be of carved oak, upon a granite base; ornamental parclose screens will separate the chancel from its aisles, these, like the stalls, and the seating throughout the body of the building, will also be of oak. Mr. Piers has been entrusted with the making of the pulpit, stalls, screens, and oak fittings generally. The structure is being erected entirely by workmen on the estate, overlooked by Mr. G. W. Crosbie, the estate clerk of works.

WAKEFIELD.—A new bank at Wakefield was opened on Monday. The style of architecture adopted is in a word "Queen Anne," carried out in perfect small-scale red bricks, with limestone dressings. The words "West Riding Bank" are cut over the entrance in the stone frieze. The works have been completed by Messrs. J. and W. Bland, of Bradford, and Mr. Tattersall, plasterer, of Wakefield. Mr. Appleyard, of Leeds, had the carving in brick, stone, and wood, and with Messrs. Thompson and Dalton, of Leeds, executed the stained and encaustic glasswork, and Messrs. Clark, Bannett, and Co. the steel shutters, the whole having been arranged from the drawings, and under the personal supervision of Messrs. J. Nott and Son, architects, of Leeds.

A magnificent altar erected in St. Mary's churchyard, St. Andrew's, Mr. J. Douglass Matthews is the architect.

COMPETITIONS.

FULHAM WORKHOUSE INFIRMARY.—The Fulham board of guardians received at their meeting on Thursday in last week, a letter from Mr. G. E. Street, R.A., as President of the Royal Institute of British Architects, recommending Messrs. L. H. Currey, of 37, Norfolk-street, Strand; P. C. Hardwick, Hereford-gardens; and E. P. Anson, F.G.S., of Lower Poulteney-hill, E.C., as suitable gentlemen to act as consulting architects in the infirmary competition. One of the members suggested that all three should be retained, but the clerk having mentioned that Mr. Currey was the architect of St. Thomas's Hospital, that gentleman was appointed.

WINCHCOMBE BOARD-SCHOOLS.—The Winchcombe School-board opened last week tenders for the proposed boys' school, in accordance with plans prepared by Messrs. Medland, whose designs were selected in the recent competition. These proved so much higher than was expected that the Board decided not to allow the amounts to be made public, and after the interchange of some personalities, ordered the following resolution to be entered on the minutes: "The Board, considering that all the tenders received are so largely in excess of the estimate given by the architects as to show that a most serious error must have been made by them in their calculations, and that it was mainly upon such estimates that their tender [sic, design] was accepted, direct the clerk to express to them their dissatisfaction, and to ask whether they will be prepared to get the work done for the amount at which they estimated it, or within a reasonable excess of such amount, and if not the Board are of opinion that Messrs. Medland should withdraw their plans, and all claims in respect thereof, on being allowed a reasonable sum for their troubles may be agreed upon." A member remarked that he could not understand why the school should cost them £14 a-head, when others in the neighbourhood had been erected for £1 10s. a-head. A letter was read from Messrs. Chatters and Chandon, unsuccessful competitors in the recent competition, offering, in the event of the Board declining to go on with Messrs. Medland's plan, to guarantee the erection of a school from the design they submitted for within £50 of the estimated cost, £1,070.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

PENZANCE NATURAL HISTORY AND ANTIQUARIAN SOCIETY.—The annual excursion of this society took place on Friday last, when a large party accompanied their president, Mr. C. C. Ross, M.P. Penzance Castle was the first place visited, and was described by Mr. T. Cornish, who said that though it was traditionally said to have been built in Henry VIII.'s time, the remains showed that it was built during the reign of Elizabeth. The existing tower could never have been a defence against guns, but it was to be feared that it played a part in the wrecking which took place opposite, for it faced the most dangerous part of the Mount's Bay coast. The Rev. W. S. Luch-Szymra read a paper on "The Legendary History of the Castle," which he said belonged to the Faust family of Renaissance myths. Mr. Borlase, M.P., said towers of this character were very common adjuncts to Cornish houses, as at Cotehele and Treuniger, but in no case did they appear to be intended for defence, or to serve any other purpose than an architectural feature of the residence. At Breage the chief features in the church were shown by the vicar, the Rev. E. M. Pridmore, and some notes were read by Mr. Whitely. Godolphin House was afterwards seen. Mr. Rosenreim and Mr. Borlase, M.P., acting as guides. St. Hilary Church and the two carved stones in the churchyard were described on the homeward journey by the Revs. S. Kingsford and W. S. Luch-Szymra, and in the evening a conversazione was held at Morrab House.

ARCHÆOLOGICAL.

BALFOUR.—In the course of excavations made by Mr. George Wells under his premises on the south side of Castle-lane, which occupy the site of Balfour Castle, a number of Roman and Saxon remains have been found. They include

pottery of both the periods named; Roman bricks, fragments of flues and tessellated work, and encaustic tiles, and a few pieces of masonry, having on them Norman, or perhaps Saxon, mouldings. The discoveries, which are important, as showing that Bedford was indubitably a Roman station, are to be followed up by further investigations on the opposite side of the lane.

CHIPS.

A stained-glass window, designed by Mr. Burne Jones, has been placed in St. Peter's Church, Vere-street, Oxford-street, W.

The new Glynn memorial pulpit in the nave of Tewkesbury Abbey was used for the first time on Sunday week. It has been erected from the designs of Mr. J. Oldrid Scott, and is octagonal in shape, Early Perpendicular in style, and constructed of Purbeck marble and stone.

The annual dinner of the Builders' Benevolent Institution will be held on the 3rd November, at the Freemasons' Tavern, Mr. George Burt, J.P., in the chair.

Mr. William Lee, J.P., who for fifteen years represented Maidstone in Parliament in the Liberal interest, died last week at his residence at Holborough Court, Snodland, Kent. Mr. Lee, who was senior partner in the firm of Lee, Son, and Co., cement manufacturers, Snodland, was born at Lewisham, 1801, and married nineteen years later. He unsuccessfully contested Maidstone in 1852, but was successful next year. He was defeated in 1857, regained the seat in 1859, and held it until he retired in 1870. He was a magistrate and deputy-lieutenant for Kent.

A further advance is notified in window-glass. On July 23 last, window-glass advanced 7½ per cent., on August 25 10 per cent., and again on the 25th inst., 7½ per cent., making 25 per cent. advance in the aggregate.

The memorial-stone has been laid of St. Matthew's mission church, at Fenton, in the Potteries. The church will seat 500 persons, and will cost about £2,500. Messrs. Inskip are the architects.

New gasworks at Smethwick, Birmingham, were formally opened on Saturday. They have been erected at a cost of between £50,000 and £60,000, from the plans of Sir Frederick J. Bramwell.

Plans prepared by the Rev. — Loftie, of the Chapel Royal, Savoy, are about to be adopted for the restoration and reseating of Smeeth Church, Kent, having been submitted to, and approved by, Messrs. Micklethwaite and Middleton, architects, of Westminster.

A new estate to be known as Naza Park is being laid out for building purposes at Walton-on-the-Naze, and the foundations of the first villas are being laid. Mr. Eide is the contractor.

The Lewisham district board of works last week elected Mr. Ernest Van Putten as assistant surveyor.

A deputation from the Worcester town council visited last week the sewage works and farms at Droitwich and Kidderminster in order to inspect the modes of working.

A Methodist Free church at Luddenden Foot was reopened on Saturday after repewing in pitch-pine, and other internal structural alterations. Messrs. J. Dyson and Sons, of King's-cross, Halifax, were the contractors.

The corporation of Wakefield are at present engaged in the construction of new waterworks, by which an abundant and pure supply will be furnished to the town and neighbourhood from the Rishworth Moors, instead of that which has hitherto been used from the polluted river Calder. The works are being carried out under the superintendence of Mr. E. Filler, C.E., of Leeds, and are to be inaugurated on the 18th November by the public turning of the first sod for the principal reservoir.

The new church of St. Mark, Farnborough, was consecrated by the Bishop of Winchester on Tuesday week.

Mr. J. F. Bateman, C.E., visited Cheltenham last week, preparatory to reporting to the town council on the best means of increasing the supply of water.

The Midland sawmills, Lower Bristol-road, Bath, the property of Mr. F. W. Lee, timber-merchant and packing-case manufacturer, were destroyed by fire on Wednesday week.

New Baptist Sunday-schoolrooms were opened at Stantonbury, Bucks, on Tuesday week. The builder was Mr. Mitchell, of Newport Pagnell.

A nave and aisles have been added to St. Mary's Church, Tyndall-park, Bristol, and will be opened by the bishop of the diocese on Thursday next.

"To a practical man with a taste for mechanics, and the bumps of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Twopence of all newsmen, or post free 24d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31 TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 5s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All *Situation* advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33s. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL., Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—G. S.—H. and G.—W. C.—G. A. W.—D. F. Co.—G. N.—J. M.—S. Bros.—J. and S.—B. and P. H. B.—C. and Co.—E. B. and Co.—D. F.—F. I. Co.—J. W.—M. and Co.—C. S.—F. W. and Co.—B. and O.—H. P.—W. B.—B. of R.

Correspondence.

EASTGATE HOUSE, ROCHESTER.

To the Editor of the BUILDING NEWS.

SIR,—A very sparkling and highly imaginative sketch of Eastgate House appears in your paper of yesterday. Unfortunately the house is totally unlike the sketch whether the proportions or materials are considered. Eastgate House is a large and rather grand-looking building. It looks a worthy residence for a Secretary to the Admiralty, whereas your illustration conveys the impression of a small picturesque house. I send you herewith a photolithograph from a drawing made some years since, which shows the house in its true proportions. There is, I think, only one mistake in it, and that is, the drop in the centre where the two gables meet is omitted. If you like to publish it I shall be pleased to send the drawing from which the photolithograph was made with the mistake corrected.

To show how wrong the illustration you have published is, I would point out that fifteen courses only are shown in the chimney to the right; there really are twenty-four courses. This vice goes through the whole drawing. Highly ornamental brackets are shown to the lower story—there are none; the stringcourses wave as shown in the photolithograph sent—in your illustration they are crisply drawn with a straight edge. A sort of plaster runs up the nearest corner all formed in cement—this, and a peculiar ornament on the first floor, are entirely omitted. The oriel window on the first floor is

shown much too wide. I will say no more.—I am, &c., JOHN DRAKE.

High-street, Rochester, Oct. 1st.

[The difference between the two sketches is certainly considerable; we regret want of space prevents us from reproducing Mr. Drake's drawing.—Ed. "B.N."]

FIRES IN THE CITY.

SIR,—One is glad to see the City authorities are taking into their consideration the immense value of goods stored in the several warehouses in the City, and are bestirring themselves to make large additions to the Fire Brigade.

It would be an advantage if, in addition to providing more fire-engines, some measure of precaution were taken where warehouses are let in separate stories, for preventing fire being communicated from one floor to another, and that there should be safe modes of ingress and egress.

In the case of the recent fire at No. 45, Cheap-side, it is evident that the staircase (apparently a wooden one) was the channel by which the fire was communicated from first to second floor.

Much has been written at various times about staircases acting as flues, and conducting fire from floor to floor with exceeding rapidity, thus cutting off exit from the upper portions of a building.

Where the floors of warehouses are let to different tenants, the stairs ought to be isolated. Architects might easily arrange this, and make them a beautiful feature of the building.

The steps ought to be out of firestone, not, as is the modern practice, out of soft limestone, which, in case of fire, speedily calcines, and when the fireman's hose is turned thereon, falls like quicklime. Hence the just condemnation of Captain Shaw of stairs built of such stone; whereas, if steps were of firestone (much of which is very beautiful), it would afford safe ingress and egress.

The staircases should be entirely of firestone, the skirtings of hard cement, and if any ornamentation is required, have a dado of ornamental tiles.

The doors, light iron ones (readily painted to imitate wood) for use during the day, closing with a heavier door on the fireproof principle at night.

If the colour of the stone is the object, stones from Craigleith, Thornthwaite Brough, Hart-with Stott, and many others, are the same in appearance as the soft white limestone so much used.

There are also numerous other stones equally good as fire-stones, which would come in at less price, and afford equal safety to those stones above referred to, viz.: Scotgate Ash, Wild Carr, Cunliffe, Greenmoor, Fell Beck, &c.—I am, &c., SAMUEL TRICKETT.

HOUSE-TOP GARDENS.

SIR,—If the writer of the letter in your last week's paper will call here, he will see the very thing he describes forming the roof of my offices. It has proved a great success, and was engraved in the *Garden* and in the *Illustrated American* ten or eleven years since. Any passer-by can see it, although, as Bunhill-row is not a leading thoroughfare, it is not so well-known as it would otherwise be.—I am, &c., 121, Bunhill-row, E.C. W. H. LASCELLES.

MUSEUM COMPETITION, DUBLIN.

SIR,—I sent a note a few days ago, asking for an extension of time in connection with this competition, and in reply the secretary wrote: "It is not considered necessary to extend the time, as the number of applications for the conditions for the competition has been very large, and there have been but two applications for the extension of time." I have now to suggest that those among the intending competitors who find the time too short, should at once write, asking an extension of at least a month. It is quite evident that no architect whose time is otherwise much occupied can do anything like justice to this competition within the time allowed at present. In the Glasgow Municipal Buildings competition more than three times as long was given, and I have not yet heard anyone complain of its being too much.—I am, &c., 4th Oct. AN ARCHITECT.

"WAYSIDE NOTES IN THE WEST."

SIR,—In reply to "Provincial" I beg to say that I am an architect. What, I beg to know, does "Provincial" understand by *esprit de corps*? Union for noble ends, or swearing black's white, so hang together lest we hang separately? Art (like religion) stands high above its professors. If I am obliged to choose sides, I prefer to range myself with art. "Viator" makes, I think, a poor apology for Sir Gilbert Scott. I spoke of organ screens, he mentions several as exceptional cases which are not of the class referred to. Amongst others concerning which Scott was guilty, must be named Bristol. I deplore the injury at St. Paul's, Westminster, and Chichester. "Viator" can best answer the query of "East Anglian."—I am, &c., M.

HOUSE-DRAINAGE AND SEWER AND GULLY VENTILATION.

SIR,—Your correspondent "S. T. G." (p. 443) invites opinion upon the subject of trapping and ventilating street-sewers. This is no doubt a matter of great importance, and as yet not generally adopted in practice. Its necessity is nevertheless admitted, and when existing prejudices are set aside and the question better understood, all our main sewers will be as far as possible properly ventilated.

House-drainage and street-sewers, although distinct questions, cannot well be separated. In reference to the former a greatly improved system prevails to that formerly practised. We have now glazed fireclay tubes of sizes for all requirements, with socket joints and bends and junctions to suit all curves, and by the adoption of trapping inside and disconnection outside the house, the waste-pipe delivering over a gully and grate, or placing the gully lower down and fixing a grating over the same with the waste-pipe under the grate, which is equally effective (and which method is by no means a new one, as your correspondent "S. T. G." appears to think—I have adopted it myself, and know others to have done so years since). With these provisions properly attended to, house-drainage is practically safe.

Before we can carry out any well considered system of drain and sewer ventilation we must first insist that their construction shall be perfect and complete. The materials must be of the proper description, and the workmanship well and carefully done; falls must be as much as practicable and uniform throughout. (It is not uncommon in opening out a drain to find the pipe one-third full of sediment by being laid too low at a particular place.)

Were these conditions carefully attended to, there would not be that amount of stagnant matter lying in various places to generate gas, as they would run themselves comparatively clean, and free ventilation could then be more safely attempted. I use the term free ventilation, as I think it is in this direction we must look for solving the question. Mechanical contrivances have been proposed, and various methods for extracting the foul air or gases, but they are very uncertain in their action, and but very unsatisfactory.

Your correspondent suggests the introduction of a trap or siphon at the end of each street. I think the plan would be very objectionable, and would prevent the free discharge of the sewage. The multiplication of traps I consider an evil. They are essential at proper places. Untrapped street-gullies have been referred to; but I believe in some places the gullies are purposely left untrapped to ventilate the sewers.

Speaking from experience, I don't think the street gully-grates close by the footways are the most desirable places to ventilate the sewers. But it is a well-known fact that where gullies are trapped, when most needed, in dry weather, the water has all evaporated, and the trap is a delusion. The proper place to ventilate the sewers appears to be the centre of the roadway, over the sewer, at regular distances, and having good strong large iron grates at the road-level, with proper provision to catch the detritus or road-grit, and having regular attention to keep same clean and open. If objection is taken to offensive smells along the centre of the roadway, I would say it must be far better to let it out freely there, than being confined, forced to make its escape at places likely to be injurious to health. Inlets might be made in some instances at convenient places for the admission of fresh air into the sewers at the low-level.

Some of the ventilating shafts over the sewers might be made sufficiently large and used to receive the inlet-pipes from the street gullies, which pipes would only require to be comparatively small in diameter, and these pipes could also be used for rain-water pipe connections from the front of the houses. The gullies could be left untrapped, as these drains would enter the sewer by a shaft properly ventilated, and the sewage drains would be the only ones having a direct communication with the street sewer.—I am, &c.,

York, Oct. 4.

W. B.

OIL-PAINTING.

SIR,—The invention of oil or varnish-painting is one of the many instances where the original inventors have been forgotten while the improvers of the invention have got all the credit for it. Hubert Van Eyck and his brother John are the reputed inventors of oil-painting. The former was born in 1366, and the latter about 1390. I find the following interesting allusion to the art in "Memorial of London" (extracts from the early archives of the City of London, selected, translated, and edited by H. T. Riley).

ACKNOWLEDGMENT MADE BY A PAINTER, 12 EDWARD I., 1284
"On Friday, the Eve of St. Botolph (17 June), in the 12th year of the reign of King Edward, Nicolas Bacon, painter, acknowledged that he was bound to Hugh Motun, in the sum of twenty shilling, for cinople, * vermilion, and canvas, varnish and verdigris; the same to be paid to the same Hugh, or his certain attorney, ten shillings at the Feast of St. Bartholomew (24 August) and ten shillings at the Feast of St. Michael (29 September) without further delay."

A passage in *Liber Horn*, fol. 341, temp. Edward II (preserved at Guildhall) throws some light on this early allusion to oil-painting.

"RULES AS TO PAINTING OLD AND NEW SADDLES.

"It is provided that no one put any but good and pure colours upon gold or silver; that is to say, good cynople, good green, good vermilion, or other colours tempered with oil, and not brass, a coarse red, or indigo of Balidas [Bagdad], or any other bad colour."

—I am, &c.,

C. F. M.

LEAMINGTON SPA COMPETITION.

SIR,—In reply to "Observer" in your issue of 16th ult., I may say that 46 designs were sent in, from which the council selected three, and ultimately decided on that of Mr. J. A. Cundall, of Leamington.

Local opinion, however, has been divided on the question of the necessity of the building, and it has not been decided whether the design shall be carried out, or whether the Denbigh Villa be converted into municipal and public buildings.

I think the council ought to have decided this point before they put competitors to the trouble of sending in designs.—I am, &c.,

Oct. 5th.

YOUNG COMPETITOR.

CHIPS.

The foundation-stone of a new water-works engine-house was laid on Monday, at Eastbourne, by Miss Ada Currer, of London, the daughter of the architect to the Duke of Devonshire's estate.

Colonel Yolland, chief inspector of railways, has been gazetted to a civil companionship of the Bath.

A subscription portrait of Mr. T. R. Hall, M.P., has been painted by Mr. Frank Holl, A.R.A., and hung in the Guildhall, Worcester. The unveiling took place last week.

New schoolrooms attached to the Presbyterian Church, St. Matthew's, Ipswich, were opened on Wednesday week. They are faced with Kentish ragstone, with freestone dressings, and are furnished in pitch-pine; the chief room seats 200 children, and the cost has been £550. Mr. Frederick Barnes, F.R.I.B.A., of Hatton-court, Ipswich, who designed the adjoining church, was the architect, and the contract was taken by Mr. C. Borrett.

Shoreditch Town-hall has been for many weeks undergoing extensive renovation. The general colouring and decoration of the large public-hall and of the offices are very successful, while the council-chamber, the meeting-room of the vestry, in which the decoration has been far more extensive, has a very handsome appearance. Messrs. Lily and Wood have carried out the more important part of the decoration, and Mr. R. Conler has had the general contract. The whole of the work has been carried out under the direction and superintendence of the architect, Mr. Richard J. Lovell, A.R.I.B.A., 63, Finsbury-pavement, E.C.

* "Cynople," a green colour mentioned in old French heraldry is no doubt the one here meant."

Entercommunication.

QUESTIONS.

[6682.]—**Statics and Dynamics.**—Will any of your readers kindly recommend a good book on above for a beginner, and also one a little more advanced?—W. S.

[6684.]—**House Surveying.**—A large builder told me recently that a surveyor came to examine a mansion with a spirit level and plumb-line, and I heard of another surveyor using a gimeter at the end of a walking-stick to try the soundness of rafters. Pray, are such tests usual, and is there any cheap book giving practical hints on house surveying?—N. W.

[6684.]—**Burnt Ballast.**—Will some experienced reader kindly give me a few hints as to burning clay into ballast, making fire at first, and proceeding operations, how much firing to use, &c., and greatly oblige—SUNSHINE.

[6685.]—**Plastering.**—What is the cause of cracks showing in ceilings, &c., often in good work where no shrinkage of timber, &c., occurs? Is it too great a body of rendering on, or the setting followed on too sharp, or again left too long before the next coat is put on; and as to laths, are the rent equal to the straight cut laths? It seems to me the rent laths being all sorts of curves and full of large knot holes, the prickling up coat varies much in substance, and is not this a cause of cracks, through unequal drying and shrinkage?—ESQUIRE.

[6686.]—**Cement Work.**—A flank wall has been rendered finished, trowelled face. The face is peeling off about 1/4 in. thick. What is the cause of this? Is it the different gaugings from rendering and finishing coat? The rendering is perfectly sound and dry. Will back ing over the whole face stop it from peeling again when done again?—YOUNG BEGINNER.

[6687.]—**Zinc Soakers.**—Will some reader kindly give sketch or say how these are made and put under the slates, and whether any flashing is required, and if cement fillet is put over?—ESQUIRE.

[6688.]—**Factor of Safety.**—Will any of your readers kindly explain the meaning of "factor of safety," and how it is used?—M.

[6689.]—**Local Taxation and Tithes.**—What book or books can be recommended for reading up the assessment and incidence of Government and local taxation and tithes?—JNO. TREVOR.

[6690.]—**Oil in Boards.**—I have a quantity of flooring laid which is to be stained and varnished. Through carelessness a man has spilt several quantities of sweet oil over boards. What is the best remedy for taking out the stains so that it will not affect or show when the above work is executed?—LEO.

[6701.]—**Books.**—Can any one oblige me with publishers' names, prices, &c., of really good practical inexpensive recent works published on the following subjects:—1. Planning, arrangement, &c., of small farm buildings. 2. Handbook on specifications of the several trades, as required in the practice of an architect. 3. Good London and provincial price book for this year. 4. Practical work on measuring, surveying, and levelling ground.—SUBSCRIBER.

[6702.]—**Lunatic Asylums.**—What is the best published work on these? Name of author and publisher would oblige.—ESQUIRE.

[6703.]—**Boundary.**—An adjoining owner has a building which stands back from my boundary 4 in., but his eaves hang over 12 in., and so are within 10 in. of my boundary. How far must I keep back from my boundary with a new building, which will be above my neighbour's eaves?—ACCURACY.

[6704.]—**Riding Schools.**—Are there any riding-schools in London situated upstairs, and on what floor? Of what are the floors constructed? Would brick arches covered with concrete say 6 in. supported by ironwork do? What proportion should the length be to the width for a four sized school?—G.

[6705.]—**Brick Architecture.**—Will any reader kindly give the name of any good books illustrated which treat of brickwork and its applications to domestic and ecclesiastical architecture? What parts of England have the best examples of brick architecture, and will any one name a few within 100 miles of London? I particularly want to see some good but plain work, where stone is either unused or but sparingly introduced.—S. F. C.

[6706.]—**Sningles.**—Will any reader say what is the usual size and thickness of the above, how they are worked at the hips, and the manner in which they should be described in specification.—A 10 YEARS' SUBSCRIBER.

REPLIES.

[6654.]—**Ventilation of Soil-pipe.**—In reply to W. P. Buchanan, I have not used his I.C. cowl, and certainly do not consider a good cowl, "that is, one that requires no attention," useless. They are absolutely necessary in close and confined places. I should have been more specific in my reply, as I was thinking of the revolving cowl, and anything in that form requiring constant attention, which they are sure not to get, is objectionable, and without that attention they become useless. For the case in point, I have no doubt a full-sized ventilating shaft and fresh-air inlet properly put in, would have counteracted the evil.—WILLIAM H. BUCHANAN.

[6659.]—**Ventilation of Soil-pipe.**—In my answer to this on p. 469, the word "remove" on the eighth line should be "replace."—HUGH McLACHLAN.

[6697.]—**Religious Houses of the Middle Ages.**—Sharpe's "Architecture of the Cistercians," Viollet le Duc's "Dictionnaire Raisonné de l'Architecture." The late Canon Mackenzie Wallace proposed to bring out a work on mediæval religious architecture, but I am not aware if it was ever published. The works of M. Lacroix would probably best give the information

required by your correspondent; "The Monarchs, Customs, and Dress during the Middle Ages," and "Military and Religious Life in the Middle Ages," both profusely illustrated: the originals are in French. The architecture and dress in the best works have been kept distinct. I believe the best work on costumes is the one by the late Mr. Planché.—HUGH McLACHLAN.

[6698.]—**Involution.**—By logarithms. The logarithm of the number to be raised is first looked out from a table, the log. is then multiplied by the number 3, 5 or whatever power it is required to raise the number to, the product will give a new log., which is that of the result required. It is best first to obtain a little knowledge on logarithms before using them, they are easy to learn, though to understand the theory requires an acquaintance with the "binomial theorem."—HUGH McLACHLAN.

[6699.]—**Lighting Cellar.**—"J. H. A." does not explain whether he wants cellar under floor of shop or under pavement lighted, and I expect one of the two, if not both, is intended. Use Hyatt's or Hayward's lens lights, the makers will tell you which description is best. I can see no other reason for supposing wood to be better than iron for the framework than that cast-iron becomes very brittle under severe frost and has been known to break when stepped on. Wrought iron might be used. Iron has the advantages of greater strength, smaller section of framework, thereby offering less obstruction to light, and much greater durability under the wear of feet. Glass can be fastened to it as easily as to wood, and even rust will not destroy it as soon as wear or rot will wood, if both are equally cared for or neglected. Experience is also in favour of iron, wood framework for glass paving being nearly discarded.—HUGH McLACHLAN.

[6670.]—**Enamelled Iron Tiles.**—The refreshment room of the Shorncliffe railway-station has the walls covered with enamelled iron tiles. They have been fixed about a year, and show no signs of warping or bulging. The surface yields to pressure, but no injury is apparent. A good backing of cement ought to obviate this yielding. I should be glad to learn the name and address of the makers.—JNO. TREVOR.

[6670.]—**Enamelled Iron Tiles.**—Where earthenware or china tiles can be used, as on floors, walls, and ceilings of concrete floors in all of which they can be easily fixed in cement, or in jambs and lintels of stoves when the framing is made to receive them, I would prefer them to the enamelled iron for artistic appearance and durability. On many ceilings and other places enamelled iron is the best, since it can more easily be fastened to wood-work with greater security. I do not think tiles secured by pins at the angles can make durable work, however well they may look when newly fixed. Great heat from fires or the sun would warp the iron, on account of its little thickness, otherwise I see no reason for such a result. Enamelled iron is easily cleaned and looks fresh after the process, the enamel will, however, wear off as with tiles.—HUGH McLACHLAN.

[6671.]—**Rights of Light.**—Mr. Bell answered this very fully last week, but as "F. T." may still wish for further advice, I answer his questions seriatim. (1) Yes. (2) Yes. (3) Yes; if B's lights are "ancient," i.e., at least twenty years old, B can prevent such deterioration by obtaining an injunction in Chancery to restrain A in building. (4) Cannot say, as I have not looked it up. The information could be easily found by anyone requiring to do so. The law of "Ancient Lights" is a part of the law of "easements," which goes back to the time of the Romans, if not earlier. "F. T." might if he wishes consult Kerr, Cox, or Fletcher who have written thereon.—HUGH McLACHLAN.

[6674.]—**Roof Strains.**—The calculations of Hurst and Milesworth are easy to work out and I question whether "Engineer" will be able to discover a quicker process. He prefers it he might try the "Graphic method" referred to and partly explained in Tarn's "Science of Building," pp. 194 and 205; the author calls it "Professor Maxwell's method," and says that "several examples of the application of this method will be found in Tarn's 'Lectures on Iron Roofs and Bridges.'" I learnt it from a paper read before the Class of Architectural Science at the Architectural Association in 1874 by Mr. W. W. Robertson and have used it in the finding of the strains to my answer No. 6649; it can be applied further than the formula referred to and I believe will be found if anything more correct.—HUGH McLACHLAN.

[6678.]—**O-Traps.**—In reply to "Enquirer," in your issue of the 24th inst., the O trap he refers to is, in my opinion, one of the best forms made, if its contour is properly followed out. It is so convenient, it is less liable than any other to m to choke or silt up, and it is not possible to use it by either a sudden dash of water or by waving out. Would not some of the disputants in your columns, who have such seeming facility and aptitude for making tests of the greater or less suitability and efficiency of traps, give us the advantage of a test in this instance? It is in such a way that this bottle of traps may be productive of much good—certainly not in acrimonious quill warfare.—PRACTICAL.

[6679.]—**The White House.**—The President's home at Washington, known universally as the White House, is a pleasant building standing a little way back from New York Avenue, immediately in front of Lafayette-square, and a mile and a half from the Capitol. It occupies a site between the Treasury and the War Department Offices. The former is a superb structure, whilst the latter is, perhaps, the most wonderful erection of gray granite in the world. It is certainly by far the handsomest building in that material I ever saw in my life. Our Thames Embankment, in comparison, is simply nothing more or less than a gutter-walk. The architect of the White House was an Irishman named James Hoban. In America he first resided at Charleston, South Carolina. He won the award of \$5000, (one hundred pounds) for the best design, and the building was to due course erected under his supervision. The foundation stone was laid Oct. 13, 1792. The place was first occupied, etc. it was quite finished, in 1800. It cost \$33,250,000. In August 1, 1814, the house was burnt by the British. The next year its rebuilding began, Mr. Hoban being again the architect. It was re-erected after the original plan at a cost of \$14,460,000. (260,200). Mr. Hoban is said to have taken the inspiration of his

design from the Duke of Leinster's Palace at Dublin. This job giving him a good start, he made Washington his permanent home, was ultimately buried in the neighbouring Catholic cemetery, and his descendants still reside in the city. I visited the White House last month during the time the suffering President lay there. It stands like all Washington, upon flat ground, and has two good fronts, each, perhaps, 20ft. long. The gardens around are carefully laid out, and are only separated from the avenues by low iron rails, so that the building, from almost every point of view, is overlooked by the public eye. The country southward is quite open, and the windows face directly across the flat land to the junction of the waters of the Potomac River, with its Eastern branch. The house is not of marble, as its name seems to imply, and as so many of America's fine public buildings are composed of, nor even of granite. It is built of a yellowish-tinged (Virginia, I think) freestone, and this seems to have been painted white from time to time. It is two stories high. In the centre of the north front, i.e., the one facing the main road, there is a fine portico, 80 or 90 ft. wide, and not unlike the one at the west end of St. Martin's-in-the-Fields Church, Trafalgar-square, London. It is carried by eight columns. Upon the opposite or garden front is a semicircular colonnade, occupying a similar position. There is an open balustraded parapet around the top. All the Presidents except Washington have lived at the White House. The earliest was John Adams. After its re-erection Monroe was the first President to take possession. The fact that the building is so overlooked, and has from every point of view a front, produces a lack of convenient privacy. This was particularly suggested to me by the fact that at the open window of the room next to the one where the poor President lay dying, I saw a "bed-tie" and sheets stuffed out to the sill to air. That sort of thing one expects to see in Canongate, and amongst the wynds and purlieus of Edinburgh, but scarcely at the city palace of the President of America. Yet with no "backlet" of any sort in the rear or midst of the premises, what are folks to do? I procured an excellent photograph at Washington of the north elevation of the White House, which I will readily lend for illustration if desired.—HARRY HEMS.

[6679].—**The White House.**—The following clipping is from an American paper:—"I have noticed in several answers to your correspondents, and in at least one article in your valued paper, an allusion to what they call the whitewash on the White House. As I know something of that preparation, I think it proper that I inform you and your many readers. About the year 1835 John Ogden Dey, Esq., a maternal uncle of mine, visited Washington. He was a man of very observant habits, and in his inspection of the White House and the old Capitol building (the central part of the Capitol as it now stands) he found that the stone of which it was erected was being acted on severely by the weather. The outside of the stones had splintered by exposure and contraction and the disintegrating effect of the atmosphere to such an extent as to seriously threaten its permanency. He sought the Committee on Public Buildings, and proposed to remedy the evil, not with stucco, but with a cement wash. After a full interchange of opinion, he was empowered to send the materials and instructions to Washington, which he did, and it was put on the next year, and has stayed there ever since, protecting the building material effectually. The information was given without fee or reward. The old man has passed away long since, and in justice to his memory, as well as to inform the public, I have penned this. The material used was 'Onondaga Hydraulic Cement,' from the State of New York, mixed with a small amount of glue and with milk—the exact proportions I do not now remember. I have seen several brick houses covered with this cement that have stood all kinds of weathers for years. Some I have in mind were washed thirty-five years ago, and still retain the full coat, and look as well as when put on. The cement has to be applied soon after it is mixed, and put on as thick as the brush will carry it. Sometimes two or more coats are required."—JAM. PESTLE.

[6679].—**The White House.**—There has been a correspondence recently in a Midland "daily" with reference to above. A Wolverhampton gentleman writes: "It is built of white marble. I have a piece in the rough of the material brought from Washington," while a Leamington gentleman writes: "It is built of sandstone, and painted white." Johnston's "General Gazetteer of the World" says, speaking of Washington, about 13 miles N.W., is "White House, the official residence of the President of the United States, an elegant edifice, built of freestone, painted white." I think "Scholler" will, with me, think Johnston reliable.—W. B. T.

[6679].—**The White House at Washington.**—There seems to be some difficulty in ascertaining of what material the White House, Washington, is built. In a letter to the *Birmingham Daily Post* last week, signed "J. J. S.," it is stated that "it is built of white marble, of which he has a specimen in the rough brought from Washington." Another correspondent has two guide-books to Washington City, in both of which it distinctly states that the Executive Mansion, popularly termed the White House, is built of sandstone and painted white.—E. W. G.

[6681].—**Beer Stone.**—Through the kindness of the owners I inspected these quarries about two weeks since. The beauty of the stone, the large size of the blocks, its ease in working, freedom from flaws and veins, its uniform tone and fine grain will make it a most valuable stone when better known for internal and high-class work. I was surprised to learn it could be delivered in London at a less cost than Bath stone. It certainly is, in appearance, much superior—in fact, equal to Portland. The owners claim for it equal durability; but of that I have no personal knowledge.—W. H. LASCELLES.

[6682].—**Printed Reports in Competitions.**—It is not usual to distribute printed reports among the committee, especially when other architects on 'y submit one. This is a decided advantage over other competitors. If the conditions state that a written report is to accompany each design it should be complied with, if the conditions are in any way to be followed. The difference seems very trifling, nevertheless conditions should be strictly adhered to, and not set aside with impunity, as some architects invariably do. It only forms a loophole by which the

committee manage to give the job to a favourite, generally a local man. However, one cannot expect any better when the power of selecting a plan rests with the committee, mostly composed of retired grocers, cheesemongers, and the like: a feat of draughtsmanship generally carries off the palm. Architects, however, have themselves to blame, as there are always plenty of black sheep in the profession who would undertake a job for *nil* in order to become associated with an influential committee.—J. F. BELL, Bolton.

[6685].—**Variation of Compass.**—At Folkestone it is 18° 30' W.—JNO. TAEVON.

[6686].—**Hedges.**—In this county (Kent) fields are usually bounded by a hedge with a ditch on one side of it. The owner who plants the hedge sets it sufficiently within his own boundary to enable him to form a ditch between the hedge and the adjoining field, the earth from the ditch being thrown up to form a dyke, on which the hedge is planted. The ditch also forms a right of way for the owner to trim the farther side of his hedge. It will be seen, then, that where a hedge and ditch together form the boundary to a field, they both belong to that field which has the ditch on the farther side of the hedge. About 4ft. 6in. is a usual allowance for the distance from the centre of hedge to outer edge of ditch which forms the boundary-line, but inquiries should always be made as to local customs. A wood fence constructed with nails belongs to that property from which the nails are driven, excepting, of course where it adjoins a public road. A line touching the outmost projections of the fence would be the boundary line between the two properties.—JNO. TAEVON.

[6690].—**Surveyors' Institution Exams.**—The preliminary exam. is held every year in January. The proficiency biennially in April, the next taking place in 1883. Before going in for the proficiency, the preliminary must be passed, or "W. R." must have matriculated or passed in honours the senior local Oxford or Cambridge. Candidate does not become a member of the Institution after passing proficiency. Another exam. must be passed to become an Associate.—NADA.

STAINED GLASS.

CREWKERNE.—A stained-glass window has been placed in the parish-church as a memorial to the late vicar, the Rev. H. T. Breay. It occupies the east end of the Archdeacon's aisle, and consists of five lights. Each of these is filled with the representation of an act of mercy. In the central light is the Saviour, surrounded by children and with a child in His arms, blessing them, and beneath is the text, "Suffer little children to come unto Me." The other lights depict the feeding of the hungry, the giving of drink to the thirsty, the clothing of the naked, and the visiting of the sick—the texts under them being respectively, "Was an hungry and ye fed Me," "Was thirsty and ye gave Me drink," "Was naked and ye clothed Me," "Was sick and ye visited Me." Over each subject is a canopy, and the tracery above is filled with angels while beneath the window is an inscription. The artists are Messrs. Gibbs, of London.

ST. ALBAN'S.—On Friday afternoon the east window of the Lady Chapel, which has just been restored at the expense of the Corporation of London, who have also caused it to be filled with stained glass, by Messrs. Burlison and Grylls, was unveiled.

BATH.—A stained-glass window has been placed in St. Andrew's Church, Bath, in commemoration of its completion. It occupies the east end, and contains in the lower part three tiers of worshippers, typifying the Holy Church. Above is Our Lord in Glory, surrounded by Angels, Archangels, Seraphs, Apostles, Prophets, and Martyrs. The window is the work of Messrs. Burlison and Grylls, London, and cost £300. Beneath is an inscribed tablet, formed of an oblong slab of Rosso Antico marble, with gilded lettering. This was designed by Mr. J. Eldridge Scott, and executed by Messrs. Farmer and Brindley, of Westminster Bridge-road.

The city council of Lichfield considered last week a recommendation from Mr. Griffiths, C.E., that some allowance should be made to Messrs. Drevitt and Pickering, who have just completed the sewerage contract, as they were £120 out of pocket by the work. The mayor stated that, although it was evident some mistake had been made in the accepted tender, yet the work had been honourably carried out. Several members said that to recompense the contractors for their own error would be establishing a dangerous precedent; but eventually it was carried by a bare majority of votes that the sewerage committee make an allowance at their discretion, the maximum to be £75.

The new buildings of the Young Men's Christian Association at Carnoustie, near Dundee, were opened on Tuesday by Earl Dalhousie. They include a hall on ground-floor and a reading-room over the south end capable of utilisation as a gallery to hall. Accommodation is provided for 400 persons, at a cost, including ante-room and caretaker's house, of £600. Messrs. C. and L. Owen were the architects, and the principal contract, that for masonry, was taken by Messrs. A. and J. Black, Messrs. D. Buck and Son being the joiners.

LEGAL INTELLIGENCE.

IN RE W. SMEATON AND SONS.—(Court of Bankruptcy.—Before Mr. Registrar Hazlitt.)—A first meeting for the proof of debts and the appointment of a trustee was held under an adjudication against Messrs. William, John, and William Mills Smeaton, plumbers and sanitary engineers, carrying on an extensive business in Moorgate-street and elsewhere. They presented a petition for liquidation in July last, with liabilities estimated at £20,000; but at the first meeting the proceedings fell to the ground, and an adjudication of bankruptcy followed. Considerable discussion took place upon some of the proofs, and eventually debts amounting to about £7,000 were proved, and the creditors appointed Mr. H. W. Banks, accountant, trustee of the estate, with a committee of inspection. The assets are stated to be uncertain in value.

IN RE BURFORD.—(Court of Bankruptcy.—Before Mr. Registrar Hazlitt.)—This was a rather heavy failure in the building trade. The debtor, James Burford, who has presented a petition for the liquidation of his affairs, is described as of Norway-house, High-street, Hampstead, builder; and his liabilities are stated at £31,500 in the aggregate, with assets £48,000, consisting of stock-in-trade, plant, book debts, goodwill, and securities in the hands of creditors. Mr. Ernest Field, solicitor, applied for the appointment of Mr. Joseph Andrews, accountant, as receiver and manager of the business, and for an injunction to restrain numerous actions. The evidence showed that the debtor was engaged in several contracts which should be completed for the benefit of the creditors, and there were also the wages of workmen to be paid. Mr. Registrar Hazlitt made the proposed appointment, and granted an injunction until after the first meeting of creditors.

POLLUTING THE THAMES.—At the Henley Police-court on Thursday week the Thames Conservators summoned the rural sanitary authority for polluting the Thames by allowing the drainage of Caversham to enter the river. The case excited much interest, and the defence set up was that the authority had done their utmost to prevent the pollution. Mr. Wimmer, the analyst to the Conservators, proved that the sample of water taken at the drain was concentrated sewage, and caused by old sewage matter being allowed to run into the river. Ultimately the Bench inflicted a penalty of 40s. Notice of appeal was given.

"BLESSINGS TO TENANTS" AND THEIR RECOMPENSE.—At Stratford police-court, on Wednesday, the Rev. F. Bousfield, of Lonsley House, Princes Risborough, was summoned by the Leyton local board for not complying with a notice to abate a nuisance at four cottages, near Forest-place, Leyton. The inspector of nuisances, the surveyor to the local board, and the medical officer of health, stated that the houses were in a fearfully dilapidated state, the plaster falling from the walls, large holes existing in the ceiling, the floors breaking up, and the closets in a filthy state. Pigs were allowed to run about the lower rooms, and the place was quite unfit for habitation. Scarlet fever had broken out, and in one house six cases had occurred; three cases had terminated fatally. The first order was made by the board in July last. The reverend defendant contended that the houses were perfectly healthy, and that it was a blessing to the tenants to be allowed to live there. The proceedings, he added, were hard and tyrannical, and it was a shame that he should be called upon to expend about £1,000 over them for nothing. The magistrates, however, made the order as asked, and allowed a month for the performance of the work.

BREACH OF BUILDING ACT.—(Worship-street, Sept. 22, before Mr. Hannay.)—W. H. Middleton was summoned by the district surveyor for East Hackney (North) for £159 1s. 4d. for expenses incurred under the 47th section of the Metropolitan Building Act, 1855, in rebuilding walls of less than the minimum thickness allowed, and of raising stories of less than the minimum height of a block of five houses at the corner of Castlewood and Mountfield-roads, Craven-park, Stamford-hill. The works were carried on in December and January last, at which time the defendant was owner, but he became bankrupt in January, shortly after the completion of the works. An account of the expenses named was served on him in June last. The magistrate considered the defendant was not liable, as he being then a bankrupt could not be said to be in receipt of the rents or profits when the account was served on him. Summons dismissed.

Two large blocks of business premises of red brick, with freestone dressings, and semi-Renaissance in style, have just been completed in the Walworth-road, S.E., near the Elephant and Castle station. Mr. Benjamin Taber, of Coleman-street, E.C., was the architect, and Mr. Richard Conder, of Ball's Pond-road, Dalston, the builder.

Our Office Table.

THE operations in connection with the tunnel which the Mersey Railway Company are boring under the Mersey, from Liverpool to Birkenhead, are being rapidly pushed forward. On the Birkenhead side the permanent pumps are now in position, and continuous work night and day, with three shifts of workmen, has gone forward with the test or drainage heading. The length cut last week was eleven yards. This is all done by hand, with the aid of explosive gelatine, the confined space making the application of boring machines difficult. This heading is now well under the river, and no increase of water is perceptible. In fact, the water does not now present any feature of difficulty, and the engines keep that under even when working dead slow. The company's engineers and the contractor have now decided that the main tunnel shall go forward at the same time as the drainage heading, and permission has been obtained for the Mersey Dock Board to sink a second shaft close to the existing one, in order to expedite this work, and this has already been carried down a considerable distance. On the Liverpool side less rapid progress has been made, owing to the fact that the upper part of the shaft had to be sunk through made ground, and also on account of the confined space on the quay within which the work has had to be carried on. It is in contemplation to apply for permission to sink a second shaft on the Liverpool side, and this will shorten the time for the completion of the railway by a period of nearly six months.

On Saturday the fourth annual Fine Art Exhibition was opened at Dundee. The sales of pictures at the Exhibition of 1879 amounted to about £4,000; last year they ran up to £5,000—not far behind the proceeds of the Royal Scottish Academy sales. The present Exhibition may not unlikely show a further advance in this important particular of finance. There are fewer paintings in oil than there were last year—797 as against 860. On the other hand, there are no less than 631 works in water-colour, and an interesting collection of 136 etchings is this year added for the first time to the attractions of the Exhibition. Altogether, including the sculpture, the works embraced in the collection number over 1,600, or some 180 more than in 1880.

Rumours are abroad about an Art City to be founded somewhere in the backwoods of America, of which all the denizens are to be artists, musicians, or artists, or the like. Those still in active life will retire there for their holidays; whilst others, tired of the world, but still eager for art, will be retained permanently to form a "focus of art instruction," which will render it unnecessary for young American art students to come to Europe to study. One of the primary conditions is the exclusion of all art critics from the sacred precincts of the art city. If only some of the artists, musicians, "or the like," we know will betake themselves to the new art city we think they need not fear the art critics following them!

THE huge vase sculptured by the late Sir Richard Westmacott, with bas-reliefs to commemorate the Battle of Waterloo, has been taken to pieces, and now, although covered by tarpaulin, may almost be said to "lie naked to the injuries of stormy weather" in the private road bounding the precincts of the buildings of the South Kensington Museum. A few months ago it stood in a corner of the north court of the museum—a court which had been devoted to the technical illustration of sculpture. But when a rearrangement of objects in the museum was set on foot, the Waterloo Vase, an historic link in the chain of British sculpture, had to take its departure to permit the bringing together of all the Italian works of art the Kensington Museum possesses. An ethnical super-added the technical arrangement of objects. Before the Waterloo Vase came to South Kensington it stood in the vestibule of the National Gallery in Trafalgar-square. In time, however, the incompatibility of sculpture with painting drove the vase from Trafalgar-square. The production of the vase was a costly undertaking, instigated by popular acclaim of martial deeds, and paid for by the nation. The Carrara marble out of which Sir Richard Westmacott carved it was, Mr. John Thoms says in his "Curiosities of London,"

captured from the French, who had intended it for a vase to celebrate the triumphs of the First Napoleon.

THE Science and Art Department have commenced the translation of the inscriptions which are to be found on so many of the objects the India Museum contains. The work will be carried on under the direction of Mr. A. N. Wollaston, examiner in Persian at the Royal Military College, Sandhurst, and translator of the "Auvai-i-Suhali," who has secured the services of Mirza Muhammad Bakar as his assistant in making the translations. The Mirza, late of the British Residency at Bushire, is a most accomplished Persian and Arabic scholar, and known in Persia as one of the first native poets of his time. The Science and Art Department will begin the work of translation in the India Museum, but should it prove to be advantageous—of which there is not the slightest doubt—it will, it is anticipated, be continued until all the inscriptions on the various art objects in the Persian collection also have been rendered into English.

THE Custom House of the City of London is about to undergo some improvements and additions. The present building in Lower Thames-street is the fifth erected for the purpose of collecting the customs at the port of London on nearly the same site. The first was built in 1335, by John Churchman, who was then Sheriff of London. The second was erected in the reign of Queen Elizabeth, and appears in a view of London published in 1543, with several high gables and a water-gate. This building was destroyed in the great fire of 1666. The Custom House was shortly afterwards rebuilt by Sir Christopher Wren, and this structure was also destroyed by fire in 1718, being the only edifice erected by this great architect which was burned in London during his lifetime. This building was replaced by one by Ripley, which in its turn was again consumed in 1814. The present structure was erected 1814-17, from the design of David Laing, but in consequence of some defects in the piling, the original centre gateway and the present river front was constructed under the instructions of Sir Robert Smirk.

THE annual exhibition in connection with the Birmingham School of Landscape Art is now open. In the landscape art class the first and fourth prizes have been awarded to Mr. A. Marlow, the second to Mr. J. Billingsley, and the third to Mr. J. Terris, while honourable mention is made of Mr. A. J. Langston. In the elementary drawing classes, Mr. T. A. Smith has been awarded the first prize, Mr. T. W. Hands the second, and Mr. J. C. Moore is thrice honourably mentioned. The exhibition is of a very varied character, and comprises nearly every kind of study which can be said to come within the range of landscape art. Elementary drawings by the students are also exhibited. The exhibition remains open until the 15th inst.

CHIPS.

The local board of Ystradgynaf are about to carry out the drainage and sewerage of the Rhondda Valley from plans prepared by Mr. Lomax, C.E. It will be executed under the supervision of Mr. J. W. Jones, surveyor to the local board.

An iron chapel, seating 250 persons, and built at a cost of £300, was opened at North Skelton, Middlesbrough, on Sunday. Mr. Wm. Sanders, of London, was the builder.

The Mynyddyswyn School Board have adopted the plans of Messrs. A. O. Watkins and Son, of Newport, Mon., for additional school-buildings at Newbridge, Monmouthshire.

A chancel-screen has just been erected in St. John's Church, Lichfield, from the designs of Mr. W. H. Crompton, of that city, by whom the church was restored about ten years since. It is of oak, and consists of five arches, the central opening being surmounted with a cross. Mr. Baunister carried out the work.

A new post-office is in course of erection in Broad-street, Hereford. It has been designed by Mr. E. J. Rivers, of her Majesty's Office of Works, and is Jacobean in style, the street-front will be of brown Portland-stone. Mr. William Bowers, of Bath-street, Hereford, has taken the building contract, Mr. S. Ruddock, of London, is executing the carving, and Mr. H. Luff is the clerk of works. The cost will be about £5,000.

New board-schools are about to be opened at West Hill, Cannock, Staffordshire. Mr. B. Baker is the architect, and Mr. Guest the contractor.

A new lighthouse at Anville, St. Darlestone's Head, near Swanage, was inaugurated by the President of the Board of Trade on Thursday week.

New warehouses and offices have been erected at Micklehurst, Ashton-under-Lyne, for Messrs. Radcliffe Brothers. A rearing supper was given the other evening to the workmen in the employ of Mr. Taylor, by whom the contract was carried out.

The annual meeting for the distribution of prizes to the successful students in the Dudley school of art was held on Michaelmas Day. It was stated that there had been a marked improvement in the work done, and that the amount of grant earned was £122 8s., as against £99 19s. 6d. last year, while thirty-five Queen's prizes had been gained.

The pinnacles and upper portion of "Tenterden steeple" are under repair by Mr. C. Faith, of Coventry.

A stained-glass memorial window was last week placed in the north side of All Saints' Church, Hereford. It is a decorated window of three lights, and is occupied by life-size figures, representing Martha, Mary, and Lazarus, as representative of Hospitality, Devotion, and the Resurrection. The work has been executed by Messrs. Clayton and Bell, of Regent-street, London.

The Dublin Corporation have promoted Dr. C. A. Cameron, their medical officer of health and city analyst, to the entire charge of the Public Health Department, with a salary of £1,000 a year.

The following cynical definition is given in the architectural section of the *Artist*: "SQUIRE.—A roof prolonged upwards into an advertisement."

At the Glasgow Dean of Guild Court on Thursday, the 29th ult., the retiring dean, Mr. D. Milne, gave some statistical details of the value of property erected in the city during recent years, which showed a continuous falling off. In 1880, the value of property which had been passed by the Court was £397,640, compared with £431,000 in 1879, and £755,000 in 1878. The total value of property erected in the past three years was £1,550,000, which fell considerably below the amount for the single year of 1876, when the plans which passed the Court represented property valued at £2,125,000.

An oak screen has been placed on the west side of the organ in Luernton Church, near Tavistock, an edifice recently rebuilt after destruction by fire. The screen was designed by Mr. J. Piers St. Aubyn, of London, and was carved by Mr. Montrie, of Tavistock.

The Plympton rural sanitary authority are about to carry out a scheme by Mr. Shiers, C.E., for supplying water to the village of Pomphlett.

The town-council of Newark-on-Trent were informed on Tuesday that Mr. W. Gilstrap, of Farnham Park, Bury St. Edmund's, had bought the present cattle-market as a site for the free library which he proposes to build and present to the town. The market will probably be removed to land on the opposite bank of the Trent to a site which will be raised above flood-level.

With reference to the paragraph in our last issue entitled "A Powerful Light," it may interest our readers to know that this light is driven by two of Crossley Bros. Otto 8 h.p. silent gas-engines.

The foundation-stone of a new Sunday-school, in connection with Cottage Green Baptist chapel, Camberwell, was laid on Wednesday week. The school is situated at the rear of the chapel, and is of Gothic design, faced with red brick and sandstone dressings. It consists of a central hall with galleries, having class-rooms opening into the main building on both area and gallery levels. Accommodation will be provided for 500 children at a cost of £1,500. Mr. John E. Sears, A.R.I.B.A., son of the pastor, is the architect, and Mr. John Marsland, of Walworth, the contractor.

Saucreed church, West Cornwall, which had fallen into an extremely dilapidated state, has just been restored at a cost of £2,150, and was reopened on Monday. Mr. J. D. Sedding, of Bedford-square, London, was the architect.

Mr. S. Woodall, of the Windmill Works, Dudley, has obtained the contract for the making of a swing-bridge 150ft. span, and 40ft. wide, to be erected at Caiao.

At a preliminary meeting of the Nar Valley Drainage Commissioners, held at King's Lynn last week, Mr. Martin Ffolkes was appointed engineer to the board, and was instructed to prepare a plan of district and a scheme.

A new English Baptist chapel was opened at Blackwood, near Cardiff, on Thursday, the 29th ult. It is built of Pennant stone, and furnished with pitch-pine seats and rostrum. Mr. John Thomas, of Gellihiir and New Tredegar, was the contractor.

Truth states that the Dean and Chapter of St. Paul's have commissioned Sir Frederick Leighton and Mr. E. J. Poynter, R.A., to make on probation designs for a series of paintings to decorate the cupola of the cathedral, in place of those of Thornhill, and to paint each one picture also for approval.

An organ is in course of erection in the Guildhall, Cambridge, at a cost, raised by subscription, of £1,500. Messrs. Hill and Son, of London, are the builders.

A new dry dock at Cardiff was publicly opened on Thursday last week. It is situate between the West and East Bute Docks, and is the largest but one in the Principality, having accommodation for two 2,500 ton vessels at the same time. The dimensions are 420ft. by 76ft. and 20ft. deep, and the cost has been £60,000. It is intended to light it by electricity, so that work can be carried on by night as well as in the day. Mr. C. W. Jacobs is the consulting engineer. Messrs. Kirk and Randall, of London, carried out the iron work under the supervision of Mr. James McConchie, C.E.

A new railway-station at Uttoreter, erected by the North Staffordshire Railway Company at a cost of £15,000, was opened last week.

At Gipsy-road, Norwood, the foundation-stone was laid on Tuesday week of a new Baptist chapel and schoolroom. The style of the building will be Early English. Over the schoolroom will be the chapel, which will have a gallery on three sides, reached by distinct entrances and stone staircases. The walls will be plastered internally, the roof open-timbered, and the windows filled with lead glazing, and at the further end will be a circular-freented platform with preaching rostrum; 740 seats are to be provided. The contract has been taken at £3,336 by Messrs. James Smith and Sons, of South Norwood, and the architect is Mr. Hampden W. Pratt, of Fumival's Inn, whose design was selected in competition.

In the BUILDING NEWS of last week it was stated, "Mr. Bevan has also just been appointed architect to the Paulton Burial Board for certain works in connection with Holy Trinity Church, Bristol." It should have been—Mr. Bevan has also just been appointed architect to the Paulton Burial Board, and for certain works in connection with Holy Trinity Church, Bristol.

EXAMINATION under the METRO-

POLITAN BUILDING ACT 18 and 19 Vict. cap. 122 (sect. XXXIII.) The Board of Examiners appointed by the Royal Institute of British Architects to examine all persons presenting themselves for the purpose as to their competency to perform the duties of DISTRICT SURVEYORS IN LONDON, and to grant CERTIFICATES to Candidates deserving of the same, will hold an EXAMINATION on the 27th and 28th inst. Each candidate must, on or before FRIDAY, the 21st inst., send to the secretaries an APPLICATION, which must be accompanied by a statement drawn up according to a form to be previously obtained from them, and each Candidate will be required to attend at the ROYAL INSTITUTE OF BRITISH ARCHITECTS on THURSDAY, the 27th inst., from 10 a.m. until 1 p.m., and from 2 p.m. until 5 p.m., for the WRITTEN and GRAPHIC Examination, and on FRIDAY, the 28th inst., at 12 noon, for the ORAL Examination. Each Candidate, on sending in his formal statement and application, must pay to the Royal Institute of British Architects a fee of TWO GUINEAS, and each Candidate, on receiving his certificate, should the same be granted to him, must pay to the Institute a further sum of THREE GUINEAS. No person will be admitted to the Examination unless he declare that he intends to offer himself as a Candidate for the office of District Surveyor in London.

J. MACVICAR ANDERSON, Hon. Sec.

WILLIAM H. WHITE, Secretary.

Royal Institute of British Architects, 9, Conduit-street,

Hanover-square, London, W., 1st October, 1881.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—University College, Gower-street, W.C. Public introductory lecture on "The Mode of Studying Architecture for Examinations." By Prof. T. Roger Smith. F.R.I.B.A. 6 p.m. Admission free.

Epps's Cocoa.—Grateful and Comforting.—"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected Cocoa, Mr. Epps has provided our breakfast tables with a delicately-flavoured beverage which may save us many heavy doctors' bills. It is by the judicious use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. Hundreds of subtle maladies are floating around us ready to attack wherever there is a weak point. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame."—*Civil Service Gazette*.—Made simply with boiling-water or milk. Only in Packets labelled—"JAMES EPPS AND CO., Homoeopathic Chemists, London."—Makers of Epps's Chocolate Essence for afternoon use.

Lamplough's Pyretic Saline is refreshing, most agreeable, and the preventive and curative of FEVER, BILIOUSNESS, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by chemists throughout the world, and the Maker, 113, Holborn Hill. Use no substitute. See Medical Testimony.

Holloway's Pills and Ointment.—Dyspepsia, Jaundice.—These complaints are the results of a disordered liver, which secretes bile in quantity or quality incapable of digesting food. Digestion requires a free flow of healthy bile, to insure which Holloway's Pills and Ointment have long been famous, far eclipsing every other medicine.

Doubling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to CHARLES TRASK, Norton-sub-Hamdon, Ilminster, Somerset. —[ADVT.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates. General Repairs and Alterations Executed. Experienced Workmen always in readiness, and sent to any part of the country.—[ADVT.]

BATH STONE. BOX GROUND, THE BEST FOR ALL EXTERNAL USE CORSHAM DOWN

CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS. (See trade advt. on p. XXIII.) ADVT.

TENDERS.

Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ARCACHON, FRANCE.—For warming and ventilating by their new hydro-caloric apparatus, the dwelling-house, and billiard-room, Villa Hermosa, Arcachon, France, for Mr. W. Laird McGregor: Weeks, J., and Co., Chelsea ... £180 0 0

For severing portions of Gower-street, Gower-street, and Wilton-street, for the local board. Mr. J. W. Brown, surveyor:—		Gower-street.		Wilton-street.		Gower-street.		Wilton-street.	
Wallis, A. G., Birmingham	...	£157 0 0	£210 0 0	91 0 0	183 0 0	146 0 0	£100 0 0	85 15 0	172 12 4
Hilton, H., Birmingham	...	...	...	...	...	...	...	...	...
Cutwell and Lewis, Birmingham	...	...	...	...	...	...	...	...	...
Fulmer, A., Birmingham	...	...	...	...	...	...	...	...	...
Jones and Fitzmaurice, Birmingham	...	...	...	...	...	...	...	...	...
*Accepted.									

BANSTEAD, SURREY.—For the erection of additional schools, &c., for the accommodation of about 500 children, in the Banstead-road, Sutton, for the managers of the South Metropolitan School District. Mr. W. Waller, architect. Quantities by Messrs. Franklin and Andrews:—

Macgregor, W. D., London	...	£108,615 0 0
Tyerman, J., London	...	95,269 0 0
Kimbrey, A., Banbury	...	94,276 0 0
Jones, D. C. and Co., Gloucester	...	92,847 0 0
Shepherd, W., London	...	91,6 0 0
Higgs, F., London	...	90,750 0 0
Shumway, W., London	...	86,904 0 0
Mowlem, J. and Co., London	...	84,857 0 0
Higgs and Hill, London	...	85,684 0 0
Rider, T. and Son, London	...	84,888 0 0
Tongue, W., London	...	84,255 0 0
Perry and Co., London	...	83,959 0 0
Chappell, J. T., London	...	83,800 0 0
Nightingale, C. E., London	...	82,846 0 0
Longley, J., Worth, Sussex	...	82,764 0 0
Adcock, W. J., Epsom	...	82,685 0 0
Crockett, W., Epsom	...	82,473 0 0
Marshall, J., London	...	82,449 0 0
Boyce, T., London	...	82,350 0 0
Paranour and Son, Margate	...	81,510 0 0
Shaw, G., London	...	80,700 0 0
Martin, Wells and Co., Aldershot	...	80,664 0 0
Beale, W. J., London	...	79,734 0 0
Hart, H. F., London	...	78,872 0 0
Kirk and Randall, London	...	...

BARTON ST. MARY, GLOUCESTER.—For erection of new board school. Mr. Moore, Barton St. Mary, architect:—

Coleman	...	2680 0 0
Jones	...	580 0 0
Wingate and Co.	...	547 0 0
Tombs	...	184 0 0
King	...	527 0 0
Meddith	...	519 0 0
Ford	...	510 0 0
Nicholls (accepted)	...	493 17 0

BARNLEY.—For construction of 1,600 lineal yards of main sewers, with manholes, &c., in Pindar Oaks-street and adjoining streets, and in Alfred-street; also 80 lineal yards of main surface-drains in Huddersfield-road. Mr. J. Taylor, C.E., borough surveyor:—

Accepted Tenders.

For Pindar Oaks-street sewer:—	...	£163 10 0
Cooper, J., Barnsley	...	72 0 0
For Back Commercial-street, E to F G:—	...	63 0 0
Coles, R., Barnsley	...	59 5 0
For Back Corporation-street, H to J K:—	...	31 12 0
Taylor, J., Barnsley	...	13 4 0
For Huddersfield-road surface-drain:—	...	...

BARTON REGIS, NEAR BRISTOL.—For supplying and laying 900ft. lineal of stoneware pipes at Rockleaze, with manholes, &c., for the Barton Regis Rural Sanitary Authority. Mr. W. M. Lowick, Westbury-on-Trym, near Bristol, surveyor:—

Mereweather, W., Bristol	...	£298 0 0
Britton and Frowd, Bristol	...	240 0 0
Kennedy and Curtis, Westbury	...	236 0 0
Howell and Osborne, Bristol	...	234 0 0
Flower, J., Shirehampton	...	231 0 0
Walters, E., Bristol	...	182 0 0
Perrett, J., Bristol	...	171 0 0
Gregory, J., Bristol	...	156 0 0
Norman, F. L., Bristol	...	125 0 0

BASINGSTOCK, HANTS.—For erection of boiler-maker's and engine erector's shop at the North Hants Iron Works, Basingstock (labour and scaffolding only). Mr. R. S. Wallis, Basingstock, architect:—

Richards, W., Enfield	...	£500 0 0
Simonds, W. H., Reading	...	499 0 0
Balshaw, W., London	...	490 0 0
Ayres, J., Woodford	...	447 0 0
Beech, G., Southsea	...	427 0 0
Johnson, T. C., Portsmouth	...	375 7 9
Sims Bros., Basingstock	...	350 0 0
Turner, J. H., Fleet	...	348 0 0
Adridge, A., Deal	...	343 13 0
Kent and Lunn, Basingstock	...	340 2 6
Jarvis and Bellamy, Wisbech	...	250 0 0

*Accepted.

BATLEY, YORKS.—For widening, draining, levelling, kerbing, and macadamising of Intake-lane, at Brown-hill, Batley (about 450 lineal yards). Mr. M. Sheard, Batley-lane, Batley, surveyor:—

Marvell and Paver, Leeds	...	£234 16 0
Hall, J., Halifax	...	875 10 0
Ritson, W. and Son, Batley	...	867 2 0
Parker and Sharp, Birstal	...	866 5 5
Bower, A., Batley	...	797 12 2
Hirst, T. and Son	...	786 9 3
Farrar, B. and J., Batley	...	750 0 0
Jowett, J., Brighouse	...	674 13 1½
Parkin, W. H., Ravensthorpe	...	640 0 0
Iogham, W. A., Batley (accepted)	...	624 11 9
Hall, M., Dudley Hill	...	604 7 4½
Spencer, J., Bradford	...	582 7 4
Barracough and Son, Rastrick	...	488 17 11½

BEDFORD.—For providing and fixing galvanised cast-iron eaves gutter to the whole of the roof of the infirmary. Mr. J. Day, 12, Victoria-terrace, Bedford, architect and surveyor:—

Day, W., Bedford	...	£102 6 0
Builder:—	...	...
Smith, J., Bedford	...	98 0 0
Ironmongers:—	...	...
Kilpin and Bilson, Bedford (accepted)	...	97 15 0

BELFAST.—For supply and fitting up of laundry and cooking apparatus in new nursery buildings at the workhouse. Mr. J. F. Macmillan, C.E., Chichester-street, Belfast:—

Bradford, J. and Co., Salford	...	£275 0 0
Tiddell and Co., Belfast	...	697 0 0

BELPER, DERBYSHIRE.—For the erection of a public hall at Belper for the Belper Public Hall Co. Mr. John Johnson, A.R.I.B.A., 9, Queen Victoria-street, E.C., architect:—

Statham and Askew, Matlock	...	£2,722 0 0
Beck, T., Matlock Bridge	...	2,720 0 0
Webbe, W., Buxton	...	2,570 0 0
Sinkins and Co., Langley Mill	...	2,474 0 0
Walker and Son, Wicksworth	...	2,382 0 0
Bodell and Sons, Belper	...	2,075 0 0
Wheelton, Bros., Belper	...	2,056 3 0

*Accepted.

BLACKHEATH.—For alterations and additions to Point House, Blackheath, to adapt it to requirements of the West Kent and Greenwich Carlton Club. Mr. Albert L. Guy, 1, Eastcheap and Lewisham, architect:—

Greenwood, J. & J. Arthur-st., W.	...	£1,495 0 0
Disney, Blackheath	...	1,486 0 0
Merritt and Ashby, London-wall	...	1,436 0 0
Hatfield and Son, Blackheath	...	1,350 0 0
Higgs and Hill, South Lambeth	...	1,346 0 0
Banks, E., Lewisham (accepted)	...	1,345 0 0

BRISTOL.—For extending Messrs. Jones and Co.'s organ and harmonium manufactory, in Broad-street and Broad Plain, St. Philips, Bristol. Mr. Henry Masters, 29, Corn-street, Bristol, architect:—

Daltrey	...	£456 0 0
Tilley	...	389 0 0
Horsell, J.	...	357 13 6
Veals	...	349 0 0
Barstow	...	331 0 0
Eastbrook	...	330 0 0
Belmont and Quin	...	323 0 0
Fugle-y	...	320 0 0
Cowlin, S.	...	314 0 0
Banner	...	308 0 0
Louis and Cabrook	...	307 0 0
Clark, E.	...	300 0 0
Ha'herley	...	297 0 0
Humphreys	...	288 0 0
Hodges	...	278 0 0
Edwards (accepted)	...	261 19 0

BOOTLE, LIVERPOOL.—For construction of the Bootle Tramways:—
Nuthall, Manchester (accepted) £27,000 0 0

CARNEDDI, BETHESDA, N. WALES.—For enlargement of Carneddi British School, near Bethesda, county Carnarvon. Mr. Richard Davies, architect, Bangor:—

Hughes, J., Carnarvon	£630 0 0
Thomas, W., Bangor	555 0 0
Pritchard, W. & O., Llanfair, P. G.	415 0 0
Williams, O., Bethesda (accepted)	414 0 0
Roberts, J., and J. W., Bethesda	504 0 0
Roberts, W., Carneddi	405 0 0
Williams, J., Tanybwlch	386 0 0

CHINGFORD.—For enlargement and repairs to "Hawthorn," Chingford, Essex. Mr. F. Doreham, architect:—
Morter (accepted) £1,547 0 0

CORRINGTON, NOTTS.—For a pair of villas in Church Drive, Corrington:—
Cox, W., Foss-street, Carlisle-road, Nottingham (accepted)

CORRINGTON, NOTTS.—For a pair of villas in Burnard-street, Corrington, for Mr. Roper:—
W. Cox, Foss-street, Carlisle-road, Nottingham (accepted)

COVENTRY.—For various painting at the farmhouse at Pinley, for the Coventry General Works Committee. Mr. E. J. Yurnell, Coventry, city surveyor:—

Smith and Burrow, Coventry	£65 10 0
Whiteman, Coventry	65 0 0
Shaw, Coventry	60 0 0
Mander, Coventry	55 0 0
Garlick, Coventry	55 0 0
Makepeace, Coventry	55 0 0
Bacon, Coventry	51 0 0
Wolf, Coventry	42 13 0

Surveyor's estimate £38 6s.

CAOCH EXP. N.—For erection of mission-hall, The Grove, Crouch End, Mr. J. Farrer, architect. Quantities supplied:—

Southcott and Co.	£849 0 0
Conder, R.	750 0 0
Haper	743 0 0
Macfarlane	731 0 0
Richards and Jenkins	695 18 6
King, J. S. (accepted)	615 0 0

DUBLIN.—For alterations and sanitary improvements to the Meath Hospital and County Dublin Infirmary. Mr. H. R. Newton, 202, Great Brunswick-street, Dublin, architect:—

Tighe, T., and S. n, Dublin	£2,658 0 0
Moore, L., Dublin	1,987 15 11
Adams, S., Dublin	1,829 5 0
Pill, J. P., Dublin	1,780 0 0
Lawlor, Blackrock, Co. Dublin	1,774 10 0
Marks, P., Dublin	1,757 0 0
Mallard and Son, Dublin	1,744 0 0
Pemberton, T. H., Dublin	1,727 0 0
Breen	1,698 7 5
Nolan	1,635 0 0
Lockett, Dublin	1,525 0 0
Collen Bros., Dublin	1,441 1 0
Tyrrell, G., Dublin	1,429 1 6
Jackson, Dublin	1,380 0 0
Hall, T., and Son, Dublin	1,308 5 0

* Accepted

EXETER.—For the construction of tramways in the main streets of the borough:—
Sharpe, R., Falmouth (accepted) £18,650 0 0

FINCHLEY, N.—For repairing, &c., a culvert in Regent's Park road, Finchley, N., for the Local Board:—

Rowles, M. H., Acton	£421 0 0
Watts, W. H., Hampstead	219 17 6
Vickery and Taylor, Hammersmith	144 10 0
Cooper, H., Finchley (accepted)	123 10 0

FOLESHILL.—For enlargement of Edgwick Schools, for the School Board, Foleshill, near Coventry. Messrs. G. and I. Steane, architects:—

Haywood, jun., Coventry	£500 0 0
Bacon and Sons, Foleshill	479 10 0
Wood, Coventry	465 0 0
Watts, J. I. and Co., Foleshill	326 5 0
Blakeman & Sons, Coventry (accepted)	360 0 0

GREAT DUNMOW, ESSEX.—For erection of a brick and iron bridge over the river Chelmer at Church End, Great Dunmow, for the Dunmow District Highway Board. Mr. Frederick Baskett, surveyor:—

Nowell, F., Westminster	£1,175 0 0
Cole, J. G., Great Dunmow, Essex	1,110 0 0
Wood, W., Chelmsford, Essex	1,064 0 0
Runnalls, Halstead, Essex	997 0 0
Glascock, J. L., Bishop Stortford, Herts (accepted)	790 0 0

GREAT YARMOUTH.—For the erection of house, St. Peter's-road, Yarmouth, for Mr. Flagman. Mr. W. B. Cockrill, Telegraph House, Colleston, archt. Total cost, £455.

HAWTHORTH.—For the erection of new Baptist church, Hawthorth, near Birmingham. Mr. J. P. Osborne, architect:—

Mollatt	£7,027 0 0
Corkick	6,959 0 0
Barnsley and Son	6,754 0 0
H. G. Mansfield	6,490 0 0
Wells and Son	6,471 0 0
Pearce	6,412 0 0
Wicks	6,380 0 0
Smith, B. N.	6,250 0 0
Lewis	6,250 0 0
Pearce	6,060 0 0
Lewis	6,040 0 0
Staple and Sons	5,865 0 0
Honley Bros.	5,820 0 0
Peckler and Son	5,773 0 0
Jebb and Son	5,600 0 0

Millward, Executors, too late.

HAMMERSMITH, W.—For rebuilding the Old Red Lion, Hammersmith-in-all. Mr. W. Nunn, architect:—

Hunt	£1,180 0 0
Lambell	1,165 0 0
Eyes	1,159 0 0
Wescombe	1,142 0 0
Mansell	1,132 0 0
Chamberlain	1,119 0 0
Nye	1,015 0 0

HIGH HEWORTH, NORTHUMBRIA.—For works of street formation and sewerage, at High Heworth, Co. Durham, for the owners of Heworth Colliery. Mr. J. S. Hodgson, C.E., engineer, Hexham. Quantities supplied by the engineer:—

Elliott, J., Fence Houses	£1,094 0 4
Simpson, J. J., Newcastle-on-Tyne	1,058 6 10
Crug, J., South Shields	925 17 11
Coxon and Boiston, Heworth, near Gateshead	700 0 8

KETERING, NORTHAMPTON.—For the erection of a villa residence, London-road, Kettering. Mr. C. H. Payne, architect. Quantities by the architect:—

Palmer, Market Harborough	£856 0 0
Marston, Leicester	843 0 0
Henson, Kettering	779 10 0
Briggs, Kettering	779 10 0
Payne and Son	680 0 0

KNUTSFORD.—For erection of new infirmary, alterations to old infirmary, and boundary-wall for Knutsford workhouse. Messrs. Tate and Popplewell, 20, Cooper-street, Manchester, architects. Quantities supplied:—
Stone, M., Altrincham (accepted) £5,750 0 0

LEVEL OF TENDRING, ESSEX.—For repairs of sea wall and construction of groynes and outfall, for the commissioners of the Level of Tendring. Mr. W. Berrell, 26, Great George-street, engineer. Quantities supplied by Messrs. R. L. Curtis and Sons:—	
A.	£3,292
B.	£3,007
C.	£3,007
D.	£3,007
E.	£3,007
F.	£3,007
G.	£3,007
H.	£3,007
I.	£3,007
J.	£3,007
K.	£3,007
L.	£3,007
M.	£3,007
N.	£3,007
O.	£3,007
P.	£3,007
Q.	£3,007
R.	£3,007
S.	£3,007
T.	£3,007
U.	£3,007
V.	£3,007
W.	£3,007
X.	£3,007
Y.	£3,007
Z.	£3,007

LINCOLN.—For taking down portion of Old Corn Exchange and erection of arcade with shops, &c., at Lincoln. Messrs. Bellamy and Hardy, Lincoln, architects. Quantities by the architects:—

Martin and Sims	£4,400 0 0
Binn's Bros.	4,225 0 0
Baines	3,950 0 0
Harrison and Horton	3,756 5 0
Walter and Hensman	3,488 0 0
Wright (accepted)	3,419 0 0
Croze, H. S. and W.	3,357 0 0
Cowen and Lansdown	3,250 0 0
Chapman	3,240 15 4
Crosby and Sons	3,097 0 0
Morrison	3,024 7 6

LONDON.—For repairs at No. 56, Strutton Ground, for Messrs. W. F. and G. J. Boyler:—

Walker	£76 0 0
Pickersgill	74 10 0
Stilling (accepted)	74 10 0

LONDON, E.C.—For new warehouse, Lower Thames-street, E.C. Mr. E. N. Clifton, architect:—

Macey	£25,324 0 0
Cooke and Co.	24,982 0 0
Morter	23,343 0 0
Lawrence	22,855 0 0
Ashby and Horner	22,530 0 0
Conder	22,499 0 0
Holland and Hannen	22,288 0 0
Peto Bros.	22,151 0 0
Brass	21,987 0 0

LONDON, E.C.—For alterations, &c., to the Reghan Hotel and Tavern, 61, St. Martin's-le-grand, for Mr. T. Young. Mr. Edward Power, architect:—

Pitcher and Co.	£592 0 0
Conder, R.	589 0 0
Shaw, G.	460 0 0
Hayward and Son	447 0 0
Spencer and Co. (accepted)	415 0 0

MADSTONE, KENT.—For building a mortuary for the Maidstone Urban Sanitary Authority. Mr. J. S. Anscombe, borough surveyor:—

Akhurst, H.	£145 0 0
Clements, Wallis	112 0 0
Simmonds, T.	135 0 0
Bridge, H.	124 18 0
Davis, J. (accepted)	17 0 0

Surveyor's estimate, £130.

MANCHESTER.—For alterations to two houses, Mosley-street, Manchester, for Mr. W. Roberts, M.D. Messrs. Tate and Popplewell, 24, Cooper-street, Manchester quantities supplied:—
Gerrard, J., Salford (accepted) £1,142 0 0

MARYLEBONE.—For painting the rectory relief station, for the guardians of the poor for St. Marylebone:—
Garrod, Edgware-road (accepted) £49 10 0

NELSON (LANCS).—For levelling, paving, flagging, and channelling (labour only) part of Netherfield-road (202 yards), for the Local Board. Mr. William Dent, surveyor:—

Bottomley, B., Nelson	£363 10 0
Wadge, J., Burnby	268 0 0
Hodson, G., Burnley	208 0 1
Read, G. and J. L., Burnley	193 18 9
Parkinson, J., Blackburn (accepted)	185 7 10

NORTH SHIELDS.—For construction of retaining walls, roadway, and surface drainage, on Tynemouth Banks, in front of the Grand Hotel. Mr. C. T. Comoszynski, borough engineer:—

Hutchinson, J., Tynemouth	£3,136 0 0
Shotton Bros., North Shields	3,123 0 0
Smith, G., Newcastle	2,340 0 0
Miller, J. L., Tynemouth	1,605 0 0
Broomhead & Keswick, Newcastle	1,588 0 0
Nelson and Co., York	1,561 0 0
Simpson, J. T., Newcastle	1,527 0 0
Jackson, C., Newcastle	1,514 0 0
Hudspeth and Dodds	1,423 0 0
Nicholson, W.	1,420 0 0
Donkin, J., Chullercoats (accepted)	1,161 0 0

Borough engineer's estimate, £1,330.

NORTHWICH.—For erection of an iron-foundry, tool-shop, &c., for Messrs. W. Hamer and Son, Northwich. Mr. W. Simpkin, C.E., engineer, 46, High-street, Crewe. Quantities, &c., by the engineer:—

Wilson, J., Ruabon	£1,050 0 0
Clarke, S., Middlewich	895 0 0
Bestock, J., Northwich	670 0 0
Leicester Bros., Northwich	547 0 0
Molyneux, D., Northwich	510 0 0
Beswick, J. and J., Knutsford	480 0 0
Stelfox, Carter, and Rylance, Northwich (accepted)	480 0 0

NORWICH.—For painting the exterior of the Norwich workhouse. Mr. J. Band Pearce, F.R.I.B.A., architect, Surrey-street, Norwich:—

Atherton, Norwich	£135 0 0
Hardy, Norwich (accepted)	130 0 0

NORWICH.—For painting the exterior of the workhouse, for the Norwich board of guardians:—
Hardy (accepted) £135 0 0

OWESTRY.—For offices and shops at Oswestry, for Miss Roberts and others:—	
A.	£2,367 0 0
B.	£2,240 0 0
C.	£2,190 0 0
D.	£2,190 0 0
E.	£2,190 0 0
F.	£2,190 0 0
G.	£2,190 0 0
H.	£2,190 0 0
I.	£2,190 0 0
J.	£2,190 0 0
K.	£2,190 0 0
L.	£2,190 0 0
M.	£2,190 0 0
N.	£2,190 0 0
O.	£2,190 0 0
P.	£2,190 0 0
Q.	£2,190 0 0
R.	£2,190 0 0
S.	£2,190 0 0
T.	£2,190 0 0
U.	£2,190 0 0
V.	£2,190 0 0
W.	£2,190 0 0
X.	£2,190 0 0
Y.	£2,190 0 0
Z.	£2,190 0 0

OWESTRY.—For alterations and additions to premises, York-street, Plymouth, for Mr. W. F. Bowden. J. Harvey, architect:—

Jagg, R.	£397 0 0
Quick and Maddock	290 10 0
Jillard, J. C.	288 12 0
Lethbridge and May	285 0 0
Davy and Shepherd (accepted)	280 0 0

POTTERS BAR.—For a pair of semi-detached villas at Potters Bar, near Hatfield, for Mr. E. Tabernacle. Mr. B. C. Ravenscroft, architect:—
Eldridge and Gee (accepted)

SOEWERY BRIDGE.—For the erection of branch banking premises at Soewery Bridge, for the Halifax Joint Stock Bank Co. Messrs. Utley and Grey, Halifax, architects:—

Accepted tenders:—	
Masonry:—John Turner.	
Carpentering and joinery:—Samuel Fox, Soewery Bridge.	
Slatting and plastering:—George Hoyle, Triangle.	
Plumbing and glazing:—J. W. Helm.	

THE BUILDING NEWS.

LONDON, FRIDAY, OCTOBER 14, 1881.

TOWN CHURCHES.

MR. BODLEY'S paper, read at the Church Congress, and which we reported last week, was an able and interesting one. We do not here either endorse or discuss the first abstract proposition of the author, that high art cannot exist, or, at least, cannot thrive without religion: we confine our attention to the more practical part of the address. With respect to churches, larger buildings were advocated, with outlying chapels; but the question naturally arises whether such a system would work well in large towns. No doubt a large church has an influence; but we must have something like unanimity in ritual first, and this is a point on which the speaker did not touch. It is, perhaps, a regrettable fact that while we are making our domestic buildings more complete, our churches are becoming less important, yet we cannot expect our ecclesiastical edifices to assume the monumental character and architectural significance they formerly possessed. It is unnecessary to allude to the causes which render such a condition of things impossible; but if a wide latitude of doctrine and ritual be allowed, such as the Dean of Durham the other day contended for in the Anglican Church, one effect certainly will be the reduction in size of our English churches to buildings having a congregational capacity proportionate to the wants of a locality.

Mr. Bodley said truly, nothing is so impressive as height, and for churches in towns this element seems one which is of far greater consequence than in the country or in open districts. Churches in densely-crowded streets can only be effectually lighted by clerestories, and this consideration seems to point necessarily to buildings of some height, in which the clerestory is made a feature. We could mention many London churches where gas is required, even at the early services, during the greater part of the year. Ample entrances and passages are more important still, and fixed seats are always undesirable, and should not be made the test of accommodation. Mr. Bodley proposed that an open iron grille of some height be fixed to screen off a part of the west-end for the casual worshippers' use, the door being kept open all day. This is a good and sensible suggestion, and might be made a feature. Our church entrances are usually meagre and insignificant, and they are cased off by matchboarding or panelling, which rather tends to repel than invite the stranger. There are other considerations, however, than purely artistic or religious ones. How would the regular worshipper like to be subjected to cold blasts of air in wintry weather, which almost render the small wooden vestibule a necessity? Whatever else an Englishman worships at church, he certainly worships comfort. Some other heating arrangements than we have at present seem necessary to render an open porch practicable. A better architectural effect could be gained than we generally get, by forming a recessed vestibule open to the street, groined inside, with a glass screen enabling those passing by to obtain the perspective or vista the author of the paper suggested.

With respect to vaulting, it is also perfectly true that this feature lends dignity and monumental solidity to a church, and does not very greatly add to the cost. An open-timber roof is not always desirable, and

even a boarded vault is liable to be destroyed by fire, as in the case of the new church at Whitechapel. There are, notwithstanding, considerations which do not add to our appreciation of the stone or brick vault. To mention two practical objections,—the vaulted roof is expensive, inasmuch as it necessitates either walls of increased thickness or deep buttresses; and it seldom insures the best acoustic effect internally. These are points of sufficient weight to justify reference. Unfortunately, a lofty vaulted ceiling of stone is in conflict with good acoustical results, and our cathedral churches bear ample testimony to the deadening effect on sound of a lofty ceiling of masonry. High open-timber roofs are sometimes equally defective as regards the conveyance of sound; the waves are broken up or lost, and a low, flat ceiling is frequently to be preferred. We have, therefore, rather conflicting wishes to harmonise; the artist is quite right in saying dignity and impressive interior effect is so to be gained by vaulted ceilings, but the experience of those who preach and sing in churches of this kind is certainly against them. The flat elliptical or pointed ceilings of plaster common during the eighteenth century are better and more resonant, and if voice and hearing are to count for anything, architects have to study their claims for adoption. That upon the interior of our churches more sculpture and painting may be lavished, and more decoration employed, we are quite ready to admit; but let the sculpture be good and the painting a little higher than cheap decoration. The record of Christian events might be profitably employed in frescoes or mosaics upon the walls, and there can be little said against making the walls of the sacred edifice teach the people objectively. Our great care, however, should be to prevent a tawdry kind of decoration, and not to bespatter the walls with ornament. Mr. Bodley was careful to point to the value of concentration of ornament—a restraint on the resources of decoration; and every artist is well aware that a severely plain edifice with real art in points of interest—such as the choir and altar—has more lasting effect upon the mind than an interior covered with cheap and lavish ornament, either in colour, sculpture, or pictorial incident.

THE PHOTOGRAPHIC SOCIETY'S EXHIBITION.

THE Annual Exhibition of Photographs, held by the Photographic Society of Great Britain, at the gallery of the Society of Painters in Water Colours, 5, Pall Mall East, may be considered fairly up to the average, if there are indeed fewer striking novelties to notice. The great feature of the present exhibition is the revolution which has lately been effected in this art by the substitution of the gelatine dry plate for the wet process. The walls furnish abundant proof of the fact that the use of dry plates has resulted in vigorous pictures full of delicate detail, brilliancy, and pleasing colour. In looking over the numerous photographs which adorn the walls, we notice first on entering the gallery the beautiful collection of Swiss and other views on gelatine plates prepared by Mr. William England, and numbered from 3 to 20. The Valley of Chamounix (No. 6), is a charming transcript of atmosphere and clouds taken with one exposure; the views of the Matterhorn, Zermatt, Mont Blanc, Geneva, &c., are brilliant specimens of the art. Mr. England obtains a medal for his very fine-toned picture of Mont Blanc Range. Near it Mr. E. Fox exhibits views of the Alexandra Hospital for Sick Children at Brighton, taken by the wet collodion process. One of the most marvellous series of marine views taken on gela-

tine plates is by Mr. Matthew Whiting, representing views off Dover, at Purfleet, &c. They are wonderfully brilliant, clear, and sparkling; the rippled water and sunlight are excellent, and as examples of instantaneous photography and artistic effects, there is nothing to surpass them in the room. Mr. Whiting well earns a medal. Mr. Annan's view, "The Stepping Stones" (25), enlargement, silver print, is bold, and we cannot pass by a vigorous and delicately-manipulated enlargement from gelatine plate by Mr. F. Thurston, entitled "Frosted Trees." Mr. W. Bedford as usual has some fine works. His view on the Monnow, for which a medal is given, is a lovely bit of light fleecy foliage, and the views on the Wye are no less remarkable for crisp detail and artistic light and shade. As examples of wet collodion, the English Lakes, by the School of Military Engineering, surpass for technical execution and rich colour any we have lately seen. The view of Grisedale from Ulswater, The Tree Study (69), and the view on the Ulswater are remarkable for the crisp leafage, the stems and branches and water, and we might imagine we were looking at monochrome studies. Nothing can surpass the grand foliage and its vigorous light and shade in 68 and 69; the colour is a deep reddish brown, and there is a degree of opacity which takes off the feeble monotony of ordinary photographs. Some marine views, by Mr. Joseph Gale, who receives a medal, are clever. Captain G. H. Verney sends some fine architectural subjects at Nimes. The triumphal arch, the Roman amphitheatre, and the aqueduct are splendid remains of Roman work in this part of Southern France. The detail in No. 124 is delicately rendered. St. Mark's, Venice, by Mr. A. Pringle, and view from Christchurch tower, Hants, by Mr. A. J. Spiller, are good gelatine specimens.

Landscapes, mountain scenery, studies of children, and portraiture make up the largest part of the gallery. We may refer in general terms to the admirable work of the Autotype Co., who have developed the resources of the art in the reproduction of several drawings. Their portraits are masterpieces of photographic enlargement. We instance the large full-size studies of Mme. Neilson as Helen of Troy, from negatives by Messrs. Downey. No. 164 occupies a pre-eminent position at the end of the gallery, and a grand view of Holland House (198) from a negative by Vernon Heath, illustrates the beauty and detail of the work of this Company for architectural purposes. Near these we notice a large-size portrait of a lady; the softness of expression of the countenance is heightened by the highly-finished manner in which the features have been touched up. This portrait is from negative by Messrs. Downey. The Autotype Co. show some excellent specimens of their collotype process, and they have introduced a sensitive gelatine dry plate, which produces a bold and well-detailed negative. Messrs. W. Cobb and Son (134), Messrs. James Valentine and Sons in "Views in Scotland" (142) send good work; and "Gleanings from the Farm," printed from gelatine plates with optical modifications, by Mr. Lyddell Sawyer, illustrate some clever effects. We most particularly call attention, in studies of still life, to Mrs. S. G. Payne's beautiful grapes and flowers (151), in which the bloom is almost realistic to a fault, if one could indeed find fault with such an artistic group. The floral studies and the game and fruit, by the same lady, show good grouping, texture, and exquisite finish and sharpness. Capt. Abney, R.E., sends a series of interesting Swiss views. No. 163, "Summer," is a pleasing study of a girl, by Mr. A. Debenham. A group including the Premier and Mrs. and Miss Gladstone, at Deal Castle, by Mr. J. Berryman, makes a good picture. As an example of instantaneous

photography (No. 217) "The Thames off Greenwich," taken from a steamer going 12 knots an hour (printed in platinum) by Messrs. W. Cobb and Son, may be mentioned for its sharp definition and clearness. The amusing group entitled "The Brighton Cats and Dogs" will enlist attention for grouping and expression, as well as interest old ladies and spinsters.

Architectural subjects are, if not plentiful, fairly represented. We have already mentioned a few and, notably, the grand view of Holland House, by the Autotype Co., and we now call attention to Mr. Henry Dixon's well-deserving endeavour to record, by photography, the relics of Old London. Ashburham House (227), of which five views are shown, is the only specimen exhibited by the Society whose object it is to preserve impressions of old buildings. The staircase, a fine Italian example, is, perhaps, the most interesting feature of the series. We may also notice "Carnarvon Castle" (219) from a painting; "Alford House, Sussex" (253), by Mr. J. Gale; Mr. A. Hill's "St. Alban's Abbey" (348); but more especially the very admirable series of views, "Old English Houses," by Mr. Vernon Heath. These include Raby Castle, Penshurst Castle (1250); Andley End, well known to all admirers of the architecture of James I.; Easton Neston; Coleshill House, dated 1625; Moor Park; Bisham Abbey, east front (1200); Dorton House; Kentchurch Court, Hatfield (1611); the Oaks, Epsom; Stoke Pogis Manor House; Broome Park, Chirk Castle, Charlton and Holland houses. Coleshill House and Moor Park, of the Roman style, common in the time of George I., are interesting just now. The "Relics of a Bygone Age," by Mr. Seymour Conway, include bright and sharp photographs of Fountains and Rievaulx Abbeys, in which the definition and detail are good; and Mr. Arthur Hill sends two specimens in "Canterbury Cathedral and Knele House" (494). The fine prints from gelatine plates shown by Mr. J. Thomson, F.R.G.S., of Lion and Lioness at the Zoological Gardens, and the Animal Groups (enlargements) by Mr. J. T. Dixon, leave little to be desired. Mr. G. E. Alder shows some capital portraits (243-245) taken without daylight, by the Luxograph gelatine plate; and Messrs. Hunter and Sands' "Group of Boys from Foundling Hospital," done by their "instantaneous shutter," is a clever specimen of sharp definition. We can only mention a few other photographs which call for notice in a speedy review. Mr. H. P. Robinson's series of gelatine-plate studies (264-272) are vigorous and deeply-toned in colour. Capt. Abney's views in Switzerland show also the admirable capabilities of the same process. Mr. Owen G. Bird exhibits some rapid photography of lawn tennis, archery, and cricket exceedingly well, illustrating the powers of gelatine plate under skilful manipulation. Lieut. Darwin's "English Lakes," by dry and wet processes, call for attention from the student; while, for portraiture, the outdoor portraits taken on the terrace of the House of Commons, by Messrs. Russell and Sons; Mr. Mendelssohn's fancy studies (336); Miss Violet Cameron, by the Woodbury Co.; and several others by the same firm, require a word of praise. On the screens we particularly notice the selections from the views taken among the Great Andes of Ecuador in 1879-80, by Mr. E. Whymper, a series of natural mountain summits of great altitude, and objects of pottery, all autotype enlargements. The archaeological interest attaching to this series is great, and the views of the volcano, the summits of Chimborazo, &c., are interesting to the student as having been taken at very great altitudes. The exhibition is well worthy of a visit, as it indicates the progress of an art which is gradually pushing its way in spite of many obstacles and technical difficulties.

ST. PANCRAS INDUSTRIAL EXHIBITION.

THE exhibition just opened at the Institute in Drummond-street, quite maintains its past character. Among building appliances we notice several contributions in the lower room, besides a few drawings or designs of a rather mediocre description. The drawings for sanitary plumbing by Samuel Fairchild, plumber, may be taken as an indication of improved sanitary knowledge among the plumbing fraternity. The author shows the closets placed in a separate building or tower, with tubes carried up with cowl tops, one as an inlet to the drains and the other as a ventilator. The wastes, &c., are all disconnected from the drains. We have seen these drawings before. A sanitary cottage shows a rather objectionable arrangement—a drain carried through the house. C. Maynard Walker is the exhibitor of a valveless water waste-preventing apparatus for flushing, and Dougald Leah a tin-plate worker, sends an improved house sink-trap, the advantage of which is that the water-seal is attached to the grating, and is not liable to be left dry by careless servants. Several ink drawings of designs for buildings by J. Pitt Bayley, architect, of Fulham-place, are exhibited for churches at Windermere, Brixton, Douglas Cathedral, Isle of Man, &c. A cottage hospital at Surbiton, and designs for church furniture are among the drawings. The churches are in different styles, and have apsidal ends with wood groining. A design for an improved iron girder by Edgar Pask, and drawings of internal decoration are other exhibits in this part. Electrical and lighting apparatus is represented. G. E. Webster's duplex system of gas-lighting, and the gas-fire which can be fitted in front of any grate, and which radiates heat into the room, are worth notice. The latter is a semi-circular shaped apparatus with fire-brick back, and with two layers of open wire netting in front, the gas heats to a red glow the inner netting, and the metal and firebrick retains the heat. W. J. B. Symes' gas-filter is a novel apparatus for purifying gas, and the difference of light shown in the working-model is certainly in its favour. The inventor claims a saving of 20 per cent. An automatic electric lamp is shown by A. J. Jarman. We notice among other mechanical improvements, an ingenious "ball castor" for furniture on the principle of the universal ball and socket, by which the weight of furniture is sustained centrally. D. Leah shows a clever means of connecting the tap and vent of beer-casks by a small flexible tube so as to allow free running of the beer, the opening or closing of the tap simultaneously opening or shutting off the air. A double kettle to increase heating-surface, for spirit or gas-stoves, is shown by this inventor, besides many useful improvements in naval and life-saving apparatus to which we cannot here refer. A folding screen by T. A. Bone, and a decorative design for a lamp-shade by C. M. Walker; improvements in pianoforte construction, conservatory-stove for gas, by G. E. Webster; an alarm till for shopkeepers, by H. Opperman; an improved railway-brake and carriage-door, the latter being made sliding, are objects which meet the visitor's attention. An instrument for describing ellipses, by E. Pask, engraver, is simple, and J. S. Johnson's rules, combining self-acting square and compass, are interesting improvements, and appear to answer their purposes well.

We pass on to notice a few of the more artistic works, and the first models of interest we see are some plaster models of an entrance to house in Throgmorton-avenue, by F. W. Porter, architect, lent by C. S.

Kelsey and Sons. The details are well designed in Italian; a doorhead also, with reclining figures in the spandrels, and carved tympanum, is spirited and clever. Metal-work is not very largely represented. W. J. Allard shows a pleasing allegorical design for a clock-dial in copper repoussé. Some repoussé work in iron, by G. H. Hardiman, and embossed dessert-plate, call for notice, not so much for artistic merits as for its execution. A pair of bronze and ormolu candlesticks with figures, and a pair of bronze, by W. H. Izod, are also shown. Wood-carving is represented by some very artistic and spirited panels in oak and pine, by W. Ammonier, whose work we have noticed favourably before. The chrysanthemum panel design in oak, and a festoon, are feelingly carved, and the panel or pilaster in Renaissance is clever and refined in execution; the relief being low but sharply cut. E. T. Grove also sends a walnut and satinwood cabinet and frame, and we notice a carved clock-case in oak by H. Wilcocks, and a dark oak clock-case on a bracket, by Jas. Barron, relieved by Elizabethan mouldings and carved work. The birds and nests by W. F. Jenkins (86) are a wonderful feat of manipulative skill, and the details and moss are rendered with a minuteness which will excite admiration in the visitors. G. H. Bull shows some good carved work in frames and brackets. There is little in the cabinetwork or inlaid specimens to which to draw attention this time. A Japanese hanging bracket, and a few boxes and cabinets are to be seen, but are not mentionable for any special merit in design. Painting on china is a branch of art few have availed themselves of. The best designs we see are two plaques with swallows by Arthur Evans, glass painter, and three terra-cotta plaques with heads and flowers by Jessie Hills. The last is creditable work for a student whose art-training has not been perfected. Edward Sears contributes stained-glass panels, and N. Sears an allegorical subject in glass representing Time.

Coming to the paintings and decorative subjects, our review need not occupy much time. The water-colour drawings, a very few of which are in this class of the exhibition, contain some clever sketches by S. James, chiefly of the North of London. Turner's Fields, Highgate, the Seven Ponds, Winchester Hall (recently pulled down), Highgate Hill, and the corner of Tottenham Court-road and Oxford-street show decisive handling; the buildings are well put in. Another sketch of coast scenery at Land's End, by T. E. Jeffers, and a septa drawing of Well Hall, near Eltham, by Alice B. Perry, are creditable. In the specimens of decorative work we notice some well-executed specimens of graining and marbling by H. J. Medhurst, three decorative panels by T. B. Parlyby, and hall and staircase decoration, by H. G. Wright. The predominant colour, light sage-green, is pleasing, but the design of the apple-blossom in the panels of dado is wanting in repose. On one table we see specimens of ornamental red brickwork, showing cut and rubbed work by a builder's foreman, terra-cotta heads, &c., all clever specimens of handiwork.

Our notice would not be complete were we to omit mention of the amateur part of the exhibition, which will be found in the upper rooms. The several branches include wood-carving and inlaid work, painting on porcelain, oil and water-colour paintings, pen-and-ink drawings, architectural and mechanical designs, needle-work, and models, and fancy articles of all descriptions.

In the wood-carving we glance at four carved oak cabinet doors with thistle and poppy foliage, several specimens of decorative pottery showing various degrees of artistic knowledge; oil-paintings, from smudges and eppies by tyros in the art, to decided indications of talent. The silver

medal goes to W. Hooper for "Summer Fruit," in which the execution shows skillful handling, though faulty perspective and shading; the "White Currants" by the same artist exhibits conscientious observation of nature. With regard to copies such as that of "Cherry Ripe," "The new and old Eddystone Lighthouses," we are sorry such daubs should have been placed where they are. One of the best studies in oil is J. S. Teape's "Spring Flowers" (245), primroses and wallflowers in a vase, and another figure subject is "Waiting for the Tide," by the same artist, a carver. Amusing attempts meet the eye in the water-colour collection, and it is a pity these were not placed elsewhere. They represent, however, a strong craving for art on the part of a number of amateurs whose real avocations are not at all associated with art. Thus there are tin-plate workers, pastrycooks, locksmiths, sign painters, estate agents, joiners, jewellers, letter-sorters, and even policemen among the contributors to the artistic exhibits. Pen-and-ink drawings are numerous; No 288, a humorous study of London and sea-side life, obtains a medal. Several abortions are hung, which almost make the collection ridiculous, such as 289, 262, 265, 266. No. 296 is one of the best ink sketches. The details of a queen-post roof, by G. E. Bulgin, is a more instructive kind of drawing, and it is a pity that so much energy is spent in copying bal and vicious objects under the impression that they are artistic. In the needlework good design and colour is shown in 333, a cushion in crochet, and several models, some of cathedrals and others of a more useful kind, are exhibited, which indicate the same desire to turn constructive capacity to account, but often in the least profitable manner. The work of pupils and apprentices under 18 is extremely instructive, and we discover here and there signs of latent genius and misapplied talent. As a piece of cabinetmaking, the ebonised cabinet and back, by an apprentice aged 17 (C. R. Hamblin), is creditable; and the clever and spirited panel carving, by W. H. Allen, another apprentice of the same age, calls for attention. O. R. Plummer's oak-carved chairs are cleverly executed for a youth; and the drawings of technical carpentry, by F. J. Bancroft, aged 16, are highly commendable for the industry and skill exhibited; but we have no space to enter into this department with the attention to details it deserves.

THE WATER QUESTION.—XVIII.

THE SIZE AND COST OF A RESERVOIR— (Continued.)

THE size of the reservoir here taken as an example from which to estimate approximately the cost per million cubic feet of storage room—and that is, perhaps, the most convenient form in which a general estimate can be attempted—is one which would be sufficient to equalise the flow of the streams from an area of 2,000 acres during three consecutive years of least rainfall in a locality where 33in. is the average annual rainfall of a long series of years; and where, also, the character of the rainfall and the ground are such that 180 would be the proper number of days' storage of the average daily yield of those three years; the site being understood to have the proportions already stated as being approximate to an average of many examples. In such a case the available depth of a year's rainfall would be 15in., if from 14in. to 16in. be allowed for evaporation and other forms of loss, and from 5in. to 6in. of the 33in. as being in excess of the average of the three years to be reckoned upon. The area from which the water would proceed being 2,000 acres, the yearly amount would be 94,350,000 cubic feet, and the daily average yield 258,575

cubic feet. To contain 180 days' supply, therefore, of this quantity, the capacity of the reservoir would be 46½ million cubic feet. This would be impounded by an embankment 600ft. long and 60ft. high at the middle of its length. If the top width be made 20ft., the inner slope 3 to 1 and the outer slope 2 to 1, the extreme width of the seat of the bank would be 320ft. nearly (rather less, because the level of the ground at the toe of the inner slope is somewhat higher than at the toe of the outer slope, and because the inner slope is flatter than the outer one); and the area to be cleared of objectionable material, to a depth of, say, 5in. vertically, would be about 12,000 sq. yd.

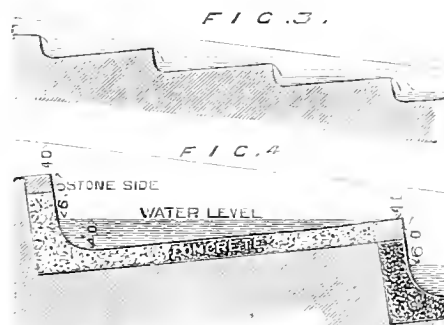
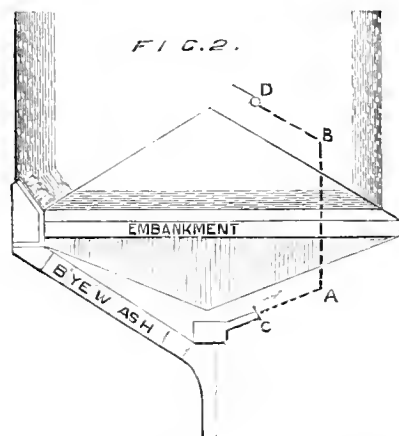
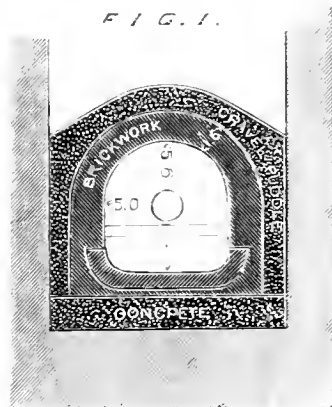
If the thickness of the puddle wall at the top be made 7ft., and the batter of the two sides 1 in 8, the width of the puddle trench at the lowest part of the ground would be 15ft. nearly, and 7ft. at the ends. The depth in different parts of the trench would vary according to the ground met with, but would be, in general, deepest near the middle, and if at the middle point the depth be assumed to be equal to the height of the bank—60ft. in the present example—and 10ft. at the ends of the bank, a line drawn straight between these lowest points would probably equalise the steps in which, practically, the bottom would be cut, and would represent the average depth. The excavation of the puddle trench would then be, if the sides were carried down vertically, about 8,000 c. yd. The quantity of puddle below the ground would be the same. Above the ground the puddle wall would be about 6,000 c. yd., and the total quantity of puddle 14,000 c. yd.

The embankment would be 80,000 c. yd., including the puddle wall, and deducting that the quantity would be 74,000 c. yd. The embankment, less the puddle wall, is taken in one, because, although the material consists of three kinds—viz., a toe of rough stone at the foot of each slope, selected material on each side of the puddle wall, and the remainder of earth, each of which would be estimated at its own price when it had been ascertained from what part of the site each kind of material would be procured, yet in a general estimate the distinction can hardly be made. There would be, however, in this example 8,000 c. yd. of rough stone, 24,000 c. yd. of selected material, and the remainder would be 42,000 c. yd.

If there are to be two discharges from the same reservoir—viz., one for supply and the other for compensation to the stream, the supply pipe would be laid through the discharge culvert, up to the valve tower at its inner end, whether it be situated in the reservoir, clear of the embankment, or be built within the embankment itself. The former is the better plan. The best position of the discharge-pipe or culvert, or the line along which it should be laid, demands the most serious consideration in every case, in order to hit the happy medium which combines security with economy. The level at which it must necessarily be laid being near the bottom of the reservoir, and the puddle trench being almost as necessarily sunk much below that level, the pipe or culvert, when laid near the middle of the bank, must cross the puddle trench at a considerable height above the bottom, and right through the mass of puddle. This is the plan which was formerly adopted, whether the discharge-pipe was inclosed in a culvert of masonry or was laid bare in the ground; but as it was necessary to support the pipe or culvert across the trench upon a more solid foundation than the puddle itself afforded, the unequal settlements which took place when the bank had been made to its full height tended to fracture the work.

To obviate this, straight vertical joints completely across the whole structure of the culvert were sometimes provided at the

points where the unequal settlements would be likely to occur—slip joints—so that the portion of the culvert on each side of the slip joints might settle bodily and evenly. In the same way the brickwork of railway and other tunnels driven through yielding ground is made with a straight joint at the end of every length, instead of leaving toothing for the next length, which is proper enough, and more slightly when finished, where the ground is



on unyielding rock. This provision of a straight joint, however, in the case of reservoir embankments, has sometimes not had the expected effect, owing to the uncertainty of the direction in which the settlements take place, there being horizontal as well as vertical movements of the earth above the culvert. The culvert, therefore, should not cross the puddle trench at any great height, if at all, above the bottom of

the trench. This consideration drives the position a long way from the middle of the bank, as is shown in Fig. 2 on preceding page, in order to lay the culvert in the solid ground.

The bottom of the reservoir, to a height of 11ft. or 15ft. above the lowest point, contains but little water—say in this case half a million cubic feet. It is not necessary, therefore, to lay the discharge-pipe lower than is sufficient to draw off the water to this level, say 10ft. below the top-water level, and the lowest sluice should be, say, 3ft. below this level, to give a head of entrance into the pipe, thus fixing the level of the upper end of the discharge-pipe at 13ft. below the top-water level of the reservoir, by which means 46,000,000 cubic feet of water can be drawn off from a full reservoir. If the invert of the culvert be laid 2ft. lower than the pipe, it would form a channel for the compensation water to be discharged into the stream. To determine the size of the culvert, that of the supply-pipe must first be found. The daily quantity of water due to 13in. rainfall on 2,000 acres of ground is, as before found, 258,570 cubic feet. If one third be discharged into the stream as compensation, the quantity passing through the pipe would be 172,380 cubic feet per day. If the mean daily velocity through the pipe be made 2ft. per second, the diameter found from these data would be 15in. In assigning room for the 15in. pipe, which would be laid before the arch of the culvert is turned over it, it should be considered that it might be possible at some future time that it would be necessary to cut out, remove, and replace one of the pipes, in which case more room would be required than is necessary for laying the pipe in the first instance; the width and height, therefore, should be sufficient for this—say 5ft. wide, and 5ft. high. The best form would be that shown in Fig. 1. The pipe would be supported above the bottom of the culvert, which might be by cast-iron girders built into the walls.

The width of the trench for the culvert would be about 10ft., and it should be made straight as far as it extends under the embankment, and some distance away from the foot of each slope, as shown from A to B in Fig. 2; but excavation may be saved towards the ends by inclining them inwards from the points A and B to C and D respectively.

In laying the culvert in the trench thus excavated in the solid ground at such a depth below the head of water, every possible care is to be taken to prevent the water finding a way outside it, and for this purpose gravel puddle is a suitable material with which to solidly fill every space not completely occupied by masonry. It may be thought that concrete is a more suitable material for this purpose, and in any case the invert of the culvert would be laid on a bed of concrete, unless the ground consist of a solid rock; but for filling in the spaces between the back of the masonry and the sides of the trench gravel puddle is a better material, inasmuch as it can be made more compact and watertight is such a situation. The valve tower at the upper end of the discharge culvert may be of brickwork 18in. thick, 6ft. diameter inside. The lowest valve being 4ft. below the top water-level; there might be three more above it, at 30ft., 20ft., and 10ft. below that level, so that the water can be drawn off from near the surface at all times. These would all communicate with the descending pipe erected within the valve-tower, from the top of which they would be worked, a light iron footbridge affording access from the top of the bank. 8 in. by 8 in. with the lowest valve would be sufficient for drawing off the compensation water. This should be of larger size than the supply-pipe; in this case it might be 2ft. diameter, if circular,

but a rectangular form is preferable. The inside slope of the embankment would be covered with rough stone, the interstices being filled with smaller broken stone, forming a protection to the earth from the wash of water. The area to be so covered would be about 6,000 sq. yd. The outer slope, to be soiled, would be about 4,000 sq. yd., and, including a grass border on each side of the road to be formed on the top of the embankment, the quantity would be 4,800 sq. yd.

A more important part of the work is the waste weir and byewash. For such a drainage area as that assumed the length should not be less than 60ft. The byewash may be nearly wholly of concrete, of the form shown in Figs. 3, 4, and 5 on previous page.

By forming the byewash in a series of ponds, of not more than 6ft. difference of level between them, the descent of the water, in the heaviest flood, may be sufficiently checked, and it may be gradually let down to the stream below the embankment without injury.

A large body of water may be dealt with safely if it be prevented acquiring a too great velocity. Each of the steps shown in the sketch forms an independent pond into which the water falls from a moderate height. The general inclination is, in the example, 1 in 8, each step 6ft., and the length from step to step nearly 48ft.

There would be, in a flood, a great body of water, but no great velocity in any part of the channel; and, except for the overfall sills, which should be of stone, the whole of the byewash may safely be formed of concrete. If the width at the level of each overfall sill be made 30ft., or half the length of the weir, when the water is flowing 2ft. deep over the weir the corresponding depth over the sills would be 3-17ft.

The land occupied by the whole reservoir would be, on the scale previously referred to, about 50 acres.

The estimate would stand thus:—

	Quantity.	Price.	
		s. d. £	
Clearing seat of embankment	12,000 sq. yd.	0 2 100	
Excavation of puddle trench	8,000 c. yd.	5 0 200	
Clay puddle	11,000 "	2 6 1750	
Embankment	74,000 "	1 6 5550	
Road over embankment	800 sq. yd.	2 0 80	
Pitching inner slope	6,000 "	2 6 600	
Soiling outer slope	4,800 "	0 2 40	
Excavation for culvert and valve-tower	4,500 c. yd.	4 0 900	
Putto for byewash	4,000 "	1 0 200	
Concrete in foundations	300 "	6 0 90	
Putto in byewash	2,200 "	7 0 770	
Brickwork in culvert and valve-tower	700 "	21 0 810	
Gravel puddle	500 "	4 0 180	
Stone sills, caps, coping, &c.	1,500 c. ft.	2 0 150	
Valves, &c.		150	
Footbridge		180	
Gauge well		100	
		£13,650	
Contingencies		1,400	
		15,000	
Land and fencing		5,000	
		£20,000	

This would be at the rate of £135 per million cubic feet of storage room, for works and land, but as, perhaps, there might be required as much as £2,000 for expenses outside these, the whole cost per million cubic feet would be £178.

MEDIEVAL SEALS AS WORKS OF ART.

(WITH LITHOGRAPHIC ILLUSTRATIONS.)

IT is remarkable at the present time, when works of ancient art are so highly valued, and everything relating to them is studied so diligently, that mediæval seals are comparatively neglected; for, though their importance has long been recognised by antiquaries, their art-value seems not to be sufficiently known. When it is considered what light they throw on the architecture, costumes, shipping, and every detail

of the external life, and even on the habits and manners of thought of the ages in which they were executed, it will be seen that they are not only an excellent guide to the history, but also an invaluable exponent of the art, of the mediæval period.

Their use was introduced into this country from France, perhaps with that affectation of Norman manners which preceded the invasion of the Conqueror. Those of the French kings begin with Dagobert I. in the seventh century; but, though there are seals of Offa and Renulf, kings of the Mercians, the Great Seals of England are first found in the time of the Confessor; and from that period they form an uninterrupted series to the present time. In shape they are round, and represent on the obverse the king mounted and in vigorous action, holding in his hand a sword or spear, and on the reverse or counter-seal seated on the throne. The early examples are rude in execution, and partake of the character of all archaic design; and in them the throne is little more than a simple stool; but in the time of Henry III. it received architectural additions in the way of pinnacles and arcading, which became more elaborate with each succeeding reign. At the same time the figure was better drawn, and the detail more developed, owing to the improved execution of the seal. In the reigns of Edward III. and his immediate successors the art was at its perfection, its productions being designed in that spirit of beauty with which the ready metal-workers of those days could endue the least objects of their care. Nor was any labour spared on their accessory decorations, which in the fourteenth century were lavish in the extreme. Having thus culminated with the Gothic style, the art of seal-engraving began in the following reigns to partake of the decadence which was foreshadowed in Perpendicular period; and the Pointed style was abandoned in the time of Henry VIII., when seals of Debased Renaissance character were used. But it was in the time of the Commonwealth, "in the third year of freedom by God's blessing restored," as we are told in the inscription that it was most degraded, for the great seal of this date displays on one side a *perspective* representation of the Commons assembled, and on the other a map of the British Isles.

It was in the twelfth century that seals were first ordinarily used by private persons and corporate bodies; but in the following one their use became general. It will be found that their art-history is precisely that of the royal seals. Amongst ecclesiastical ones those of prelates are perhaps the most interesting. Their shape is generally a pointed oval, and they usually represent the bishop giving the benediction. In the early examples the figure is in the simple and archaic spirit found in the great seals; but diapered backgrounds and canopies were soon added, medallions and shields of arms being often placed at the sides of the figure. The seal of Richard Aungerville, Bishop of Durham, author of the "Philobiblon," and a correspondent of Petrarch, 1333-1345 (Fig. 1), is the finest period of the seal-engravers' art; and the dignity and elegance of the pose and drapery of the figures, together with the richness and beauty of the architectural and other accessories, have, perhaps, rarely been equalled; yet, this elegance was a general characteristic of the period, and the seal of Ralph, Bishop of London (Fig. 2), is another excellent example. Sometimes the arrangement of episcopal seals was varied, the middle being occupied with figures of saints, while the bishop himself was placed in a niche beneath. The seals of monasteries and guilds form a large class of infinite variety. Some of them have elevations of churches or other ecclesiastical buildings, while many have representations of figures beneath canopies; but all con-

tain architectural details of the greatest interest. That of the Priory of Wenlock (Fig. 3) gives an admirable rendering of St. Michael destroying the Spirit of Evil.

Seals were largely used by private persons in the middle ages, for they were attached, not only to legal documents, but sometimes to private letters; and many of them have been preserved, some of considerable beauty. Those of the great barons, like the royal seals, generally represent the owner armed and mounted, as in the spirited one of Henry de Laci, Earl of Lincoln, *ob.* 1310 (Fig. 4), and are equally valuable for the details of armour and accoutrements which they furnish. That of Thomas de Beauchamp, Earl of Warwick, dated 1344, is an excellent specimen, in which the shield on the counter-seal is surrounded with beautiful Gothic tracery. The lesser nobles and knights ordinarily used their armorial bearings, sometimes in combination with most elaborate ornamentation, as in the seal of Lord Bardolf of Waringay, *circa* 1350 (Fig. 5), and the counter-seal of Mary de St. Paul, Countess of Pembroke, of about the same date (Fig. 6). It may be observed that in all seals of this date the heraldic animals are drawn in a fine spirit of grotesque, which modern herald-painters would do well to imitate. That of George Rygmayden (Fig. 7) is a singular example, which contains a rebus on the name of its owner, a maiden seated on the ridge of a hill. That spirit of quiet merriment, which was the cause of the quaint gurgoyles and *misereres* of our churches, is also observable in the seals of the middle classes, who, having no armorial bearings, were compelled to resort to grotesque and punning devices, and consequently the seals of the fourteenth and fifteenth centuries form a curious and interesting study.

The use as personal seals of antique gems with mediæval settings is a singular chapter in the history of glyptography. The means by which they reached this country are not known; but they certainly were highly valued, and were probably collected in Greece and Italy by crusaders and pilgrims on their return from the Holy Land. Most of those discovered are late Roman in date, few being of the best period of Classic art. Roger, Archbishop of York, 1154-1181, used a chimera with three heads; and Walter Gifford, also archbishop of the same see, 1226-1279, had Fortune holding a Victory, and also a medallion of two Romans. The seal of the Abbot of Walden was a winged victory, that of Ernaldus de Bosco, a warrior protecting a wounded man; and that of Eustace de Vesci, a galley sailing, with two dolphins. It is interesting to know that the mediæval workmen themselves essayed the art of cutting these intaglios, some having been found with Christian subjects.

From the seals of the admirals of England curious illustrations are gained of the singular ships of the middle ages, the precursors of our ironclad fleet. One of these is given in Fig. 8—that of Richard, Duke of Gloucester, afterwards Richard III., who was made Lord High Admiral when as yet only in his tenth year. Much information on these nautical matters is also found in the seals of some of the seaport towns, while those of inland towns, generally representing one of the gates or other fortifications of the city, give details of military architecture, which cannot be otherwise obtained. The seal of the City of Norwich (Fig. 9) is a good example.

Besides their intrinsic value as works of art, it will be seen, from this short account, of what use ancient seals may be made as suggestions for modern design; and it cannot be doubted that those who are interested in mediæval art may derive much advantage from their study. To the architect, especially, they are invaluable, for a small and carefully selected collection of impressions, occupying

but little space, places in his hands, at a trifling cost, the very works of the ancient masters. What, for instance, could be more suggestive of beautiful treatment than the elegant tabernacle work in Figs. 1 and 2, or the equally admirable tracery in Figs. 2 and 3? To the herald, too, and the student of furniture, costume, and kindred subjects, mediæval seals will be found a veritable mine of information.

In conclusion, it may be amiss to offer some remarks on the present state of the art. Its chief characteristics are poverty of style and flatness of execution, due to the use of the die-press for making impressions on paper, whereas formerly they were taken in wax. The object of this is to enable numbers of them to be placed in books, without the material increase in thickness which arose from casts in high relief. To obviate the difficulty a plan has been adopted in some places of having a conventional printed copy of the seal gummed in its place, the original matrix being placed upon it to fulfil the requirements of the law. In this case the seal itself is reserved for attesting important and distinct documents. It seems probable that the general adoption of this system, coupled with a diligent study of ancient examples, would free the art from its present unfavourable conditions, and lead to its complete regeneration.

JOHN LEYLAND.

ARCHITECTURE AT UNIVERSITY COLLEGE.

MR. T. ROGER SMITH, the newly-elected Professor of Architecture at University College, London, gave the following inaugural public lecture in that building on Tuesday evening, explanatory of the mode of teaching he proposes to adopt in the forthcoming session. The room was crowded, several being compelled to stand throughout the evening.

It seems to me fitting, said Professor Smith, that on this occasion, which forms the commencement of my duties as Professor of Architecture in this College, I should devote the opening lecture to an account of the course of instruction given in the architectural classes entrusted to me. In doing so I shall state what has hitherto been done, and what I propose to attempt, in my conduct of the classes, and I shall offer a few suggestions to students to show how they may best profit by the advantages which this college places within their reach; and I shall point out in what parts of their professional education the courses here given will assist them, and in what they must rely upon other opportunities. This has been announced as a public introductory lecture, in the hope that, at a time when the professional attainments of architects are about to become the subject of special examinations, what is here said may, perhaps, travel a little beyond the walls of this class-room, and so may help to draw public attention to the fact that University College has taken in the past, and is prepared to take in the future, her full share in the education of those who are intending to exercise the profession of architects. Before passing on to the consideration of the work to be done in the future, the past history of these classes, and the names associated with them, claim our attention. You probably all know that this is not a course of instruction now to be begun, but one which has been carried on for many years, and round which not a few associations have been gathered. No small part of my responsibility to-day is due to the distinguished bearing, ability, and success of the professors whom I have the honour to succeed in this chair.

Professor Donaldson, happily still living to enjoy an honoured retirement, is the father of the profession of architects in England. As the founder of the Institute, and in a hundred other ways, he has conferred benefits of the greatest importance upon architects as a body. As the first Professor of Architecture in this College, he has been most helpful to very many living architects of eminence, who have studied under him here. I had myself the great advantage of attending Professor Donaldson's lectures as a

student, and I am glad to take this opportunity of saying how largely I feel indebted to him. The vast stores of his learning were poured out before his classes ungrudgingly. The kindness of his manner made us all feel at home with him; and the unfeigned interest which he took in our progress was the very thing to rouse and stimulate our own love of our work. We all know something of the researches in Greece, and the studies in Italy, which will identify the name of Donaldson with the pursuit of Classic architecture as long as the literature of that architecture continues to exist, and, partly on that account, but far more in consequence of his personal qualities, Professor Donaldson was respected, beloved, and valued by us all, as no man ever can be whose attainments and whose character are not both of the highest kind. He established a comprehensive course of instruction in the art and in the science of architecture, and what he so started remains in the main the rule of study here to this day. I should not like to pass without mention the vast labour undergone by him in providing diagrams to illustrate his lectures, and the high artistic merit of the greater part of those diagrams. As specimens of architectural drawing and tinting, those sheets (the chief of them being the work of his own hands) were calculated to exercise the best possible influence on the students. They placed before us good examples drawn in a singularly artistic manner. Nor did the Professor's services to his pupils stop at placing illustrations before us. With rare liberality he put them into our very hands, lending them to us for private study at our own homes. There is much more which I should like to say were this the proper occasion, but I will only add (what is, perhaps, the highest tribute that I can offer) that there were few of the students in Donaldson's classes who did not at the close of the session feel that they had not only attended a learned Professor, but had made a valued friend.

When Professor Donaldson retired, his duties devolved upon my immediate predecessor, Professor Hayter Lewis. I cannot speak of his work from the same standpoint which my memory of student days affords me in regard to Professor Donaldson; yet, having had the honour to be long associated with him in work elsewhere, and more recently to act as his substitute here, I feel that I am, perhaps, as competent as any one not his pupil can possibly be to appreciate at their true value Prof. Hayter Lewis's services in this chair. Public-spirited, like his predecessor, Professor Hayter Lewis has been a signal benefactor to the body of architects at large; and the establishment of voluntary examinations open to students of architecture was only one, though probably the most important, of the measures which he has been instrumental in forwarding. In this college he has laboured assiduously and with signal success, bringing to the work a wide store of learning, a singularly accurate, orderly, well-regulated method of procedure, and the attainments of a highly-cultured artist, student, scholar, and traveller. He has largely added to the already ample series of illustrations which, by the kindness of Professor Donaldson, have been allowed to be used, and he has most liberally permitted his drawings also to remain here for your benefit. It is a matter for sincere regret that Professor Lewis should have felt it necessary to retire from a post the duties of which, had his health permitted, he might have discharged for many years with the greatest possible advantage to students of architecture and to this college.

I cannot but feel how serious is the responsibility cast upon me in succeeding to men of such powers and such attainments, and I can only say that I will do my very best to keep near the high standard reached hitherto in the work of these classes. I should be the first to admit that I am in many respects unequal to my predecessors: yet I ought fairly to add that unless I had felt that I could in some degree do justice to the post I would not have sought it or accepted it. As far as I know my own powers and attainments, I will so shape the course of study here that students shall have the best which it is in my power to give, and so far as I feel my own proper line to differ from that natural to those who have gone before me, to that extent and no further, do I propose to modify the method or system of teaching which I shall pursue. As to the subject-matter of the

lectures, that in the main must continue what it was under my predecessors; but with the addition, as a permanent branch of the subject, of the course of lectures on Professional Practice, which, with the concurrence of Professor Lewis, I introduced as an experiment two sessions ago; for the attendance upon these has fully justified my belief that the subject was one on which lessons would be felt to be acceptable.

The classes, I need hardly say, are intended especially for young men who are being educated for the profession of architects, and they have been and will be carried on with a view to being made as useful as possible to students of this description. The courses, in whole or in part, have, however, been found useful by persons who are preparing for or following kindred pursuits, as civil engineers, surveyors, builders, and others. The classes are in no case intended to supersede the training obtained by being articulated or apprenticed, but they will aid the pupil, partly by enabling him to make a better use than he otherwise could of the opportunities presented to him by his pupilage, and partly by giving him information and rousing in him trains of thought which would not easily reach him in the routine of an architect's office.

It appears to me very unlikely that pupilage will ever cease to be desirable. I once, I confess, thought differently, and imagined that some well-arranged system of class teaching might in time come to supersede it; but I am becoming convinced that nothing but practice can well teach so very practical an art as that of the architect. But even in the offices which afford the most favourable opportunities, the pupil will be unable to learn all that he ought to acquire; and this deficiency must in some way be made up, or the young architect will be but inadequately equipped for his work. It is here that classes such as those which open this week come in most advantageously. They provide instruction such as the office in no instance can furnish. It is, moreover, not only the subjects taught, but the manner of teaching, which renders a class a valuable auxiliary, especially to a beginner. This consideration is too often overlooked, but it is one well worth attention. The instruction given in class is of the same kind as that to which the young student has been indebted for almost all that he has learned in school or college. He is used to it, and he knows, or ought to know, how to learn from it.

When a young man passes from a condition of life in which all his subjects of study have been taught him by qualified and appointed instructors, in which his time has been divided up for him into definite lectures, and in which his work is daily examined and his progress tested, and takes up the position of junior in an office, who has to learn what he can, as best he may, from such share of the office work as his superior is able to trust to his hands, the change is a great wrench. To some natures, of course, the altered circumstances act as a stimulus, and the new pupil begins rapidly to acquire knowledge; but this does not always— or, in my opinion, often—occur. It is seldom, I fear, the case that much good is done till some months more or less have been spent; and unhappily it sometimes occurs that the youth does not find his feet for years, if at all, and that invaluable time is lost. If for no other reason, it would be worth while for pupils to attend some kind of class, so as to keep up the old habit of study; and when a very arduous profession, requiring a great deal of technical information, has to be mastered, it is better that such class should be one which will contribute towards this end if possible, than one not bearing immediately upon professional training.

To put the matter shortly, the pupil best sees and learns practice in the office where he is articulated. He will best learn the principles which underlie that practice in some such college as this.

But it may be felt and urged that there are other ways of supplementing the practical training acquired in the office; and that it is not necessary to attend classes in order to acquire theoretical and historical information about architecture. Construction is no new science; architecture is not an art of modern creation, and many excellent standard books are accessible. The money payable as college fees would go far to procure a fair library of works of reference, and the time spent over the class would suffice

to master the contents of the volumes. I do not deny that this is so, and that the student able and willing to read, especially if he can read French, German, and Italian with facility, has access to the instruction of teachers far more profound in their knowledge of their various subjects than I can ever hope to become; and yet there can be little doubt that, especially in London, with its many amusements and many claims upon time, there is a poor chance of that steady, regular attention being given to a course of reading which is required to render it thoroughly useful. Many students, especially in the country, have only the resource of reading to supplement their office work, and well it is for them that books, and good ones, are accessible; but I have no kind of hesitation in saying that a year's attendance at classes will fix in the mind far more information than a year's reading. There is an impressiveness about the living voice which is wanting to print and paper; there is a stimulus in the presence and rivalry of classmates; the regular recurrence of the lecture evenings is of great advantage in securing that some time each week shall be devoted to study; there is, in short, at a college more inducement to close attention and careful note-taking than under the ordinary circumstances of study from books without an instructor; and the illustrations which the liberality of the past Professors have placed at your disposal, and those which I may be able to furnish, together with the specimens of materials, are of more value than most book illustrations. To those who are fairly able to attend I can, therefore, honestly recommend the direct personal teaching given in this classroom and at King's College, and the combination of teaching and mutual instruction so successfully carried on by the members of the Architectural Association, as calculated to aid their progress very materially.

In many classes in this and every other college, the subjects of instruction are chosen and arranged so as to prepare the student for passing a certain examination. The subjects for the first B.A. and the second B.A., and the B.Sc. examinations, are provided for, and the examination alluded to in various parts of the college programmes. This college, it is true, is not an establishment intended for preparing young men for examinations; but it must not be forgotten that both the examinations and the programmes of the classes have been carefully arranged to provide what experience seems to point out as necessary to a thorough education, special or general. More than this, there are now so many walks in life to which the passing an examination of some sort, or a whole series of them, forms the entrance, that it would be wrong were the subjects taught in the classes here not to a large extent made to correspond with the subjects required for examinations.

For the first time we now have an examination established which every architect who intends to take a position, such as membership of the Institute confers, must pass; and though I do not wish these classes to be considered as being henceforth devoted solely, or even chiefly, to preparing pupils for that examination, as conducted by the Institute of Architects, it would be idle to ignore what has taken place, the more so that I myself have given up a large amount of time and trouble to the organisation of the examination, and through many years past to the promotion of the voluntary examination which preceded it.

I shall have shortly an opportunity of discussing the subject in a paper to be read before the Architectural Association, so I will not enlarge upon it here. I must, however, point out that the programme of the examination issued by the Institute may be taken as embodying the minimum of attainment and skill which, in the opinion of the council of that body, and of a large committee of men of experience who advised the council, should be possessed by every architect at the outset of his professional career. It will consequently, I think, be useful to examine this programme, and to point out how much of its requirements can be supplied by information to be learned here, and how much is left to be obtained from the practical education which you must gain in the office, on the scaffold, from your sketching-tours, and in your own studies. The obligatory preliminary work consists of a set of plans with a perspective drawing, a sheet of details, and an ornament. This is, of course, intended to elicit practical skill in architecture generally and in

handling drawing materials and making drawings. That skill must, of course, be gained elsewhere, but I hope that the work would be indirectly benefited by what is learned here. Work done as a student, such, for example, as sketches from the diagrams, notes, or essays, may be also submitted, at the option of a candidate. The first subject for examination is the history of architecture, taking a general view of a wide field, and an examination in some detail of a single division of the subject. Our Art course of lectures here supplies the information needed for this paper, and arrangements (which I shall explain presently) will be made in order to enable the students to bestow special attention to one special subject each year, so as to correspond more exactly with the course of examination. The second subject of examination is one intended to show that the student has mastered some one style sufficiently to give him a command over its forms and features, so that he could use it on a building without committing gross errors. This subject is largely a test of practice and drawing and private study, but the classes will materially assist the student in his preparation for this paper, especially if he select the special subject of study alluded to above. The third subject is materials, construction, and sanitary science; and our Construction course covers the whole of these subjects as indicated in the Institute programme. I need hardly add, I hope, that practical as well as theoretical acquaintance with these subjects will be necessary in order to satisfy practical examiners, and must be sought on the works to which the student has access. The fourth subject of examination is Planning; and here practice will be of more use than teaching. I do, however, propose to deal with planning, as far as it can be usefully considered in the classroom, in my Professional Practice course.

The fifth subject—specifications and estimates—is one which is constantly kept in view in the Construction course, but on which direct instruction is given in the practice course. Here, again, practice elsewhere must be relied on to supplement the class-room work. Lastly, professional practice to a limited extent forms the sixth and last subject of the programme. This is fully dealt with in the course devoted to the subject. From this hasty view it will be seen that as much as the class-room can contribute to the student's preparation for passing this examination will be provided in our course of study here.

Another examination, that to be passed by candidates for the post of district surveyor, has recently been remodelled and rendered more searching than before. Here, again, practice and theory will both be tested; but most of the subjects which are likely to be touched upon form part of our Construction course, in which materials, construction, and ruinous structures are all dealt with, and of our practice course, which includes lectures on the Building Act.

I need only, I think, add that the examinations at the close of these courses, with possibly some intermediate examination, will afford the students a means of estimating their chances of success in these more important examinations, and good practice in answering questions on these subjects.

(To be continued.)

MODES IN WHICH RELIGIOUS LIFE MAY BE INFLUENCED BY PAINTING AND SCULPTURE.*

LIKE many other things, Fine Art is a power for good and evil, and its attractiveness makes that power great. For evil, we find it in works of vanity and vice; for good, we see it in the fire which shines from beneath the surface of good men's work. Will and genius are the sources of its power, and thus a work of marble or of colours becomes a thing of purpose and of life; yes, and a more true and clear exponent than language of men's nature and men's thoughts, for language may hide and pervert truth, but Art would convict itself in the lie it would try to tell. The impulse of art comes the artist knows not whence. An irresistible and untraceable ideal haunts him; its imagery falls

* Paper read by Mr. T. GAMBIER PARRY before the Church Congress on Oct. 6, in continuation of the paper read by Mr. G. F. BODLEY, and reported by us last week.

on him like a reflection from another state of being; the mystery of it engages him; the beauty of it fascinates him; its power increases in his search to realise it; heart and mind are oppressed at the sense of it; and the poetry of art alone affords the means of its expression. A work of art comes forth because it must. Its purpose is its own relief. All fine arts have a common origin, and are necessary to each other. The arts of the painter and the sculptor belong to the architect, and enhance the beauty of his work; but music does so even more perfectly; for, with all that sculpture may adorn it or painting enrich it, architecture is never so grandly beautiful as when the divine strains of music are echoing from its forms. Music translates those forms into a perfect eloquence, and clothes them with the colours of her own beauty. How easy then, to understand the endearment of art to mankind! Thoughts pure and beautiful flash across him, and are the next instant gone, like a sun-ray in the sky or a fragrance from the earth. The thoughts had left but a vague shadow of their image, but art rescued it and made it a reality. That first rude sculptor may well have started back who first saw the embodiment of his soul's conception. Whence that conception? An invisible, inscrutable breath had impinged upon his thoughts as the light air wafts across his forehead; whence it came and whither it went he knew not. There it stands before him a reality—terrible in its reality; an embodied shadow; an emanation from his own life; a film of thought that had flashed out from the unknown, and was the next moment lost; gone like the gloss upon the dew, but caught up, recovered, reproduced by his rude skill. How inevitable was idolatry! Whence was the birth of that rude image? Was it an agony of grief, or the dread of death, or of conscience that had struck up in his imagination? He looked blindly into infinity, conscious of a light he could not see. The terror of the unseen had forced upon him the idea of Deity. He felt the divine element in things and called them Gods. As with that rude sculptor, so in all time, art is both the creature and the producer of emotion; and most natural, therefore, is the result that the subject which produces the deepest emotions produces also the greatest art. Its moral and religious influence is indubitable; but unlike the effects of eloquence in literature and speech, art is most powerful by its indirect appeals. I doubt the moral value of its direct representations of pain or shame or evil. Its influence for good and noble action is by the fascination of its works which make those actions beautiful. Its illustrations of agony and vice are themselves as repulsive as the evil they wish to cure. I doubt therefore Hogarth's pictures of the Rake's Progress having ever stepped the course of a rake, or Morland's illustrations of the fall and ruin of Letitia having ever stayed the folly of a frivolous girl. But there can be no doubt of the power of art to elench a conviction already received, or to add force equally to superstition and to truth. The arts of all time have illustrated this, from the idol of the savage (the embodiment of the demon of his dread), to all that the arts of Assyria and Egypt, Greece and Rome, have done, or the lavished ornament of the Temple of the Jews, the paintings of the Catacombs, the frescoes of the middle ages; all testify to this use and power. The embodiment of the religious ideal—and deeper far than that, the impersonation of that ideal—has been a longing desire of mankind approaching to a necessity. The irresistible conviction of spiritual existence, the idea of the power and beauty of invisible beings, has so possessed the minds and imaginations of men that the whole material universe has been peopled with them, from the gods who reigned in the starry heavens to those bright and graceful beings with which mythology has filled the woods and fountains, the rocks, the ocean, and the very air itself. Impersonation was the ideal on which the Pagan arts had been perfected. They swayed the emotions of men. But yet with all their beauty, and with all their power, an impenetrable shadow hung over them. Satisfaction was incomplete. The impersonation was inanimate. The life of it, indeed, was in the artist's mind, and its beauty was in the eyes of those who looked on it. Human sense had grasped at what the human spirit had yearned to see. The material of an inanimate symbol was given to it. Intellect and sense alone were satisfied. The heart, the main-

spring of humanity, was not touched. A great ideal in philanthropy, in literature, and in art had for ages occupied the mind and imagination of mankind. But whence its power, if it were but a thing of fancy or a dream? The whole fabric of it had long since perished but for the conviction of its own inward truth. That conviction was the forecast of a great reality. All art had strained its eyes towards it; the loftiest music of all poetry had raised its voice to it; and, far beyond the reach of all these, suffering humanity had lifted its blind eyes, and stretched out its hands to it; and it was this—the hearts of all nations had yearned for the impersonation of life. At length, and in the fulness of time, that life was manifested, and that Life was the light of men, and the human heart was satisfied. The Christian artist is like "the sower that went forth to sow." Art is truly a divine seed, whose fruit is for the sweetness of man's life. But human infirmity mars it, and human failing blights it; till, well watered by human tears, men reap in joy. Art is sent with a divine message to the world, and that message is the evidence of the universe to the perfection of its Creator as exhibited in the mystery of beauty. This is the commission that the artist bears—to translate to the world the symbols of God's universal love. The divine attributes of power and infinity might overwhelm the world with fear, but the attribute of love reassures it. Beauty is the symbol of that love. Reason cannot define nor imagination fathom it; and he that bears the commission of that message can do no more than, by the simple eloquence of truth, to win the sympathies of men, and to train them as he has trained himself to see in the lineaments of beauty not the mere fancy of a fascinated sense, but a power overlying, underlying, pervading all things—the mystery of beauty; not a mere quality of material, but an element of life; not a mere accident in physical nature, but a designed purpose of its existence. But here we are met by the Word of Wisdom which must be true, that "no man by searching can find out God." To answer or to explain this impediment we need but little of our own unaided wisdom to reply that "the philosopher cannot be found out by searching among the atoms of his body, nor the life or instinct of an animal by the keenest anatomy." An unwise man does not well consider this, and a fool will not understand it. But the Word of Wisdom is perfect, and has dispelled all difficulty and discouragement by answering thus:—"The spirit searches the deep things of God;" and it further adds "we have received the spirit which is of God that we might know the things that are freely given to us of God, because they are spiritually discerned." Great powers of insight have been given to us, but they fail to reach that spiritual ideal, except on fixed conditions. The senses, reason, imagination, conscience, are the main elements of human perception; but each one is subject to those conditions. No one function of that great machinery can arrogate its own sufficiency when its gaze is turned to things divine. Imagination is indeed that faculty by which the soul ascends to the contemplation of the Divine nature, but for its health it needs the balance of the rest. So sense and reason alone must fail to reach it. They may suffice to treat of the phenomena of mind and matter; but they make a sorry and a crippled machine to trace the course and conduct of human life. The cold and narrow creed that some schools of thought and philosophy would thrust upon the world exacts a far more difficult acceptance than the wide and simple Gospel of God. The immortal soul is self-conscious. It is conscious too of universal life, and of its own place in it. It has been offered that Gospel of Death, and has refused it. It is satisfied with the knowledge of the fact of mystery, as that without which Eternity would be an idle void. It listens to the echoes of a distant Past. It has never let go the hand of God. It sees and hears His guiding spirit in the trial-sphere of human life. It knows His footsteps; it traces His life. All Nature is His parable. But Nature is the universe, a wide subject, and a large word to use. Nature has many meanings to men's minds. Nature is God's home and ours. How lovely is she! And yet men wrangle over her. Pride and faith would fight over her; but, thank God, how near does the love of her bring together the Philosopher, the Christian, and the Poet, heal all the wounds of prejudice and mis-

trust, turn all their enmity and contempt to brotherhood, and bend their rivalry in her adoring admiration! All subjects take their colour from men's minds. Things present themselves, and men's mind re-present them. But then those things have passed through a great machine, through the sieve of an instant analysing sense, through stream and counter-stream of reason and imagination, and they come out, like the hope of the human soul, unchanged indeed in individuality, but transformed, transfigured. So the influence of fine art upon thought and life depends greatly upon the tenor of individual disposition; for some minds turn all poetry into prose, and some invest the simplest things with the halo of their own brightness. *Nihil tetigit quod non ornavit.* The spirit of universal life in nature points to immortality. Fine art embodies it, and translates its lovely parables to the world. She is the bearer of the lamp of that life to all who have eyes to see the divine beauty in her imagery and ears to hear the divine wisdom in her voice. But some are cold, some deaf and blind; and she casts her pearls before them in vain; for no art can draw music from the chord that Nature has not already tuned. If science and morality have their sermons in stones, religion has hers in forms of beauty. But, alas! it is not unreasonable to fear that the influence of fine art with the multitude goes no deeper than the eyes, and their value of it is rather for its furniture than its poetry. Regard plainly for one moment the effect of a great picture and sculpture gallery upon the multitude. What do they find? A vast array of pictures and statues; portraits and landscapes of all nationalities; here and there a scenic representation of a religious subject from one school, or an academic composition from another; then, more rarely indeed, a gem of devotional expression; the rest are boats, or battles, or domestic scenes most picturesque, or vice and revelry most offensive; and the sight-seers disperse, delighted with their entertainment, exhilarated by its brightness and confounded by its multiplicity. But pause one moment more. There were some who went lingering away; for there were these among that multitude, and possibly among the poorest and the meanest in the world's esteem, men, women, and perhaps children too, on whom some lovely ray of thought had struck; and the aspirations of devotional expression, still breathing from the surface of some old canvas, as the poor artist had left them, with his last sigh, a legacy for the world, had found their kindred spirit and had struck home at last. These were they who possessed the chord that Nature had already tuned. The music was in the lyre, and mute only till the musician's touch awakened it. But you have asked a serious question: "How can religious life and thought be affected by art?" I can only venture to reply thus:—Fine Art is profoundly more a thing of spirit than of sense. To a soul penetrated with the love of God all things minister. To such an one, whether practically an artist or not, but at least contemplatively one, whose powers of natural insight have been cultivated and refined by all that it is art's sacred mission to teach—to such a one Nature has opened wide her great treasury of Divine life. She has spread before the eyes of his responsive spirit, in a vista of infinity, the mystery of Divine beauty. Unsolved, unsolvable! He gazes with adoration. The highest faculties of his nature—of body, soul, and spirit—in silence bow before it. Sense perceives, imagination portrays, reason accepts, conscience assures, with all the power of their blended testimony, that that inscrutable mystery of Beauty is the mode in which it has pleased the blessed God to communicate to His creatures the perfection of His wisdom and His love. The sublime vision is beyond the range of mortal sight. The moral sense, the voice of the soul within, has answered "Yes;" and the heart turns to its course in human life, the sphere of a short pilgrimage, fortified and content. The convictions which thought, study, and the experience of life had heaped together, stored, sorted, and purified in the great laboratory of memory, have been illuminated by a ray from the throne of immortality. Fear vanishes. Difficulties which tempt, infirmities which impede, are but the discipline of an existence conscious of its own infancy. The way of life lies out before. The light of Divine beauty has been shed upon it; and thus along the pathway of this mortal life, whether it be earthward or heavenward, the footsteps of

the travellers are made light, and their hearts rejoiced with the blessings of assurance and of peace.

In the discussion which followed, Mr. Beresford Hope, M.P., said: The question that is proposed to us is the mode in which religious thought and life are influenced by architecture. It would be an equally valuable and equally interesting inquiry to investigate the mode in which architecture may be influenced by religious life and thought. Let us combine the two investigations together in one great inquiry into the theory of architecture as an offshoot and exponent of religious life and thought. The propensity and passion for, and the necessity for, building, is one of the most salient marks of civilisation. Civilised man is above all things a building creature. Civilisation is universally building for decency, for comfort, for convenience, and for beauty. Egypt and Nineveh are my witness; Greece and Rome, mediæval and modern Europe, all testify to the fact that wherever the truth and wherever civilisation has freshened the nations we have beautiful buildings. Every noble nation and every patriotic commonwealth, by the very rule of its existence, must build. Then I declare emphatically that the most elect of nations, the most august and most universal of commonwealths, the Christian Church, must above all others build, nobly, reverently, lavishly, piously. It must build, or it will not be the Christian Church—*ecclesia Dei*, the civiliser and consoler of souls. The little fragments broken off, infinitesimal chips of religiosity, may despise beauty and scoff at order; but the King's daughter, the true Spouse, has been from the first, and shall be to the end, all glorious within, in her clothing of wrought gold. Every spire, climbing up to heaven, like those of Grantham and Newark, and your own beautiful needle here at Newcastle, every church tower massive and four-square, watching over the miseries, the crimes, and weaknesses of human existence, like the triple group at Durham—every one is a perpetual litany rising with the incense of perpetual prayer to the throne of grace. I pass over the teachings of the elder Church. I say nothing of that most lovely temporary cathedral reared by Moses in the wilderness. I say nothing of that metropolitan temple planted by Solomon on Mount Moriah, like Durham domineering from its rock. I go to the Christian Church, and I call upon you to admire and to wonder at the exceeding wisdom with which, in the emergency of its first emancipation, having to provide for a settled, a prosperous existence, it took hold to the heathen tribunal, and out of that heathen tribunal, by a few changes, a few master-strokes of genius, converted it into the congruous temple of the Most High. The semicircular apse at the end, once the Prætor's seat, now held the Bishop's chair, his attendant presbyters ranged right and left. Over their heads in the curved vault, wrought in imperishable mosaic, the colossal figure of Christ, prefiguring the Apocalyptic vision—"The throne, which was set in heaven," and He Who sat upon that throne, and "round the throne" the "four and twenty seats," while upon the polished pavement beneath, recalling "the sea of glass like unto crystal," was the earthly presentment of "the golden altar which was before the throne." Lower down in their enclosure were congregated the white-robed singers, from whom, like "the voice of many angels round about the throne," arose the ever-recurring psalmody. Still further from the throne were thronged the great body of worshippers, representatives of "every creature which is in the heaven and on the earth and under the earth, and such as are in the sea," all ascribing, at the great Eucharistic rite, "blessing and honour and glory and power unto Him that sitteth upon the throne and unto the Lamb for ever and ever." Last of all, hovering round the door, stood the mournful group of penitents. Such was the material church of earlier days. As time went on more beautiful forms of architectural art developed themselves. The oblong pile, recalling in its form the ship—the ship that carried Christ, expanded right and left, and still continuing the ship became also the Cross. Then, too, the Bishop left his central seat for a more modest one at the side of the choir. In capital and in string-course, and on wall space everywhere, the living stone blossomed into forms of exquisite symbolical beauty. The wood-carver vied with

the worker in metal, and every window glowed with rainbow brilliancy. I am, of course, calling upon you to make your church peculiarly magnificent and spacious, for in all things it is well to hold up the highest model. The material church is the type of the spiritual Church. The congregation, too, of the Church is not a "fortuitous concourse of atoms." It is a Christian people duly assembled. In God's service everyone, from the clergyman to the smallest school-child scrambling up to the seat with its poor little legs hanging down—from the clergyman to the youngest child of the congregation—all are partners together in one common work, swelling the great chord of praise, carrying out our Lord's teaching that when two or three are gathered—and if two or three, then still more when two or three thousand are gathered together—their prayers, if uttered with a devout heart and in a believing spirit, will surely be heard at the throne which is set in heaven. I will not pass from my subject without a word of practical application. I am at this time standing in the ancient and famous borough of Newcastle, and I trust I shall be one of the last strangers to stand in that borough, and that those who come after me will be the guests of and the visitors to the city of Newcastle. You have heard this day how very near at hand is the accomplishment of the prayers and hopes of the good people of this place and of the Church of England and of your noble-hearted Bishop. But when you have endowed the bishopric, will you have completed your work? No; your next duty will be to give to the Bishop of Newcastle competent helpers, faithful counsellors, and wise executors in his cathedral Chapter, and even when you have done this you cannot sit down and stroke your chin in a fit of complacent idleness. It is true that in the parish-church of St. Nicholas you have a stately and noble building, of dimensions which entitle it, as you have got it, to be accepted as a cathedral. You have with much munificence and taste restored it, so as to make it in its arrangements a worthy parish-church. But it wants several things to fit it for its higher destination and to entitle it to take rank as a worthy cathedral. A reredos, delicate and aspiring as that of Durham, will be required; the throne of the Bishop must not be forgotten; the choir screen and parclose must be provided; a stately pulpit must be forthcoming. Above all, you must observe how wide are the spaces of plain wall inside, now happily relieved from the pollution of whitewash. These plain wall spaces are given to you to become the field for examples of the highest religious art. I do not recommend you to cover them with frescoes, for frescoes will soon perish under the air of Newcastle, so charged with chemical elements. But they offer themselves for that most enduring, most effective process of religious art, the glass mosaic, with its brilliant, well-contrasted colours standing out from the golden background; mosaics such as you find in the churches of Ravenna, of Rome, and of the Eternal Wisdom at Constantinople. If all which I suggest be done, the church of St. Nicholas, in spite of its moderate size for its new destination, may become a most beautiful, glorious, and remarkable cathedral, and one of which the citizens of Newcastle may well be proud.

THE SOCIAL SCIENCE CONGRESS.

THE Social Science Congress concluded its Dublin meeting last Saturday.

At 10 o'clock the Art Section met to hear an address on Art from its president, Viscount Powerscourt, K.P. Lord O'Hagan occupied the chair.

Lord Powerscourt, after a modest appeal for indulgence for shortcomings, reviewed the history of art progress in the different countries in Europe, especially dwelling on the encouragement given by the authorities in France to artists. In France, whether there is a monarchy, an empire, or a republic, there is the Ministry of the Arts, and the united wisdom of the council choose, independently of any consideration except merit, the works to which they award the palm in the annual exhibition. Most of the artists of importance in France have a school of pupils. A person wishing to become a pupil is recommended to the artist, and has to pay a deposit to him, after which he is formally admitted into his class, which is constantly visited and supervised

by the master. The Government send round annually to the different *ateliers* to know if there are any pupils of sufficient promise to complete for the Prix de Rome, which is an annual grant to pay the expenses of two pupils to go to Rome and live there for a year for study, and a portion of the grant goes to the master of a successful pupil, which is a direct encouragement to him to push his pupils on. Comparing the Salon with our Academies, one could not help seeing that the conceptions of British artists are very much limited in size, scope, and subject, whereas in France there is scarcely any limit at all in any direction. Of course, he did not mean to say that there are not as great artists in England or elsewhere as in France, but the opportunities of advancement given by the State are of a larger and more practical kind than those given by the Governments of other countries. He gave a short notice of contemporary art at home. It was singular to observe, in the works of even great men of some generations back in the British school of painting, how little attention comparatively appears to have been then paid to drawing. In the works of some even whose names are the greatest, not excepting Sir Joshua Reynolds himself, the human figure is often very defective. In some of Collins's beautiful landscapes the animals and figures are put in with a disregard of form, and sometimes even of proportion, which shows that detail was very much sacrificed to general effect. Turner's figures also often lack correctness; but, of course, nobody cares for that in comparison with the unrivalled aerial effect and beautiful tone of his works. But, except with regard to the paintings of the highest rank, the first thing that strikes one always in an exhibition in these islands is a certain garishness and crudity of colour, or rather a want of tone in the general scheme of colour. He felt very strongly that the foreign schools excel us in that point of tone very much indeed. There is no doubt that in the academies and in the Science and Art Department the curriculum of drawing from the round and from the living model exists; but either there is a want of knowledge, particularly of harmony of colour, or there is not sufficient discipline, probably from the want of any direct pecuniary advantage to the master, such as he had endeavoured to show is the case in France, where the first-rate artist is the general instructor, and gains a distinct personal advantage from the proficiency of the pupils in his *atelier*. After all, even in art, we must look to the fact, that, if a thing does not pay, it will not be well done; and he was afraid it must be said that the general standard, both in drawing and colour, is higher in the French school than in our own. The remedy was to have some kind of general supervision over the student's work by the first artists of the day.

THE ROYAL DUBLIN SOCIETY—TAYLOR ART SCHOLARSHIPS AND PRIZES.

THE trustees and judges appointed to carry out the trusts of the will of the late Capt. Geo. Archibald Taylor for the promotion of art in Ireland, have published the following conditions upon which £110 will be awarded in 1882 for one scholarship and two prizes. The scheme, as settled by the Court of Chancery in Ireland, provides that all students of art, not exceeding 25 years of age, "who shall have attended for twelve months a school of art in Ireland, or who, being of Irish birth, shall have attended for the like period a school of art in Great Britain or elsewhere, and who shall produce at the exhibition hereinafter mentioned a work of art displaying sufficient merit or a fair promise of future excellence," are qualified to compete. In case a scholarship is awarded to any student for a period of more than one year, the successful competitors shall, if required, in each succeeding year while the scholarship is held, satisfy the trustees and the Royal Dublin Society that he or she is continuing the study of art. The arrangements for the funds next year propose a sum of £110 to be applied to the formation of a scholarship of the value of £50, open to male and female students, and three prizes of £30, £20, and £10 respectively. The competitive works are to be exhibited on Tuesday, April 1, 1882, such works to be sent in not later than Saturday, April 1, 1882. The pictures must be either—1. Compositions containing one or more figures. 2. Landscapes or sea pieces. This

limitation does not apply to the £10 prize. The size of works is not to be less than 2ft. by 1ft. 6in., and they may be executed either in oils or water-colours. Each work must be unframed, and must not bear the student's name.

Application for forms is to be made to Mr. Richard J. Moss, registrar, Royal Dublin Society, Leinster House.

THE GLASGOW INSTITUTE OF MEASURERS.

THE first annual general meeting of this Institute was held on Monday, 3rd inst., when there was a large attendance of members, Mr. Howatt presiding.

It was stated that forty-eight measurers practising in Glasgow had agreed to become members of the Institute, and that the entry-moneys and annual contributions received to date, amounted to the sum of £48 16s. 6d. sterling.

The following gentlemen were elected as members of council: viz., Messrs. James Howatt, John Shields, John Dansken, Robert Scott, Nathaniel Ramsay, R. G. Stirling, M. Campbell Duff, David Robertson, A. C. Hunter, Robert Whitson, John Morrison, and M. Cunningham.

Thereafter the council met, and elected the office-bearers for the ensuing year, viz., president, James Howatt; vice-president, John Shields; treasurer and secretary, Robert Scott.

THE LATERAL DISPLACEMENT OF RIVERS.

THE phenomenon, observed in all rivers, of displacement or shifting of the channel, has been fully treated in a recent book, written by Herr Stefanovic in the Serbian tongue, the contents of which he lately utilised for a lecture to the Geographical Society in Vienna. With the aid of numerous maps and examples, the author endeavoured to prove that the following forces operate to produce the effect in question:—

(1) The carrying down of rock material by tributaries into the main river; such material being detached from off the rock surface by constant weathering, and deposited at the sides of the river-bed. The nearer the angle at which a side valley meets the main valley is to a right angle, the more marked is the pressure and repellent force on the side of the main stream, deflecting it out of its original direction. To understand this action, suppose the main river to have an east-west direction, and to receive tributaries from north and south. These tributaries convey the products of weathering from the hills on either sides; but, on the north side, the weathering is greater, owing to more direct exposure to solar radiation, so that (*ceteris paribus*) more is carried down by the northern tributary, and the main stream bends to the south. The lecturer illustrated this by numerous examples.

(2) The second force which compels a river to shift laterally is the prevalent wind:—This acts in three different ways—first, it acts during the high water of spring, forcing the waves constantly against one of the banks, and so undermining it and carrying its matter away. Next, in the case of a river very snake-like in its windings, it may occur that the narrow isthmuses left are penetrated under favorable conditions, by constant action of the waves in one direction. Several examples of this are met with in the Theiss. Thirdly, the wind, by carrying quantities of sand from neighbouring steppes and wastes, to the river bank opposite its direction, may compel the river to lateral displacement in the other direction. Examples of this occur in the Danube, the Amu Darya and other rivers.

(3) In the tropics, another factor of the result is to be found in the superabundance of vegetation in the bed of the river, so filling up the cavity, that the water overflows and seeks another course. This may be observed in the Upper Nile.

THE STONE FOR TRURO CATHEDRAL.

A MEETING of the General Committee of the Truro Cathedral was held at the Bishop's Library, Truro, on Saturday afternoon, the Earl of Mount Edgumbe presiding.

Mr. E. Carlyon, the secretary, then read the following report:—

"The most important part of the duties imposed on your committee during the past year has been that of the making choice of the stone for the building of the cathedral. Mr. Pearson, on the 10th May, read his report to the Diocesan Committee of the various kinds suitable and of the estimated cost of the various kinds; but, as as you are aware, no decision was then arrived at on that report, and the responsibility of selection was delegated to your executive Committee, and subsequently (on the 27th May) a sub-committee was appointed, with special minutes of instruction to obtain any further or more accurate information, and to report to your Executive Committee on the various stones referred to in Mr. Pearson's report. The reports of Colonel Coeks and Professor Warrington Smyth, as representatives of such sub-committee, were duly presented on the 16th of August last; but it was thought desirable, in the absence of many members, to postpone any final decision for a few weeks, the architect being instructed to proceed in the mean time with the building of the crypt with the same materials as before used. Your committee have this day decided to adopt Carnsew granite for the plain ashlar work of the outer walling, and that "Box-ground" be used for most of the dressed work outside, reserving it for Mr. Pearson's special discretion if in any portion he prefers to use "Doulting"; and that the bulk of the interior plain work for the surface of walls be of St. Stephen's granite, and interior dressings be of Bath stone or other stone at discretion of architect."

Mr. W. C. Pendarves moved the adoption of the report.—Mr. F. G. Enys seconded, and the motion was carried unanimously. After some discussion, Mr. R. Foster proposed that Mr. Pearson be requested to name one or more contractors in whom he had confidence, and lay the results before the Executive Committee, and then to decide whether they should proceed.—This was seconded by Col. Tremayne, and carried unanimously.

DISPOSAL OF SEWAGE OF COUNTRY-HOUSES.*

WE have before us a pamphlet from the pen of Mr. T. E. C. Streetfield, in which the subject of disposal of sewage of country-houses is treated. The author advocates the abolition of cesspools in their present form as receptacles of all the sewage, solid and liquid, of houses. After dealing with the evils of the old cesspools, which in a few days became filled with liquid sewage, and the want of ventilation, the author points out how the root of the evil may be attacked. Mr. Streetfield proposes to remove the cesspool close to the house, to uncover it and wall it round with an opening for access, or otherwise ventilate it by two pipes 4 to 6in. diameter, both terminating in the open air, one of these being higher than the other. The solid excreta is not to enter this receptacle, which is to be used only for the liquid portion, and the feces, &c., are to be collected in a square-shaped galvanised iron pail placed in a brick and cemented trap on the main-drain between the house and sewage tank. The trap is to be built in the usual manner, the inlet side of it to be from 10 to 15in. square. Immediately below the lip of the inlet-pipe, and easily fitting the interior of trap, i.e., from 9in. to 11in. square, is placed the pail, with a long chain for lifting, perforated with holes round the sides. The outlet is to be so placed that the liquid sewage stands slightly below the brim of the pail. By this arrangement the solid feces, sludge, paper, &c., are deposited in the pail, and the liquid passes through to the outlet. The pail requires emptying, according to the number of persons in the house, every week or fortnight. The brickwork inclosing the pail is carried up to the surface of ground and finished with a stone cover and ring for lifting, or an open grating to allow for ventilation. The plan accompanying the author's paper shows the main-drain passing the stables, below which is the pail-trap described above, and a few feet beyond this the sewage-tank for the liquid, with pump attached. The drain, after passing through the pail-trap, is taken

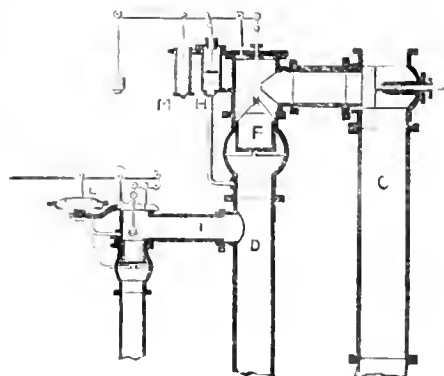
direct to the meadow, a small branch being made from it into the liquid-tank. By the use of stop-valves the sewage can be diverted in the direction required. The sewage-tank is emptied by the pump at regular intervals, or a cart, with pump attached, may be used, and the contents disposed of in the garden or on the fields. The arrangement sketched has, the writer says, been found to answer; in one case, the cesspools were entirely done away with, and the liquid sewage, after passing the trap, and being separated from the solid, was conveyed in pipes, and distributed on a few acres of pasture-land, with beneficial results. To avoid offensive effluvia from the tank while pumping, it should be freely ventilated or left uncovered, and the sewage from tank is best emptied in the early morning. Such, in brief, is Mr. Streetfield's plan. It is at least simple in construction, and can be easily carried out, at a very trifling expense (in some cases at the mere cost of the pail-trap), at any country house where a cesspool exists, and a few acres of pasture or garden-ground are near. The same drain may be made to answer if it runs in the required direction. Several quotations bearing on the subject are introduced from the report of the committee of the Local Government Board, 1876, and from Mr. J. J. Stevenson's work on "House Architecture," to which it is needless to refer here; the object the author attempts to prove is that by separating the solid from the liquid-sewage, before any cesspool is reached, all the ill-consequences of bottled-up sewage and gases are avoided, and both portions can be collected and disposed of promptly at regular intervals on the land. The plan is at least simple and economical, and is well worth the trial.

THE HOLLY SYSTEM OF SUPPLYING STEAM TO TOWNS.

THE system of supplying steam to towns for heating, cooking, and for engines, has been recently patented, so far as certain apparatus is concerned, by Mr. B. Holly, of Lockport, New York. In carrying out the object the method adopted, according to the *English Mechanic and World of Science*, is to use in a central part of the town a battery of boilers, from which steam mains are carried underground. Where the steam is used for power purposes in connection with steam-engines the exhaust can be readily utilised for warming, and in that manner the most economical results will be obtained. The object of the present improvements is to apply that principle of economy in connection with the whole system of steam mains, for which purpose double mains are employed, one for high pressure and the other for low pressure, and in connection therewith are automatic regulating valves, one form of which is shown on next page. The mains consist of pipes, protected in any suitable manner to prevent condensation, and fitted at suitable intervals with service boxes to allow expansion and contraction. The high-pressure main takes steam directly from the boilers at a pressure of, say, 60 pounds; and the low-pressure main returns it to the boiler house at a pressure of, say, fifteen pounds. From the service boxes in the main, service pipes will pass to the buildings for supply of steam at high pressure to the engine. The exhaust steam is delivered to the low pressure main by a return pipe, and in connection with these supply and exhaust pipes is the automatic regulator valve shown in the diagram. The low-pressure pipe, D, connects with the high-pressure pipe, C, by a short section fitted with a screw valve at its connection with pipe C. At the upper end of pipe D is a valve, F, hung from a lever that is weighted to balance the valve. This valve F is between the pipe D and connection, so that when open steam may pass from the high to the low pressure pipe. H is a cylinder containing a piston connected with the lever; a pipe leads from the low-pressure pipe, D, to cylinder H, I is a pipe connected to the low-pressure pipe D, and provided with a valve hung from a weighted lever that retains the valve closed; L is a diaphragm in a chamber connected with pipes I and D. In case the exhaust steam from the engine does not supply the requisite pressure in the pipe D and main, such decrease of pressure will allow the valve F to be partially opened by the weighted lever and steam will then pass from pipe C to pipe D until the pressure is raised sufficiently. The increase of

* On Disposal of Sewage of Country Houses. By T. E. C. STREETFIELD. London; B. T. Batsford, High Holborn.

pressure is felt by the piston in the cylinder H, which rising closes valve F more or less until the requisite fifteen pounds is reached, when the valve will be entirely closed. If from any cause the steam in the low-pressure main and pipe D increases above the normal point, such increase will act to raise diaphragm L, move the lever and open the valve, thereby allowing steam to pass to pipe I. The pipe, I, will preferably connect with heaters for warming, or in case the regulator valve is placed at the boiler house the steam will go to the feed water heaters. A cylinder, M, with piston is applied in connection with the upper lever as a dash pot to prevent vibration. This cylinder is to contain oil; and its piston is made a trifle smaller than the cylinder to allow passage of the oil from one side to the other, and thus insure a slow and steady movement. With these valves arranged in connection with the engines the low-pressure main is supplied with the exhaust steam at the required pressure, and distributes it throughout the district, returning the surplus to the central boiler-house, where it is used for heating the feed-water. In the mains near the boiler-house one of these regulator valves is placed for the purpose of supplying live steam from the boilers



in case the consumers require more than is furnished by the engines. At street intersections, or wherever the mains cross, in order to keep both at the same level, a device is placed consisting of a casting made with branch tubes connected at each end, and forming an opening for the other main to pass through. This casting is preferably applied to the heat main. With this double system of steam mains the steam is utilised to the greatest possible extent. It is desirable to connect the two mains at a remote point, and fit the connection with a valve that may be opened and closed by hand. The object of this is to prevent injury to either main when the engines do not use steam for a length of time, as, for instance, at night, and on holidays. In such case the power main might become filled with water. The valve is then to be opened, and the direct supply to the low pressure main cut off at the boiler house. This will at once start a positive circulation in the heating main from the remote point towards the boiler, and in the reverse direction in the power main. The water of condensation takes the following course:--The water from the power main passes by the connection to the heating main, and from thence to the consumers and boiler house. The pressure is regulated by the valves, as before described. This insures perfect operation when the power service or a large part of it is not in use.

PRACTICAL NOTES ON PLUMBING.— XVII.

By P. J. DAVIES, H.M.A.S.P., &c.

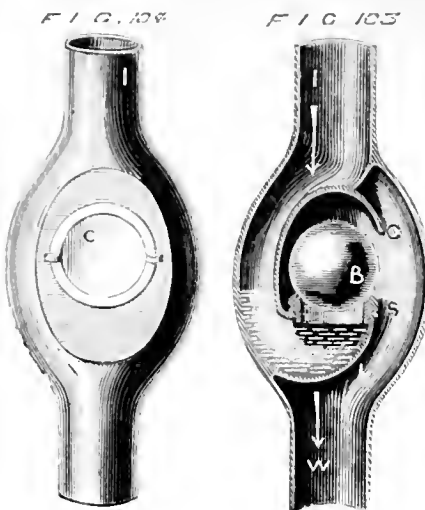
TRAPS (continued).

JENNINGS' BALL-TRAP (Fig. 103).

MR. G. JENNINGS was one of the first to use a ball inside a trap; his first patent is dated 1871. Another, and that which he considers a great improvement on the first, is dated 1878. This latter requires no criticism as to merits or demerits. It is simply perfection.

An examination of Fig. 103 will show you a rubber seating at S, which allows the ball B to

seat itself perfectly airtight. D shows the water in the lower lip, and G the guide to keep the



ball in its place, I the inlet, L to W the outlet.

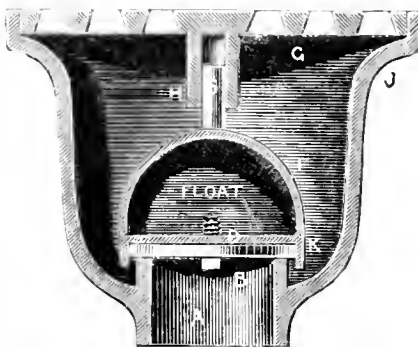
The action of this trap is exactly the same as in those before explained.

Fig. 104 is an elevation of Fig. 103, showing the cleansing-door C.

FLOAT BELL-TRAP.

This is an improvement on Clark's float-trap; but in my opinion, for practical work, it is not to be depended upon. It is made as follows: Take an ordinary Gin. bell-trap body (J, Fig. 105).

FIG. 105.



and half a water-ball, called a ball-shell, F; solder a disc, D, about 1 in. up, inside the shell; this will at once form a float; place a guide as shown at S to work into a tube fitted to the top of the grating. This completes the trap as it is ordinarily made; but occasionally a piece of indiarubber is fitted as at B, for forming a valve to rest upon the seating E.

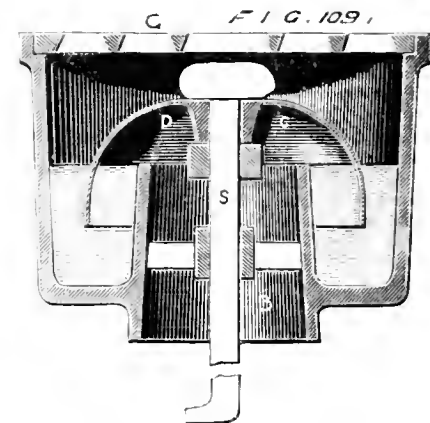
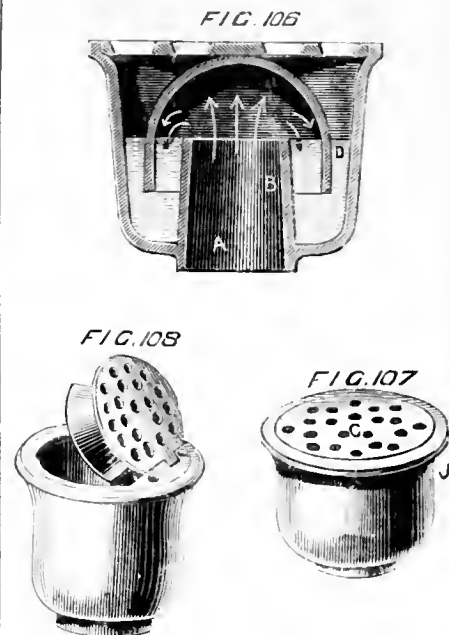
Please note at the bottom of the float two protruding points, K, which form the water-seal or dip-pipe outside the stand-pipe of the bell-trap. The stand-pipe answers as a valve-seating, as also a water-dam for the trap. The action is as follows: On the water running through the grating and lifting the body of the trap, the float also rises and allows the water to flow through the stand-pipe, but as soon as the water becomes lowered within the trap, the float lowers, and if very low, rests upon the top of the stand-pipe B.

"BELL-TRAP" (Figs. 106, 107, and 108).

Fig. 106 is a section, 107 an elevation, and Fig. 108 another illustration of an improved hinged grating for bell-traps.

On referring to Fig. 106, you can at once see the construction of this trap, which may be described as follows: A is the out-go, B the stand or dam-pipe, D the bell, J the body, G the grating. The action is too simple to require a description. The arrows in the diagram show the way in which the trap acts against the gases.

Fig. 109 is an improved form of bell, having a spindle, S, and a bridge, B, to prevent the bell being taken off. Now, in reference to this trap I cannot help expressing an opinion that I think will be endorsed most sincerely by those who are most practical, and consequently best able to judge in this matter. It has fallen into the hands of the brass-finishers as the manufacturers of it, and is, as a rule, the first piece of work



that their apprentices have to do (they may be excused for this, as they are so badly paid that they cannot afford to put experienced workmen on the job), the consequence is that they are seldom or ever properly made; they very rarely have sufficient water-seal, and servants or house-keepers, as the case may be, for the sake of saving themselves the trouble of keeping the grating clean, will remove the grating, and at once thereby destroy the seal of the trap. Under all these circumstances, I think I am justified in saying that the trap is comparatively useless, and under my advice would not be used.

JENNINGS' CONCENTRATED CONE-TRAP (Fig. 110).

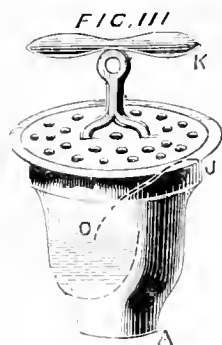
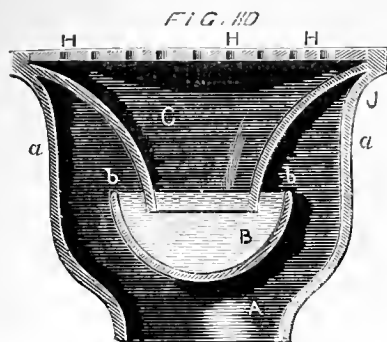
This new patent of Jennings, which you have represented in Fig. 110, is especially efficacious in such places where it has been customary to use the last-mentioned (bell-trap).

The new patent Concentrating Cone-trap has a fixed inverted bell (B, Fig. 110), and a $\frac{3}{4}$ bell-shaped cone, C, which forms the dip of the trap, and diverts the stream from the grating-holes, H H H, to the centre of the inverted bell, thereby concentrating the separated flow or small stream into one point, which at once renders this trap one of the best, or, to say the least, one of the most useful traps at present in the trade.

ANTILL'S PATENT TRAP (Fig. 111).

This trap is best known in the trade as the Lip trap, and, like Jennings', is partly made up

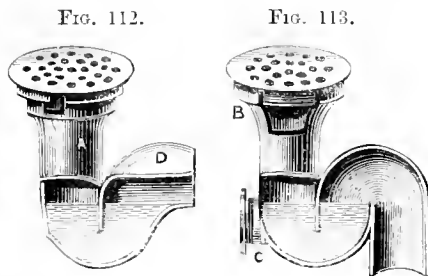
with the Bell-trap body, which can be cast in one piece together with the lip N, or the two lips and body all in one casting. If the lips are not cast in, they must be soldered to the



sides of the body, by first soldering in the bottom N, and afterwards the top O. This trap has a lock grating, which is sometimes made to work with the bayonet-joint. (See Tye and Andrews' trap.)

TYE AND ANDREWS' TRAP (Figs. 112 and 113).

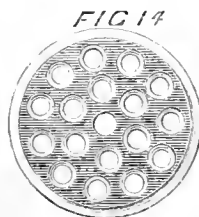
This trap, as represented in Fig. 112, is made after the O-trap pattern, but has an improved lock-grating, which consists in the adoption of



the well-known bayonet-joint, as shown at A. The grating shown in Fig. 113 is different in this respect, that it has a screw, as shown in the sectioned part at B. These traps being made of iron, are of course useless for watercloset work.

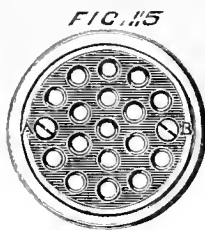
TRAP GRATINGS (Figs. 114 and 115).

Trap-gratings should always be made to allow, so that the trap will take away; the holes should



be made taper from the underside, as shown in Fig. 114, in which it will be noticed they are countersunk from the bottom side. Fig. 115 shows the top side, as also a strainer fixed with

screws, marked A B, the section of which is shown at Fig. 116.



In this chapter I conclude my remarks on the manufacture of traps, which, I trust, have been beneficial to at least the junior members of the trade.

Next week I shall introduce an explanation of a few new and important "practical experiments" that have lately been made on "full-sized" closet-traps.

THE ROYAL COMEDY THEATRE.

WE yesterday inspected a new addition to the theatres of the metropolis, which has been just completed from the designs of Mr. T. Verity, the Lord Chamberlain's architect, and which will be opened to-morrow (Saturday). The new Royal Comedy Theatre stands at the corner of Panton-street and Oxendon-street, in the Haymarket, and is the property of Mr. J. H. Addison, a gentleman well-known in theatrical circles. The lessee is Mr. Alexander Henderson, who has aided the architect in the planning of the building. There are a few features of the Comedy Theatre which call for notice. We may first direct attention to the means of entrance and exit provided, and the exceptional good position of the theatre, abutting as it does at the junction of two streets. Mr. Verity has been successful in being thus able to provide good entrances, and in making the best of the situation. The Panton-street entrance, which is the principal one, is very spacious, and few theatres of the size can boast of so desirable an approach. Passing through the vestibule, at the side of saloon the visitor finds himself on a spacious inner landing on a level with the dress circle, without having to ascend any stairs. On each side a well-placed stairs descends to the stalls, but these are easy, and contrast favourably with those of other theatres we have seen. The principal private-boxes are thus on a level with the street, and only six steps have to be traversed to reach the second-tier boxes. Another feature worth notice is that there are no corridors and gangways; the floors are of concrete on iron joists on the system of Dennett and Ingle and the staircases are constructed of the same fireproof material. The architect has also been happy in the choice of pleasing lines for his plan, by which means everyone can see the stage without unpleasantly keeping the neck strained. This is particularly noticed in the private-boxes. The upper gallery follows the oval line of the ceiling, the next tier of upper-boxes breaks forward a few feet in a curve of double flexure, while the dress-circle below that still farther comes forward with a flatter curve of the same kind. A pleasing gradation of the seats in respect of the stage is thus obtained; besides which, the upper part of the house opposite has a better range of sight.

The pit is large and open, and the floor is sloped so as to give every spectator a full view of the stage. The dress-circle is handsomely fitted, the upholstering and seating being in a rich deep red, by Messrs. Shoolbred, who have also supplied the decorations of the entrance saloon. The oval ceiling of the auditorium is chaste decorated with ornament of a Renaissance character. The prevailing colouring is a cream tint, and the balcony fronts and pilasters are richly relieved by gilding, without being obtrusive. There is a sun-light in the centre,

supplied by Messrs. Verity, of Regent-street, who have executed all the gas-fitting, &c. The drapery of the boxes is maroon plush, and the stall seats are upholstered in scarlet satin. We find the accommodation is large: there are seven rows of stalls, seating 140; dress-circle, 120; upper boxes, 126; amphitheatre, 100; pit, 400; and gallery 300. Every structural and other provision has been taken in compliance with the recent by-laws of the Metropolitan Board of Works, into which details we have no space now to enter. The general contractors are Messrs. Kirk and Randall, and the clerk of works is Mr. H. N. Taylor.

CHIPS.

A marble bust of Mr. Alderman Waller, who has twice been mayor of Hull, was last week placed in a niche on the main landing of the Town-hall, Hull. Mr. C. Mason, of that town, was the sculptor.

The Colchester town council last week appointed Mr. William Grimwood to be clerk of works of the main sewerage works now in progress.

It was reported to the Epworth burial board on Thursday week that the new cemetery was ready for interments. Mr. Meggitt is the contractor for boundary-wall, chapels, and lodge.

The heating and ventilation of Mount Stuart, Rothsay, N.B., now being erected for the Marquis of Bute, under the superintendence of Messrs. Anderson and Browne, architects, Edinburgh, has been entrusted to Mr. Wilson W. Phipson, engineer, London. The system selected for this important building is the forced introduction of fresh-air previously warmed, in distinct chambers, by an improved plan of hot-water and steam combined.

Messrs. McNaught, Robertson, and Co., of Bankend, Southwark, S.E., have sent us a miniature copy (suitable for the desk) of their book of sections of rolled iron and steel joists, which we reviewed on p. 41 of the present volume. We need say nothing now of the utility of the information given, except that the handy form in which it is now offered to the public considerably enhances its value for constant reference.

The King of Siam is about to furnish a new palace, and Messrs. Jackson and Graham are to carry out the work.

The parish-church of North Ockendon, Essex, was recently reopened after restoration. The floors have been laid throughout with Messrs. Godwin's tiles, and oak seats have been placed in the chancel, and an oak screen erected between the Poyntz chapel and the chancel and another under the lower arches; the builder was Mr. Anstey. At the same time, an alabaster reredos, set in oak frame, and representing the Last Supper, and an oak lectern, have been executed and placed in the church by Messrs. Farmer and Brindley, of Westminster Bridge-road; the architect was Mr. Armstrong.

New Centenary Schools at North Heigham, Norwich, attached to St. Bartholomew's Church, were opened on Tuesday week. They are placed parallel with the church, and, like it, are faced with flint and stone dressings; the roof is of pitch-pine; the dimensions are 60ft. by 25ft., and accommodation has been provided for 300 children at a total cost of £750. Messrs. Young and Son, of Norwich, were the builders.

The Brentford board of guardians proceeded last week to the election of a clerk of works on the new schools. The salary offered was three guineas per week, and there were upwards of thirty candidates. A member called attention to the fact that Mr. Morison, the architect of the schools, was present, and moved that he be asked to retire. This was opposed as unreasonable, but, on a division, was carried by 9 to 7 votes, and Mr. Alfred Davies, late foreman to a local builder, was then elected.

A fine art and industrial exhibition was opened in the Castle Hall, Taunton, on Wednesday week. Six cases of art treasures have been lent by the South Kensington authorities, and there is a large display of paintings by modern artists.

A new organ, built by Messrs. Ma'ey, Young, and Oldknow, of London, at a cost of £150, was dedicated in Orsett parish church, near Grays Thurrock, on the 7th inst.

At Darlington, last week, a new theatre, seated for 2,500 persons, and erected from the designs of Mr. W. Hodgson, of that town, was opened.

A new Independent chapel at Pontyrr-hill, Gars Valley, is approaching completion. It will be known as Capel Godderynydd, and will seat 200 persons. The Rev. T. C. Griffiths is the architect, and the contractors are Messrs. Jones and Lewis, of Maesteg.

CONTENTS.

Town Churches	483
The Photographic Society's Exhibition	483
St. Pancras Industrial Exhibition	484
The Water Question: XVIII.	485
Medieval Seals as Works of Art	486
Architecture at University College	487
Modes in which Religious Life may be Influenced by	488
Painting and Sculpture	488
The Social Science Congress	490
The Royal Dublin Society-Taylor Art Scholarships	490
and Prizes	490
The Glasgow Institute of Measurers	491
The Lateral Displacement of Rivers	491
The Stone for Truro Cathedral	491
Disposal of Sewage of Country Houses	491
The Holly System of Supplying Steam to Towns	491
Practical Notes on Plumbing: XVII.	492
The Royal Comedy Theatre	493
Chips	493
Our Lithographic Illustrations	494
Archæological	494
Leggott's Patent Window Lifting Arrangement	507
Patent Encaustic and Mosaic Tiles	507
Ancient Japanese Bronze Bells	507
Building Intelligence	507
Competitions	508
To Correspondents	508
Correspondence	508
Intercommunication	510
Legal Intelligence	511
Statues, Memorials, &c.	511
Stained Glass	511
Water Supply and Sanitary Matters	511
Our Office Table	512
Tenders	513

ILLUSTRATIONS.

BARROW COURT, NEAR CHESTER.—LITTLE PARK HOUSE, CHISWICK.—STUDIO FURNITURE, HOVE HOUSE, CHISWICK. ST. CUTHBERT'S CHURCH, KENSINGTON.—MEDIEVAL SEALS AS WORKS OF ART.

OUR LITHOGRAPHIC ILLUSTRATIONS.

BARROW COURT, CHESHIRE.

BARROW-COURT is pleasantly situated on an elevated site about three miles from Chester. From the top of the tower a magnificent and extensive view of the surrounding country is obtained, taking in on one side a great part of the Wirral peninsula, and the river Mersey, with the Lancashire coast on the other side, and on other, the Moel-Fanmaw range of Welsh mountains, Beeston Castle, and the Peckforton hills, Hulton Castle, &c. The plans and view will explain the style and character of the buildings, which are built of red brick, the roofs being covered with green Cumberland slates of small sizes. A feature in the house is the extensive use of special made bricks and terra-cotta for the windows and all the external dressings; these, together with the face bricks, have all been supplied from the works of Mr. Henry Bowers, of Runcorn. The interior joinery to best part of the house is being carried out in oak. The contractor is Mr. Richard Beckett, of Hartford, and Mr. Allan Lloyd has acted as clerk of works. The plans have been prepared, and the work is being carried out under the superintendence of, Mr. Douglas, of Chester.

LITTLE PARK HOUSE, CHISWICK.

THE site of this house is the south-west angle of the fine old garden of Park House, Chiswick, and has a frontage on the south to a second-rate street. This explains the *motif* of the plan arrangement. The small windows of the principal rooms facing the street are to be filled with lead glazing, so as to secure sunlight without outlook. The walls are of stock bricks with red Farnham quoins and dressings. The decorative brickwork and panels are mainly formed of Mr. James Brown's model bricks, thus reducing the cut-work to a minimum. The builders are Messrs. Adams, of Turnham-green, and the architect, Mr. C. M. Stclair, of 7, Telford-avenue, Streatham-hill.

STUDIO FURNITURE, HOVE HOUSE, CHISWICK.

A STUDIO is essentially a workshop, and, therefore, the first consideration in planning such an apartment must necessarily be of a practical character. The same rule should govern all its fittings and furniture, at the same time bearing in mind the desirability of avoiding distracting features or violent decorations such as would influence the colour-sense or engage the eye of those working within the studio walls. Use and convenience, without waste of space, have been the limiting lines of the furniture illustrated herewith to-day. The material used is American ash, brought to a bright dark colour, and

finished with a dead polish. Messrs. Robertson and Sons, of Alnwick, a well-known firm of art-furniture manufacturers to the trade, executed the designs in a very satisfactory manner. The over-mantel is the work of Mr. Alfred Robinson, of High Holborn, and this is painted in harmony with the general wood-fittings of the room. The centre of the chimney-piece is occupied by a convex mirror, the panels on either side being for figure paintings. The two shelves are provided for the display of china pots and ornaments. The grate is one of Boyd's gill-back stoves, and throughout the severe weather of last winter answered admirably. The front is enriched with tiles. The bookcase accommodates two mount-frames of rare butterfly specimens in a specially-arranged space in front of the print-drawer, the pull to which is obtained by an ornamentally-shaped verge below, thus giving an entire command of the drawer. The heights were fixed by the dado-lines and cornice. The wardrobe for costumes fits into a recess, and has three doors, so that all the space can be readily reached, and suspending-hooks occupy the whole ceiling, thus affording means of storing away a large number of articles. The lower part, having a fall-down front, is used for guns, assegais, swords, and other properties. The table is specially made for drawing on the wood, racks being provided in the top to support the reversing looking-glass, and for the sketch to be reversed. The raised desk, with its adjustable rack, forms the plane on which the block is drawn upon. Five small drawers in the front give accommodation for many tools and appliances, while a useful long and deep drawer is arranged the whole length of the table on the other side. The ends are treated with raised mouldings, like the wardrobe and bookcase fronts. The pedimented heads to the wardrobe are raised from the face of the framing, and give an effect only seen in perspective. The throne is simply a raised dais for models. The studio for which these things were made was illustrated in the BUILDING NEWS as our "Artists' Home" (No. 6), when plans were given. Mr. Maurice B. Adams, A.R.I.B.A., is the architect of the work, and under whose superintendence it has been carried out, for Mr. J. C. Dollman, the artist.

ST. CUTHBERT'S CHURCH, KENSINGTON.

OUR illustration shows an exterior view of a church to be built in Philbeach Gardens, Kensington. The walls are of concrete faced with brick, terra-cotta being used extensively throughout in lieu of dressed stone. A crypt will be formed beneath the greater part of chancel, nave, and aisles, the gravel of which the site consists being excavated and used in concrete for the walls. The crypt will form a temporary church, with accommodation for about 500 worshippers, whilst the main building is being erected. It will also contain vestries for clergy, and a choir and mortuary chapel; afterwards it will be available for parish meetings, &c. The church will accommodate about 1,000 persons, will consist of a nave 91ft. 6in. by 28ft. (with a baptistery at the west end), north and south aisles of a similar length, and each 12ft. 9in. wide; chancel 42ft. 6in. by 28ft.; morning chapel, 32ft. by 16ft. 6in.; a sacristy and organ bay. The height from nave floor to the ridge will be 72ft.; the apex of the fleche will be about 150ft. from the ground-line. The east wall of chancel will be without a window, but will be enriched with figure subjects, in niches within a bold and lofty arch. The figures in the upper tier will be Christ enthroned, in the centre, the Blessed Virgin, St. John, and two censuring angels. In the lower panels, St. Cuthbert (the patron saint) in the centre; and the four great doctors of the Western Church, SS. Gregory, Ambrose, Jerome, and Augustine, in the remainder. Below these a passage-way behind the altar is formed, communicating with the morning chapel. A clergy-house will be attached to the church at the north-west angle. The patronage is intended to be vested in five trustees, viz.:—Canon Liddor, Canon Thynne, the Earl of Strathmore, Lord Coleridge, and the Hon. C. L. Wood. Mr. Hugh Roumieu Gough, F.R.I.B.A., of 6, Queen Anne's-gate, is the architect employed.

MEDIEVAL SEALS AS WORKS OF ART.

For description of this sheet, see article on p. 486, *ante*.

ARCHÆOLOGICAL.

SURVEY OF EASTERN PALESTINE.—It has been found necessary to commence this work at the south instead of at the north, as was originally intended. On the arrival of the theodolites, therefore, Lieut. Conder lost no time in making the necessary arrangements, and took his party across the Jordan, his first camp being at Ain Hesbon, the old Heshbon. He reports that his base line has been twice measured with as great accuracy as was obtained in the preceding survey, and that he has already accomplished some hundred miles of survey. Among the archæological results are an immense quantity of cromlechs, no fewer than 50 having been sketched in three days. Some of them had small chambers near them, from three to five feet long, and three feet high, excavated in detached cubes of rock ten to fifteen feet on each side. Lieut. Conder reports a small harvest of identifications. He thinks he has found the Field of Zophim, the Ascent of Lubeith, Jazer, Sibmah, and Minnith. Before going across, also, he established his identification of Kirjath Jearim, which he had already suggested, and made a squeeze and tracing of the inscription in the Pool of Siloam, which, with a paper written upon it by Professor Sayce, is published in the October number of the Society's Journal. The latest Report from Heshbon, with the identifications and drawings of the cromlechs, came too late for the new number.

CHIPS.

Any one desirous of obtaining the latest and quaintest thing out in the way of circulars, should send to Mr. Harry Hems, of Exeter. The engraving at the head of the circular is unique.

A mission-room in Nelson-street, Cambridge, was opened on Saturday week. Mr. Frank Waters was the architect, and Mr. J. Denson, also of Cambridge, the builder. The cost of erection was £600.

Plans prepared by Messrs. Kinnipie and Morris, C.E.'s, of Westminster, for a dock at Great Yarmouth, were exhibited at a meeting held in that town on Wednesday week, and recommended to the town council for consideration. The proposal is to make a tidal basin between the east side of the haven and the Marine-parade, 1,100ft. by 400ft., or 103 acres in area, and 18ft. deep at low water, and the estimated cost is £70,000.

The first sod of new works of water supply for Beverley was turned, on Wednesday, on the site of the reservoir at Queen's-gate. The works are to be completed in twelve months, and will be carried out under the supervision of Mr. Fairbank, C.E. The contractors are Mr. Bell, of Gateshead, Mr. Rigby, of Workop, Mr. Bagshaw, of Batley, and Mr. Horsfield, of Dewsbury.

The east window of All Saints' Church, Brightlingsea, has been filled with stained glass by Messrs. Heaton, Butler and Bayne, of Garrick-street, London, W.C. The subjects of the three lights are the Nativity, the Crucifixion, and the Resurrection.

Owing to the encroachment of the sea on the coast near Cromer, it has been found necessary to rebuild the parish-church of Sidestrand on a fresh site further inland. The new church was consecrated on Michaelmas-day by the Bishop of Norwich. It consists of nave, chancel, south porch and tower, and seats 140 persons. The stones and material of the old building, except those of the tower, which is left standing on the cliff, have been reused. Mr. Cornish (Cornish and Gaymer), North Walsham, was the contractor, and no architect was employed, the new building being as far as possible a reproduction of the former one. The cost has been about £2,000.

The church of Dowles, near Bewdley, is undergoing restoration from the plans of Mr. Nicholson, of Hereford. An open-timber roof is being substituted for the present plastered ceiling, the roof above is being retiled, a wooden chancel arch is being erected, an apse and timber porch added, and encaustic tiles laid down. Mr. Parton, of Wribben-hall, next Bewdley, is the contractor.

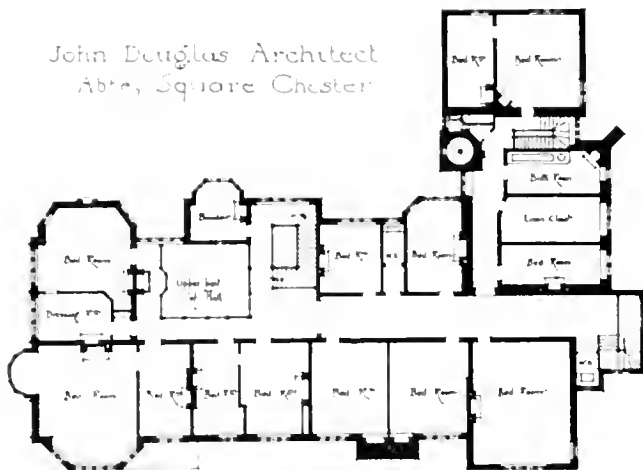
At Bromley, Kent, the Wesleyan chapel was reopened last week, after the erection of organ, at an outlay of £350, and the extension of schoolroom. The latter work, which cost £550, was carried out by Mr. Grubb, builder, of Bromley.

New schools at Gilfach-goch have just been completed for the Llantrissant School Board. Mr. J. J. Evans is the architect, and Mr. John Morgan, of Pontelown, the contractor. New schools are being built for the same board at Williamstown, from the same architect's designs; the contract has been let to Mr. David Morgan.

BARROW COURT NEAR CHESTER for H. Lyle Smyth Esq^r

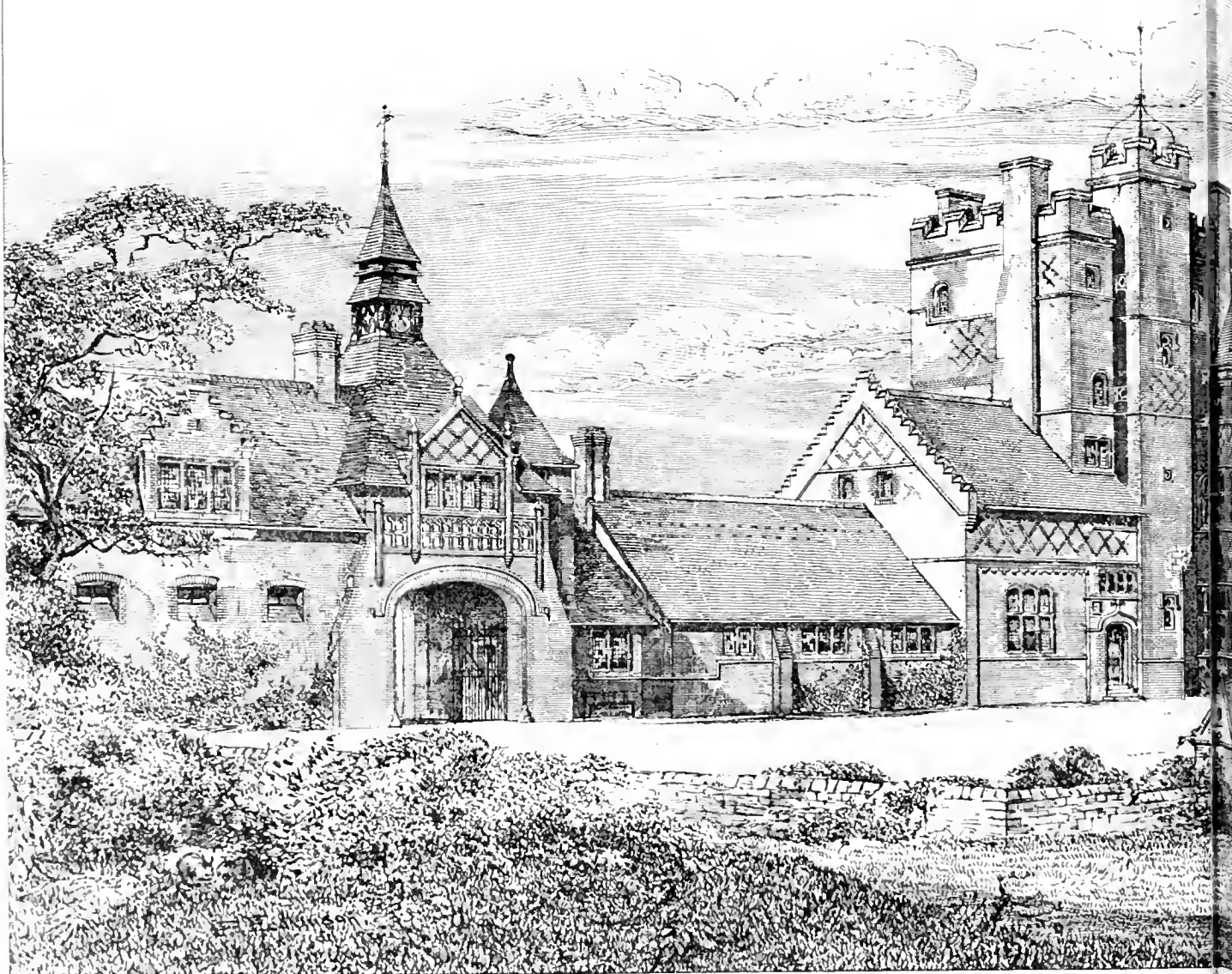
VIEW OF ENTRANCE FRONT

John Douglas Architect
Abney Square Chester

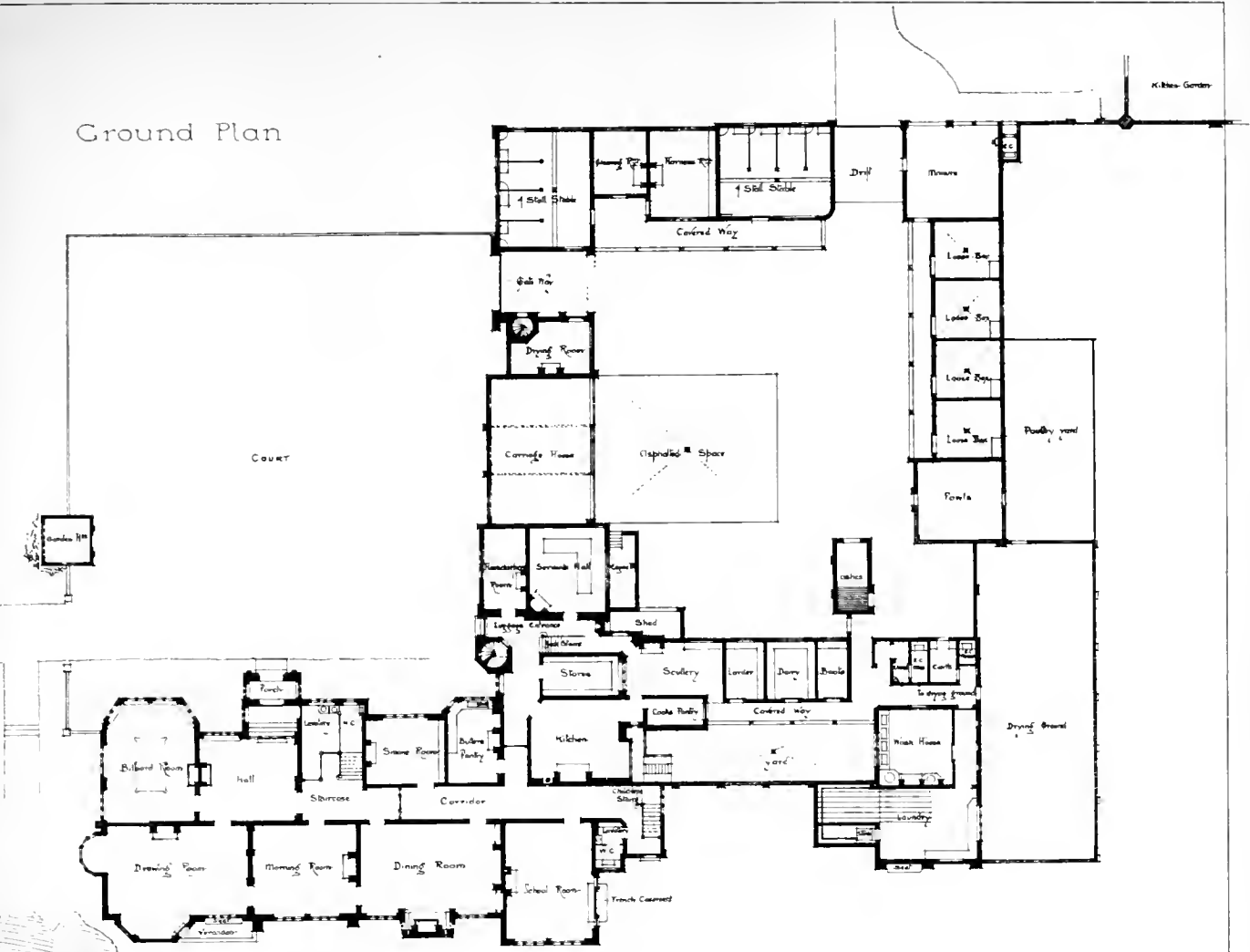


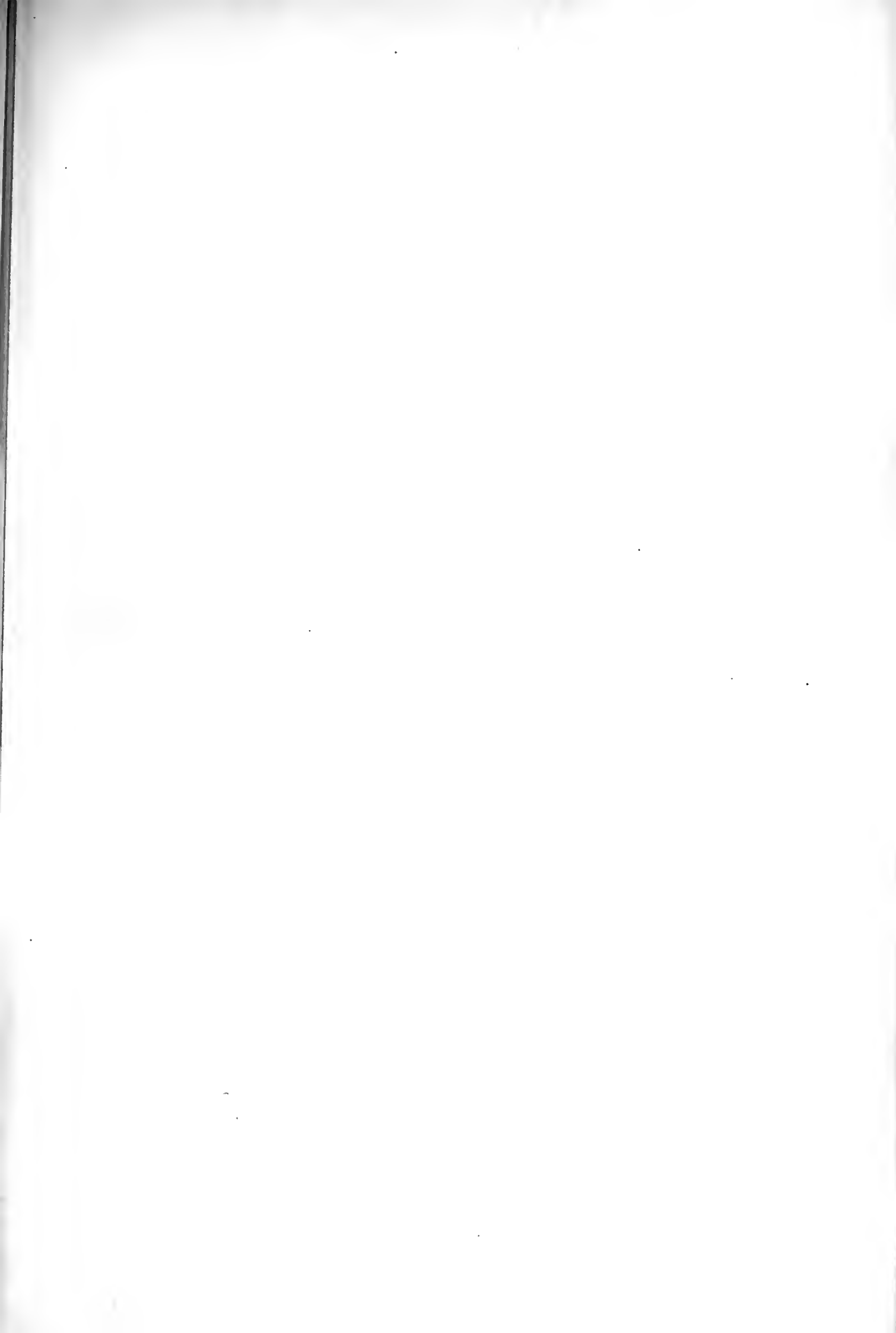
Number Plan.

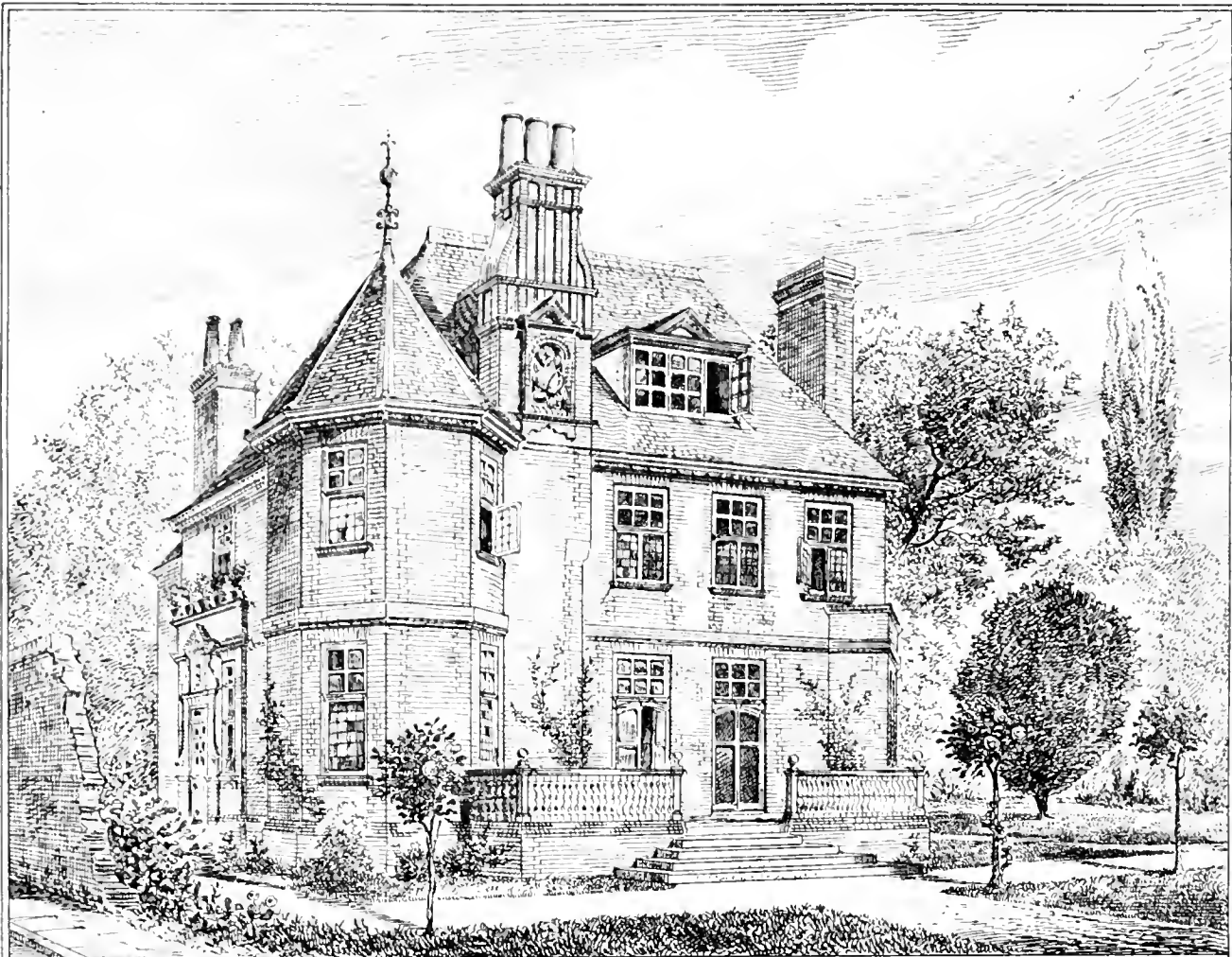
100 feet



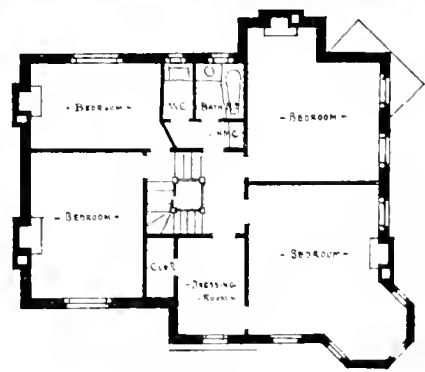
Ground Plan



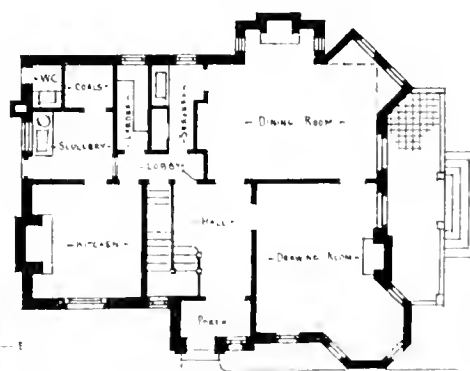




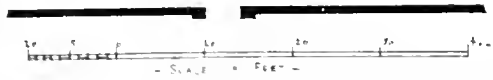
* LITTLE PARK HOUSE
CHISWICK
for R. Lathbury Esq. C.M. Stedman
Architect

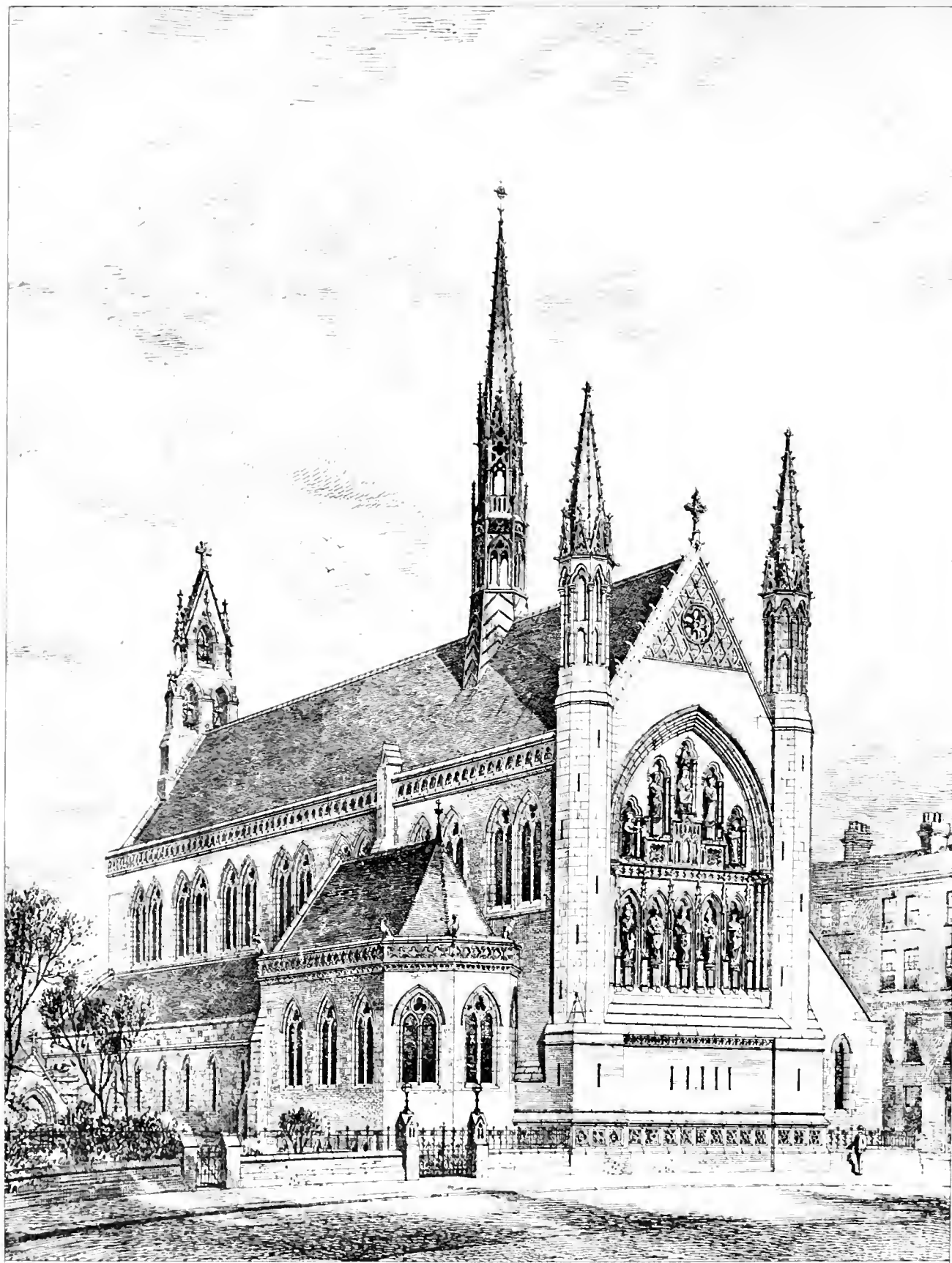


- FIRST FLOOR PLAN -



- GROUND PLAN -





S. CUTHBERT'S CHURCH.
KENSINGTON View from S.E.

DESCRIPTION	SEAT
Nave and Aisles	240
Choir	30
Chapels	69
Extra Chapels	120
Total	362
Grave	282

*High Rennie Gough Archt.
6 Queen Anne's Gate
Westminster.*



1



2



3

MEDIEVAL SEALS AS WORKS OF ART



4



5



6

BY JOHN LEYLAND



7



8



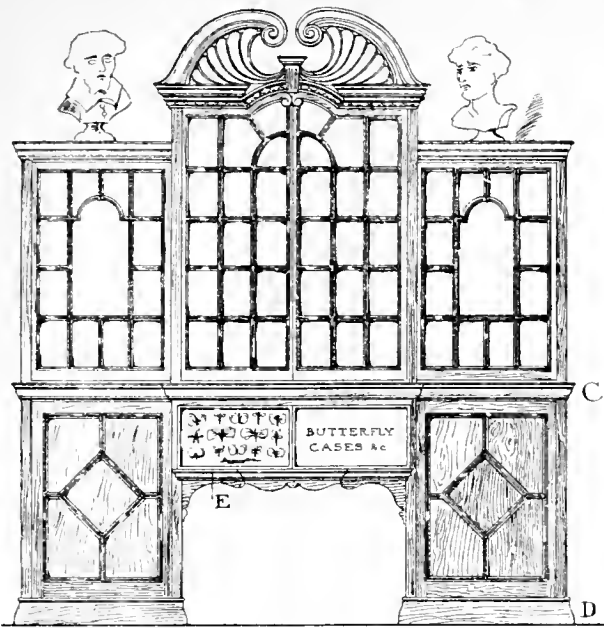
9

Bookcases

Scale of feet

Costume Wardrobe

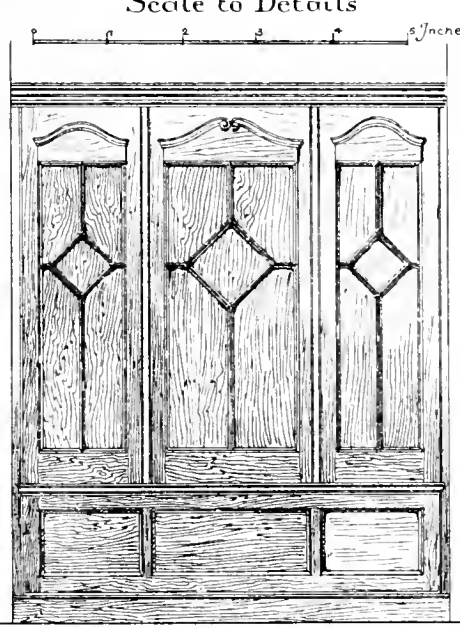
Scale to Details



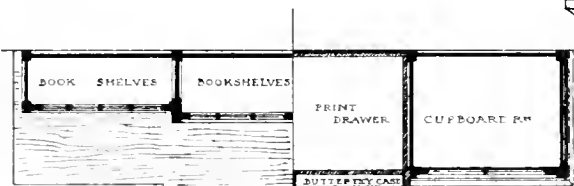
FRONT



SIDE

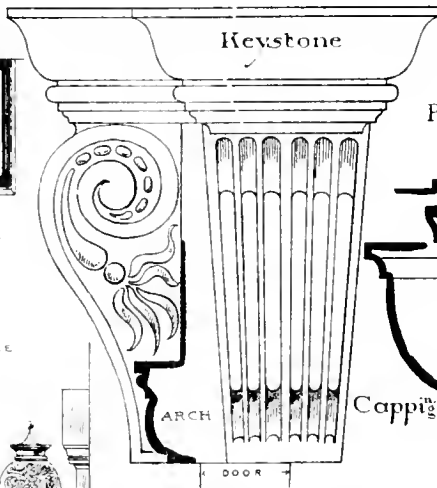


FRONT



HALF PLAN OF TOP

HALF PLAN OF BOTTOM

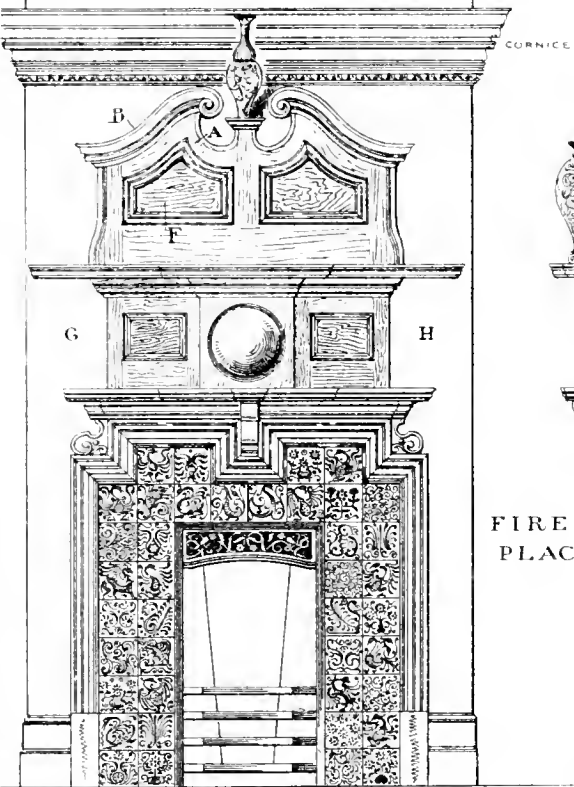


Moulding A

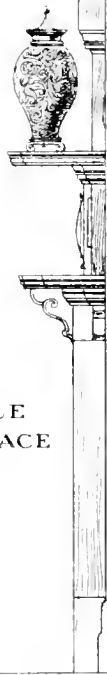
Panelmoulding

Cornice B

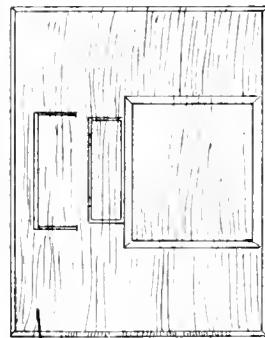
Capings C



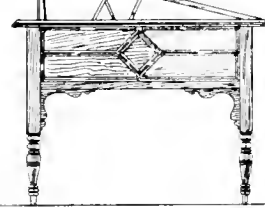
FRONT



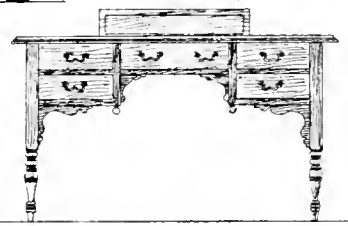
SIDE



Tabletop



SIDE



FRONT

Section F

Plinth D

Verge E

Panel

FIRE PLACE

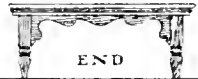


PLAN AT G.H.

Models Throne



SIDE



END

EGGOTT'S PATENT WINDOW LIFTING ARRANGEMENT.

THIS apparatus provides an easy and inexpensive method (always at command and under ready control) for ventilating any apartment by the opening of a window, either at top bottom, or both, by one operation. It affords the same time great security against thieves, the sashes, whether closed or opened, in the position in which they are left are perfectly locked. The invention is equally suitable for sashes of the heaviest or lightest kind. It dispenses with all sash-cords, sash-weights, sash-stoppers, and the consequent annoyance and expense of repairs, which always attend the antiquated system of window-lifting hitherto obtained. Whatever the height of the window, it can be opened, repaired, or cleaned, both internally and externally, from inside, avoiding the use of ladders or steps, and all risks to life or limb. It is simple in construction, and strong, difficult to put out of order, and easily reset. The inventor informs us that Mr. John Hicheord has sent over two specimen windows, fitted with the apparatus, to the new Houses of Parliament at Capetown, and that it is not improbable the invention will be used throughout that building.

PATENT ENCAUSTIC AND MOSAIC TILES.

MESSRS. T. and R. BOOTE, of Burslem, old and well-known manufacturers of patent encaustic, mosaic, and ornamental tile, pavements, tiles, hearths, &c., have issued a handsomely got-up book of designs and price-list of their tiles. The designs, illustrated in colours, display some good examples for floors of all descriptions, and from plain squares and diagonal patterns to elaborate geometrical combinations. These are drawn to a scale of $\frac{1}{4}$ in. to the foot. The black, buff, and white arrangements are striking, and are in patterns suitable for all styles of building. The tiles for walls are of equal merit and variety of design. There are also plain glazed tinted tiles for walls, or dados; hearth-tiles; hand-painted tiles for replays, furniture, flower-boxes, and other decorative uses. The catalogue contains 22 carefully printed plates of designs, accompanied by a price-list which cannot fail to be useful in the architect's office. The colours of the tiles are generally well selected, and we need hardly say, as far as the material and manufacture are concerned, the tiles made by this firm have long since won a well-deserved reputation.

ANCIENT JAPANESE BRONZE BELLS.*

By Prof. EDWARD S. MORSE.

MR. MORSE described the so-called Japanese Bronze Bells which are dug up in Japan. These bells had been described and figured by Prof. Monroe in the "Proceedings" of the New York Academy of Sciences. Mr. Kanda, an eminent Japanese archaeologist, had questioned their being bells from their peculiar structure.

Mr. Morse had seen a number of bells of different kinds, some of considerable antiquity, but none of them approached these so-called bronze bells. Mr. Kanda had suggested that they were the ornaments which were formerly hung from the corners of pagoda roofs; but the fact that none of them showed signs of wear at the point of support, rendered this supposition untenable. Mr. John Robinson, of Salem, the author of a work on ferns, had given the first suggestion as to the possible use of these objects.

He has asked why they may not have been used to incense burners. Curiously enough, old incense burners are dug up which have the same oval shape that a section of the bell shows. The "bell" has openings at the base and also at the sides and top, so that the smoke of burning incense might escape. It is quite evident that these objects are neither bells nor pagoda ornaments; and this suggestion of Mr. Robinson's may possibly lead to some clue regarding their origin.

A turret clock, constructed by Messrs. Thwaites and Reed, Clerkenwell, has been placed in the tower of Writtle parish church, near Chelmsford.

Building Intelligence.

BIRMINGHAM.—One of the most recent additions to the architectural features of this town, the new Central Arcade, extending from Corporation-street to Cannon-street, is now completed. It has been erected for the proprietor under the able superintendence of Mr. W. H. Ward, architect, the style adopted being a free treatment of the Renaissance. The whole of the interior is faced with stone, with the introduction between the shops of granite pillars, and springing from these at the top of the arcade are some light iron principals, carrying a roof which is filled with stained glass. There is a considerable amount of decoration in gold and colour on the flutings and frieze. The shops are fitted with every convenience, and the offices above have easy access from the street. Underneath the shops, with entrances both from Corporation-street and Cannon-street, is the new Central Restaurant and Grill-room, which is lighted by means of a glass and iron roof, which forms the floor of the Arcade. There is a double row of handsome gas pendants on each side of the avenue, and as each pendant is furnished with an opal lamp in imitation of a Chinese lantern, a novel and most pleasing effect is produced. In addition to the ordinary lights in the arcade there are clusters of lights at each entrance. The contract for the erection of the building has been carried out by Mr. J. Garlick; the whole of the glass-work was executed by Messrs. J. and O. C. Hawkes, of Bromsgrove-street, and the ornamental wrought-iron gates were manufactured by Messrs. T. Brawn and Co., of Clement-street, Birmingham.

BRISTOL.—The completion of the nave and aisles of St. Mary's Church, Tyndall-park, was marked by special services yesterday. These form the second instalment of the permanent building, and are decorated in style and constructed in local sandstone. The nave is 84 ft. in length and 26 ft. wide, and is separated from the aisles by four arches, each 22 ft. high and 20 ft. span, springing from circular shafts with moulded bases and carved caps. Above the arcade is a clerestory, having a three-light window over the apex of each arch. The height of nave is 40 ft. to the beam, and 61 ft. to apex of roof. On either side is a lean-to aisle of equal length and 12 ft. wide, having two-light windows. The nave-roof is covered with Staffordshire tiles, with ridge pieces, by Mr. Cooper, of Maidenhead. The internal roof is an open-timbered, king-post one of pitch-pine. Beneath the nave is a room seating 200 persons. The foundations have been laid of a tower at the north-west angle, the only feature now remaining for the completion of the church. Mr. J. Piers St. Aubyn, of London, was the architect; and Messrs. Stevens and Barstow, of Bristol, were the contractors. Mr. E. Sheppard, of Bristol, executed the carving. The total cost was £3,700.

BROUGHTON PARK.—In connection with the Broughton Park Congregational Church, Manchester, a new Sunday-school was opened on Monday. It is situated on a corner plot of land in Bury Old-road, and the design is in the Late Decorated Gothic style. The facade consists of the large gable forming one end of the roof; below are projecting double porches, flanked by staircases with hipped octagonal roofs, and terminating against double gables on the north and south elbows. The building is of stone. There are several classrooms, with a large central hall, accommodation being provided for about 300 boys, girls, and infants. The total cost, including the erection of a boundary wall, has been £2,500. Messrs. W. Southern and Son, of Salford, are the contractors, and the architect is Mr. A. H. Davies-Colley (Messrs. Colley and Brook).

CHEADLE.—Alterations are in progress at the Primitive Methodist chapel, Cheadle. The chapel will be re-seated in varnished woodwork, and a panelled wall-dado will be formed out of the old seat-framing, painted dull green. A double vestibule entrance is being built at the front, carried up one story only, and finished with an inscribed pediment and balustrade; above which the main wall (with three-light window) sets back. The front is flanked by the two angle piers carried up as gables, and is relieved by strings, architraves, and pediments of red brick. Internally, the present flat plastered ceiling is stripped off, and the timbers of

the roof encased with reeded boarding, considerably increasing the cubical content. A neat rostrum, painted like the dado, will occupy a small domed apse, projecting from the rear gable. The addition of a small porch at the back will protect the entrance to schoolroom and chapel at this end from cold draughts. The schoolroom on side of chapel is divided from it by a balustraded arcade with sliding shutters, as it is intended to form part of the chapel at large gatherings. This arcade is placed so as to give persons in the school a good view of the rostrum. Some extra windows are inserted in the side and end walls of the chapel, the existing windows raised, and the whole of them reglazed in new moulded frames. The amount of the estimates for the whole of the alterations, which were contracted for by several builders, is about £500. The builders accepted are Messrs. Samuel Wagh, William Ball, and William Shuffelbotham, all of Cheadle. Messrs. William Sugden and Son, of Leek, are the architects.

IPSWICH.—The memorial-stone of the restoration of St. Lawrence's Church-tower was laid on Tuesday week by the Mayor of Ipswich, Mr. A. Winch. The external surface of the tower, which is over 90 ft. high, has recently shown signs of failure, and, a few weeks since, some rubble and plaster fell into the neighbouring Dial-lane. The whole of the exterior is being cleansed down, and will be recased with flintwork and inlaid stone tracery. The belfry windows will be renewed in Portland stone, which will also be used for quoins throughout; and beneath this stage will be a band of diaper-work and panel tracery. The tower, which, till now, had urns on each angle, will be surmounted with a pierced parapet and angle pinnacles, adapted from an ancient drawing in the possession of the high steward of the borough. Mr. Frederick Barnes, F.R.I.B.A., of Ipswich, is the architect; Mr. George Borrett, the builder; and Mr. Tooley, late of Bury St. Edmund's, the clerk of works. The cost will be £1,350.

NEWTON HEATH.—On Saturday afternoon the foundation-stone of a new church, dedicated to St. Anne, was laid at Newton Heath, near Manchester. The style is Early Pointed. The main structure will be of brick, the whole of the outside walls being faced with parpoint stone, and Halifax stone dressings. In plan the church consists of nave, north and south aisles, chancel, organ-chamber, clergy and choir vestries. The width of nave and chancel is 24 ft., and the width between north and south aisle walls 51 ft. The length internally of the nave is 83 ft., the length of chancel 34 ft. The arcades are supported on polished granite columns, and the roof is open-timbered, collared near the apex for ventilation. The cost, including lighting and heating, is £3,947. The architect is Mr. A. Wellington Smith, of 42, Market-street, Manchester, and Liverpool, and the contract has been let for the amount above stated to Mr. James Herd, Manchester.

The new premises of Ernest E. Pither and Co. artists in stained glass, tiles, and decoration, a No. 38, Mortimer-street, Cavendish-square, may now rank as one of the exceptionally good business fronts in London. A judicious and eminently successful combination of stained glass, made by the Gateshead Stained Glass Company, for whom Mr. Pither is London agent, renders the place specially decorative at night when lit up from the inside. The front has been designed and executed under the superintendence of Mr. Francis L. Pither, architect.

The Chiswick improvement commissioners are in a despairing mood as to the frequent infringements of the by-laws by builders, in consequence of the difficulty and delays experienced in bringing test cases before the Hammersmith police magistrates. At a meeting of the board, held last week, the surveyor, Mr. H. O. Smith, said not a week passed without his seeing most flagrant cases of infringement, but when he went into the police-court he met with no encouragement. Three weeks ago he had eight cases on hand, none of which had yet been adjudicated upon, and some of these buildings had now been roofed in. The clerk added that even in case of conviction the fine was optional with the magistrates, who generally inflicted a fine of half-a-crown, and the builder laughed at the commissioners, because he had gained perhaps £100 by scamping his work. The clerk was directed to prepare a draft letter on the subject for transmission to the Home Secretary.

* Read before the A.A.A.S., Cincinnati, 1881.

COMPETITIONS.

BARROW-IN-FURNESS BOARD SCHOOLS.—At the last meeting of the Barrow School Board, held on Tuesday week, a long discussion took place with reference to the decision at the previous meeting to accept the design under mottoes "Knowledge is Power, No. 2," and "Desideratum," for the two proposed new schools, the supporters of Mr. Barker urging that his plans were preferable to either. Ultimately, the motion for selecting the above plans was rescinded, thus reopening the whole question.

CABMEN'S SHELTERS.—The committee of the Cabmen's Shelter Fund have had an architects' competition for an improved cabmen's shelter design. There were thirty-five entries, coming from all parts of the country. The committee have ultimately awarded the prize of £10 to Messrs. Harvey and Clarke, of London, and one of these new shelters will shortly be placed at the "York and Albany" cab-stand, Regent's Park.

HAGGIFORD BRIDGE.—The Weardale District Highway Board recently invited competition plans and estimates for the erection of a bridge over the river Wear at Haggiford, near Eastgate. Six sets were sent in, and those by Mr. E. Lyall, C.E., of Darlington, for an iron bridge, estimated cost £681 7s. 3d., has been adopted. The proposed cost varied from £210 to £1,200, both extremes being for masonry bridges, and all the competitors were residents in County Durham.

HOSPITAL FOR SICK CHILDREN, BRISTOL.—Designs for the above were invited by advertisement in the local papers, and a number of architects responded. After several meetings, and careful consideration of the various designs by the committee and medical staff, those prepared by Mr. Robert Curwen, of London and Liverpool, were adopted. The hospital is intended to accommodate 77 patients.

CHIPS.

In cutting the jamb of the western window in the south aisle of Tamworth parish church, now under restoration, the workmen found, last week, a little leaden case, on which was stamped, "Open me, and you shall see what was done in 1783," and the name "Panton," supposed to be that of a plumber of that period. The case contained a decayed document, which has not yet been deciphered.

The town-council of Bath considered, on Tuesday, a long-standing bill from the surveyor of works, for £15 1s., for surveys and reports and commission on works executed, and on the recommendation of a special committee, appointed three years since, resolved to offer £398 2s. in full settlement.

Mr. Kernen, district surveyor to the Sittingbourne highway board, has disappeared. He was about to relinquish the appointment, but failed both to deliver up his account book, and to attend the Government audit.

The memorial to the late Sir Edwin Landseer, for erection in the crypt of St. Paul's Cathedral, by Mr. Woolner, R.A., has just been finished in model, of which the monument itself will be a reproduction. The memorial will be of white marble, 8ft. 6in. by 4ft., and will have in the centre a medallion head of the painter, and beneath a relief-copy of his well-known picture, "The Chief Mourner," representing a shepherd's dog with its head resting on the coffin of its late master.

A stained-glass window representing St. Peter and Paul, the marriage of Mary and Joseph, the Nativity, Christ and the Centurion, and the Resurrection has just been placed in the Roman Catholic Church at Eccleshall. Mr. Whadcock, of Eccleshall, executed the work.

Extensive alterations have just been made to Board-schools at Sharnhall-street, Walthamstow. Mr. Longmore was the architect, and Messrs Palmer and Sox were the contractors.

The Liverpool Art Club, who have just moved to more commodious premises in Upper Parliament-street in that city have signalled the opening of the new club-house with an art exhibition. This was inaugurated by a *conversazione* on Monday. The pictures are oil-paintings of the British school prior to 1801, and representative works of about 100 artists, lent by as many owners, including the Earl of Derby, grace the walls.

The foundation stone of new national schools was laid at Leeson Park, Dublin, on Friday. The buildings will cost for erection and furnishing £2,000, and are to be carried out from the designs of Mr. J. Rawn Carr II, architect, of Dublin.

"To a practical man with a taste for mechanics, and the bumps of contrivances fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *Engineering*. In a hundred and fifty odd pages that make up the bulky mass of letter-press, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Twopenny of all newsmen, or post free 24d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31 TAVISTOCK-STREET, COVENT-GARDEN, W.C.
[Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.]

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph Advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33f. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

Tyao. (Rather a wide question. The list of subjects embraces the education of an architect and a civil engineer. For elementary information, you can hardly do better than get Weale's series and the South Kensington textbooks on "Construction"—W. R. (Write Secreury, 12, Great George-street, S.W.)—W. GANDY. (Your criticism is in the main correct. The perspective is undoubtedly shaky, but there were some unusual difficulties in connection with making the drawing, which, to a considerable extent, excuse the artist who did it.)—A. STURDENT. (No magazines worth reading White-Parker, Strand, and Batsford, 52, High Holborn, for lists of books)—B. O. B. (You cannot have a better)

RECEIVED.—P. and Son.—C. of G.—T. S.—J. J. C. and Son.—H. and Co.—C. and G.—J. W. E.—T. W. H.—EXORS. of W. E. R.—H. C. W. and Son.—A. and G.—J. J.—J. W.—B. and Co.—J. H.—J. S.—J. E.—M. Bros. and Co.—McN. R. and Co.—S. U. R. S. A.—G. B.—J. Bros.—B. B.—F. R. and Co.—P. M. H. B. and Co.—J. A. H. and Son.—J. B. and Son.—J. G. L. S. Bros.—G. S.—T. B. I. F. Co.

Correspondence.

HOUSE-DRAINAGE AND SEWER AND GULLEY VENTILATION.

To the Editor of the BUILDING NEWS.

Sir,—The suggestion made on page 443 by "S. T. G." to trap the end of every street sewer is likely to do as much harm as good I fear, while it would cause a great extra expense, and would not save a farthing of outlay as regards the execution of the drainage of the house upon a safe and proper plan.

If "S. T. G." imagines that, by putting in traps on the sewers at each street that, thereby, the necessity for having a disconnecting trap between such house and the sewer would be done away with, that is a mistake. The necessity or advisability of isolating each house would still continue the same. This is shown from the practice where a good job is made of isolating even the house's own drains from its soil-pipes and waste-pipes. Safety in the use of sanitary appliances in houses consists in isolating each as much as possible, so that, supposing a hole or leak occurred in the soil or waste-pipe beyond the trap at the appliance, no bad air from either drain or sewer could come out at said hole. As yet, this is far too often the exception; but, by

and-by, it will become the rule. Short-sighted selfishness is continually putting on the brake to its own harm; but yet progress is being made.

The letter from "W. B." of York, on pp. 477-8, is very good for the most part; but I can hardly agree with his suggestion to use rain-water pipes to ventilate the sewer except in those cases where the pipe went up outside of the building, and there was no chance of bad air from the sewer blowing into windows or getting in below the slates.

This latter objection could be met in some cases by carrying up the rain-pipe high enough to blow off air above the slates, allowing the rain to enter by a branch side-pipe.

In regard to the gullies in streets, when trapped, drying up, as "W. B." says, in a short time—that must be owing to their having too little water lock. In this case, having them narrow with sufficient depth is better than being too shallow, and with an unnecessarily large surface exposed to the air.—I am, &c.,

W. P. BUCHAN.

WINCHCOMBE BOARD SCHOOLS.

Sir,—In reference to a paragraph on p. 470 in the last issue of the BUILDING NEWS, on the subject of tenders, &c., for Winchcombe Board School, we beg to inform you that at the meeting of the board on Friday last we submitted a tender from a responsible builder amounting to within 10 per cent. of our original estimate—viz., £1,000, which so far met with the approval of the board, that they gave instructions for the said builder to amend his tender in consequence of certain alterations which they desired.

The board will not meet again till the end of the month, when the amended tender will be considered. We will, therefore, say no more at present on the subject.—We are, &c.,

MEDLAND AND SON.

Gloucester, Oct. 10.

SMEETH CHURCH, KENT.

Sir,—Allow me to contradict most emphatically the assertion in your current number that "the Rev. — Loftie," aided and abetted by Messrs. Micklethwaite and Middleton, is about to "restore" the church of Smeth.

I have subscribed a small sum to replace a stone of the Norman chancel-arch, removed for the monument of my ancestor, Paul Loftie, two hundred years ago, but only on condition that the "local builder," who is employed, avoids touching the monument or repainting the arms. My friends, the architects above named, were kind enough, when I consulted them privately on the subject, to inform me that, in their opinion, the contemplated improvements in the church were not likely to be injurious to its historical interest.

That they and I should be described as engaged in a work of restoration, in the usual sense of that misused word, almost amounts to a libel, considering the long fight we have all three waged independently against the falsification of architectural records.—I am, &c.,

W. J. LOFTIE.

Chapel Royal, Savoy, Oct. 11.

FIRES IN THE CITY.

Sir,—It will not be denied that not only vast amounts in property-value, but also many human lives (I believe it would be correct to say the great majority of all that have been lost by fires in buildings), have fallen sacrifices to the want of staircases of fire-resisting capacity.

The question, therefore, is one of first importance, and it is difficult to understand why it has received so little attention.

The number of buildings, either public or residential, in which the materials and method of construction of the staircases have been carefully considered with a view to fire-resistance is very small.

The majority of stone staircases, even, are of stone that is rapidly destructible by fire, and are carried by unprotected ironwork, liable to quick destruction by fire.

A method of staircase construction, giving the maximum of fire-resistance with great economy in cost, has been employed in many public and private buildings during a few years past, and, I believe, only requires to be more widely known in order to obtain more general adoption.

The fireproof staircases of the Aberdeen, new

Sadlers' Wells, new Princess's, and new Savoy Theatres, Sandall-road Schools, Portland-place mansions, numerous residences, and other buildings, have been constructed by this method in monolithic fireproof concrete, the concrete used being compounded of cement of great fire-resisting capacity, and an aggregate practically indestructible by fire.

Iron is used only where, from lack of wall bearings, as in open string staircases, additional strength is required, and is, in all cases, built into the body of the concrete, being thus perfectly encased in fireproof concrete, and protected against the action of fire.

Greatly superior to stone staircases in fire-resisting qualities, the cost is very much less, and superior decorative finish is obtainable.

Respecting another point mentioned in the letter on this subject in the *BUILDING NEWS* of the 7th inst., it is important to note that fireproof concrete doors have recently been adopted for the new Haymarket Theatre, new Savoy Theatre, Vaudeville Theatre, and Lyceum Theatres in London, and the Theatre Royal in Manchester, and that these also are superior to iron doors for fire-resistance, and cost less.—I am, &c.,

CHARLES DRAKE.

WANTAGE CHURCH.

SIR,—Will you allow me a few lines of your valuable space to plead, before it is too late, for the preservation of a most interesting feature of Wantage Church, which is condemned to be destroyed—i.e., a south porch with a good parvise-chamber over it, and a turret staircase to it.

It has been found necessary, in order to accommodate the great congregation which (thanks to the exertions of the late vicar, Canon Butler) assemble at frequent services, to enlarge the church. This is being done under the direction of the eminent architect, Mr. W. Butterfield (who, I am informed, gives his services gratuitously), by taking down the west wall and adding another bay to the nave; so far so good.

On the south side of the present church there stands a most interesting picturesque old porch, with a parvise over, and a staircase turret leading to the parvise. It is proposed to pull down this porch and to rebuild it at the west end of the south aisle, for what reason I cannot imagine.

One great objection to this alteration seems to me to be that whereas the present porch enters the church now nearly on the level, it will be when rebuilt (owing to a fall of the ground westward), five steps above the churchyard, and as this is the main entrance to the church, it will be readily understood what danger will accompany the exit of a large congregation on a dark night, to say nothing of the loss of one of the most interesting features of Wantage Church.

I ought to say that the church was most admirably restored by Mr. G. E. Street some years ago, and I am sorry it is necessary to interfere with the old proportion.

Perhaps the present architect, upon reconsideration, will modify his views as to the destruction of the porch. If he will kindly do that, I think all lovers of old work will be grateful to him.—I am, &c.,

EDWIN DOLBY.

40, Great Marlborough-street, Regent-street, London, W., Oct. 12.

THE "SATURDAY REVIEW" AND FREEMASONRY.

SIR,—Will you kindly spare a little of your space to allow me to express my surprise that you should have reprinted part of the article from the *Saturday Review*, as the subject has but little connection with architecture or building, and is distasteful to a very large number of your subscribers.

I believe that the Church of Rome is quite mistaken in its ideas of Freemasonry; but if it is foolish enough to suppose that it can ever injure the Craft in this country, it is difficult to understand why papers like the *Saturday Review* should repeat the abuse and untruths promulgated by the Romish press.

As to the antiquity of Freemasonry, does anybody suppose that it was invented and established in, or about, 1717? it would be equally truthful to say that the Church of England was created by Henry the Eighth. Masonic emblems are found on ancient monuments, Masonic signs are in use among Oriental and even savage nations, and Masonic societies

have existed in the East from time immemorial. Let any earnest student study the writings of Woodford and Whytehead.

Then as to the objects of Freemasonry: its charity is well-known; its three institutions are supported by the Craft by donations of about £10,000 per annum; its social qualities cause many to be brought together, who but for it would be wide apart; and as to its aspect from a religious point of view, I would state that all sects can meet in its lodges, the belief in the Creator being the only profession of faith required; and as regards the charge of profanity in the higher degrees, I can state that such a statement is utterly untrue, the beautiful ritual and symbolism of the Christian Orders being calculated to make a deep impression upon the candidate.

In conclusion, Freemasonry needs no defenders, it fears no Jesuit animus, or ignorant abuse; it numbers in its ranks the best and wisest of our land—noblemen, judges, statesmen, and clergymen; indeed, many of the latter take so much interest in it (and Wesleyan ministers also) that it is absurd to find fault on religious grounds; and it is said of one who has departed this life so recently, and so much mourned—President Garfield—that he was an earnest worker in the Craft.—I am, &c.,

KNIGHT TEMPLAR.

FREE PROFESSIONAL SERVICES.

SIR,—I beg to inclose a cutting from the *Freemason's Journal* of this date, reporting a meeting of the General Committee of the National Exhibition of 1882, in which it states that "Messrs. Deane and Sons, architects, wrote, intimating their willingness to give their gratuitous professional services to the Committee, which were accepted with thanks."

Perhaps some of your readers can inform me whether any members of the above firm are Fellows of the R.I.B.A., and also whether it is customary for architects to offer "their gratuitous professional services" in this manner?—I am, &c.,

JOHN L. ROBINSON.

198, Great Brunswick-street, Dublin.

October 8.

P. S.—If the report inclosed be inaccurate, it is only fair to the above-mentioned firm to give them an opportunity of correcting the error in your column.

A MONSTER PAVING-SLAB QUARRIED IN THE UNITED STATES.

SIR,—In your issue of the 16th ult., you refer to a large slab quarried and worked by our American friends.

It may not be generally known to your readers that in this "tight little Island," we can, and do, get many large paving-slabs, and other, I may say, "monster" stones—a few of which, with your permission, I will name, premising that architects and users of large stones would find both pleasure and profit in visiting the quarries for themselves where they can be seen.

Long Steps.—Craigleith steps, over 20ft. long, were delivered at the Natural History Museum, South Kensington, from the Craigleith quarries, near Edinburgh.

Scotgate.—A half space slab or landing 17ft. 6in. by 7ft. by 10in., was delivered and fixed at the London and County Bank, Lombard-street, from the Scotgate quarries, and in the same quarries there is, at the present time, a slab 32ft. by 9ft., and one 28ft. by 7ft., also a block just cut, 18ft. by 8ft. by 3ft.

At Styperstone, near Macclesfield, and at Brechin, near Montrose, Scotland, very large slabs can be got. The Brechin stone is similar in colour and texture to the Wallace-bridge stone, Nova Scotia.

At Annan, blocks 20 to 30 tons could be got if required.

At Hayshaw Moor, near Pateley-bridge, Yorkshire, a monster block is, at the present time, being cut up for the Hull and Barnsley Dock and Railway Works, 120ft. by 20ft. by 10ft., or near two thousand tons, and near to this is another very little less, of a pure white colour.

Granite.—If we speak of granite at Blacksod Bay, Ireland, enormously large blocks and slabs can be raised.

At Penryn, Cornwall, Messrs. John Freeman and Sons have a granite block now ready to be

cut up, 40ft. by 30ft. by 15ft., or nearly 1,500 tons.

At the De Lank quarries, blocks 130ft. by 10ft. by 12ft. (nearly 1,300 tons) could be got if required.

I might mention other quarries were very large stones can be had, such as Darley Dale, Grinshill, Castle Whelan, Foynes, &c., but the above will suffice.—I am, &c.,

SAMUEL TRICKETT.

DUBLIN MUSEUM COMPANY.

SIR,—As a competitor, I cannot agree with "An Architect," who writes, in your last issue, that an extension of time is necessary. I do not know when the first advertisement appeared, but I had at least seven weeks' notice; and if an architect cannot, in that time, make sketch-designs to a sixteenth scale, it must either be on account of pressure of work, for which he should be thankful, or on account of lack of knowledge, which should prevent his entering the competition at all.

There are other points, however, in which the instructions might be amended. They say that there shall be only two drawings on each strainer. Now it seems to me absurd that an elevation or section which cannot be higher than $\frac{1}{4}$ or 5in., if the competitor makes a design which can be executed for the money, shall be compelled to occupy the same space as a plan which is over 12in. in its smallest dimension. I wish to ask you, Sir, whether you think a contravention of the instructions in this particular would put my design *hors de combat*?

If "An Architect" will add this reform to his, he shall have my help in getting an extension of time.—I am, &c.,

C. P. E.

ARCHITECTURAL MUSEUM PRIZE DRAWINGS.

SIR,—In your issue of the 7th inst., a slight error occurs in the description of the prize drawings at the Royal Architectural Museum, when you state that there is a "view of the notable tower of 'Maiden Erlegh, near Reading,'" &c.; it should have been the tower of "Mortham, near Rokeby, Yorkshire."

I write this because it might mislead people who think that Maiden Erlegh has a tower.—I am, &c.,

GEO. W. WARD.

Carisbrooke Villa, Cowper-road, Acton, Oct. 12.

CHIPS.

The famous Bierens collection is to be broken up. It will be sold at Amsterdam about the middle of November. Like the Van Loon collection, which was bought *en bloc* by the Rothschild family about four years ago, the Bierens collection has the distinction of having been formed in the lifetime of the great Dutch artists of whose works it consists.

On Monday the vicar of Wakefield laid the memorial-stone of a clergy vestry which is now in course of erection at the north-east corner of that church. The new erection will cost 1,000 guineas. It includes entrance-lobby, lavatory, and vestry, the dimensions of which are 22ft. by 17ft. The plans have been prepared by Mr. W. Watson, architect, Wakefield (an ex-churchwarden); Mr. G. Fawcett (one of the churchwardens) is executing the brick and stonework, Councillor Culbert the plumbing and glazing, and Messrs. Craven and Lloyd the woodwork.

A special committee of the Andover town council reported to the latter body, last week, in favour of the adoption of a system of deodorisation and precipitation similar to that in use at Taunton. The consideration of the report was adjourned for a month.

The death is announced of Friedrich Hitzig, president of the Berlin Academy of Arts, and one of the most distinguished municipal architects in Germany, great part of the fashionable West-end streets in the Prussian capital being from his designs. The Bourse and the Imperial Bank, both handsome buildings, were among his works. The deceased was the son of the celebrated Edward Hitzig, who edited the "New Pitaval."

A tower and spire are being added to the parish-church of Ryde, Isle of Wight. Mr. Barton is the contractor.

The Broadstairs local board received on Wednesday week a report from their surveyor on the five sets of plans for drainage recently sent in in competition. He stated that having examined the plans, he could not recommend the adoption of any one of them.

Intercommunication.

QUESTIONS.

[6707.]—**Softening Putty.**—What is the necessary process for softening top and bottom putty in a greenhouse roof, so that the glass may be taken out without breaking?—A. STRECHER.

[6708.]—**Plumbers' Solder and Smudge.**—Would any of the readers of your valuable paper give me some hints as to the making of plumber's solder and smudge, and they will kindly oblige—A. YOUNG PLUMBER.

[6709.]—**Rainfall, Sewage, &c.**—Please give names of reliable works on these subjects, more especially with regard to average amounts of rainfall, dimensions of sewers to receive same, and stormwater, floods, &c.—P.

[6710.]—**Washable Water-Colour.**—Could any architect give me any information respecting a patent washable water-colour for interior decoration, instead of distemper or oil paint for walls and ceilings? I believe it is called calcarium, and is manufactured at Bristol. Will it answer well upon new plastered walls, which are fairly dry? A client of mine is anxious to introduce it, if I can recommend it.—LASCARRE.

[6711.]—**Houses of Call.**—I have noticed over the doors of different public houses "House of call for Plumbers," "House of call for Plasterers," and the like. Could any reader say where or how I could get a list of the "houses of call" for the different building trades?—W. J. H.

[6712.]—**Breaking Weight of Cast Iron Stanchions.**—I shall be obliged if Hugh McLachlan or some other contributor will state in a simple manner the method of calculating the breaking weight of cast iron stanchions. Take, for example, one 10in. by 5in., 11 shape, of 1 1/2 in. metal. The formula given in Hurst is so intricate.—INEXPERIENCED.

[6713.]—**Shoring.**—Will some friend kindly mention some good book, pamphlet, or other authority on shoring and underpinning? I wish to know what dangers are likely, and what principles to follow.—W. G. M.

[6714.]—**Gas-Tar and Shingle Paths.**—I should be glad if any correspondent would give a good recipe for making gas-tar and shingle pathways.—S. F. C.

[6715.]—**Varnishing Exterior Woodwork.**—Having a dislike to using paint on wood work as being more or less a sham, and serving to hide the natural beauties of the grain, I invariably have all internal woodwork varnished, but when I wish to have external work treated in the same way, I am met with the assertion that it blisters with the heat of the sun, and will not stand the weather. Will some professional correspondent kindly give me the benefit of his experience on the subject, and state if there is any kind of varnish that will stand both heat and weather?—LONDONER.

[6716.]—**Examination Question.**—The following question was given in Advanced Building Construction last May, Science and Art Exam. Skeleton diagram of a roof-truss thus over an



open shed 35ft. wide. All the members in tension are to be of round iron, and the remainder of timber. Give detail drawings to a scale of full size of the joints at the head and foot of the king rod, assuming dimensions for the different parts. In that case I take the horizontal member to be in tension, so I call it a tie rod, but how am I to fix the wood struts on it, and what is the rule to determine the sizes of the different members? In this case the rafters and struts would be of wood, the rest of iron.—STUDENT.

[6717.]—**Mounting Drawings.**—What is the best method of mounting drawings on stretchers with calico backs?—G. P. B., SUBSCRIBER.

[6718.]—**Back Pointing in Tiling.**—Information is requested as to whether inside or outside pointing is properly called back pointing, since the backs of the tiles only are exposed to the weather.—FIX.

[6719.]—**Specifying Painters' Work.**—I want to specify for painting the exterior of a house. The work to be painted is in stucco, and in parts in very bad condition. What is the best kind of paint to use? How many coats, and should the old paint be removed? How soon could the parts repaired in stucco work be painted upon?—E. G.

[6720.]—**Admiralty Clerks of Works.**—Will some one please inform me how clerks of works on east-guard and other Admiralty building works are appointed? If by competitive examination or otherwise.—G.

[6721.]—**Colouring Portland Cement Front.**—I want to colour down a newly Portland cemented front. Will some one kindly say best means of getting a good light bluish colour, which will stand well?—G. P. B., SUBSCRIBER.

[6722.]—**Painters' Work.**—What is the correct method of measuring the painting of a greenhouse or conservatory, inside and out?—O.

[6723.]—**Separate Cistern to W.C.**—Why should a w.c. have a separate cistern when the service pipe stands always charged? How can the water in cistern in such a case become contaminated any more than if the service pipe supplied a tap over a dirty sink?—O.

[6724.]—**Seats for Lecture Hall.**—Which is the best arrangement for seats in a lecture hall, and why?—H. D.

[6725.]—**Draughts.**—What is the cause of the down draughts frequently proceeding from large glass surfaces? How can they be remedied?—H. D.

[6726.]—**Girder.**—In a lattice girder as sketched,



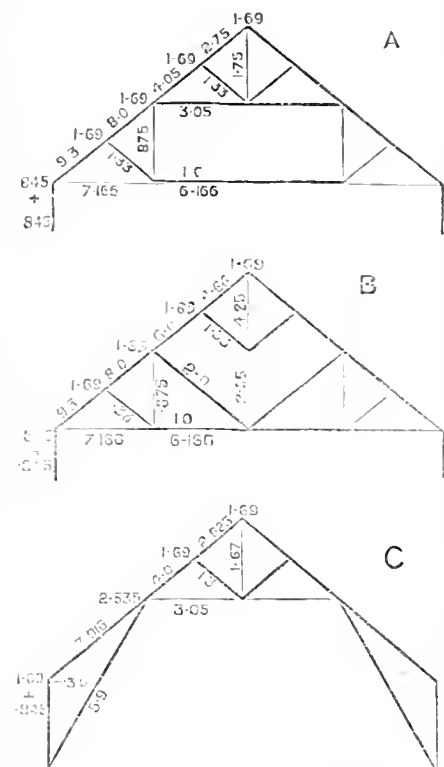
which part would be in compression, and which in tension, if the girder was uniformly loaded, and which brace would bear the greatest strain? How is it arrived at?—H. D.

[6727.]—**Window Lights.**—I think I have seen it stated that twelve years' uninterrupted use will now give the right to light instead of 20 years' as formerly. Is this correct?—S. W.

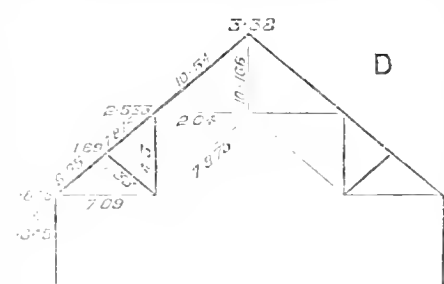
[6728.]—**Drainage of Towns.**—The title and price of the best book describing the several methods in use, with reference to actual working examples, would much oblige—W. S.

REPLIES.

[6619.]—**Roof.**—According to promise of last week I send further particulars. The diagrams A B C and D



[It will be seen that a tensile strain of 3 tons is acting at the feet of principals; this will be resisted by the wall, which if of brickwork in mortar, is 3ft. thick at trusses; and in cement, of 11t. 1 1/2 in.]



show four different trusses of same pitch and span as the one given in question. The first two have tie beams carried across from feet of principals, whilst C and D have the height raised in centre, supposing that to be wished by "D" miss. The thick lines show pieces in compression, and the thin lines those in tension. I have calculated for trusses placed as much as 10ft. apart, that being nearer the distance generally required for roofs of construction shown in question. Calculating the load on roof at 52wt. per square of 100ft. (answer last week slightly inaccurate), the total load on one side of truss would be 6tons 15lb. 5wt. Assuming three principals to rest on each side of trusses equally spaced between ridge and wall-plates, they would distribute loads over the several joints of principals as figured horizontally over the line on the diagrams. Really the ridge would not bear quite so much, as a strong wind could not bear on the

two sides of roof at the same time, but the excess of strength is not worth noticing. All loads are figured for tons and decimals of tons. The strains on the several pieces have been found from the above calculations and by the "Graphic method" referred to in a later answer. All strains are figured in the direction of the pieces which are subjected to those strains; the principals, tie-beams, and collars are also subjected to a transverse strain, which in long tie-beams must be taken into account. Of the four I prefer B and C, both on structural and artistic grounds; the first might have the struts slightly curved or be filled in with tracied boarding, the heads of tracery to be pointed towards principals in the longer compartments, the latter is the one I referred to last week with more braces between wall-struts, principals, and walls. It will be seen that in the last the heads of the principals and king-rod are subjected to the greatest strains, this being different to the other roofs. This follows from the main ties being connected to heads of principals, the weakest point would be the junction of the ties; further, what many would consider as queen-posts become struts, and throw a great strain on the upper part of the principals. This roof would be more expensive than the others, and always be subjected to great strains. The small horizontal tie and wall pieces as shown in the roof by Dennis are worse than useless, they would even do harm. Cross-braces are in all cases both in tension and compression. The steeper the pitch of roof, the less is the strain on the principal timbers, though the total load is actually greater.—HUGH McLACHLAN.

[6666.]—**Painting.**—First coat the object to be painted with Chinese white, then proceed as you would on paper.—THOS. R. DAY.

[6674.]—**Roof Strains.**—Owing to a misprint, "pp. 134 and 205" in the sixth line should be read "pp. 104 and 105." I expect the answer No. 6619 referred to therein will be printed this week, the diagrams having made it too late for last.—HUGH McLACHLAN.

[6677.]—**Cemetery Lodge.**—In many cases the first part of the service is read at some neighbouring church or chapel before proceeding to the cemetery, after which the coffin is replaced in the hearse, which is driven through the gate as near to the grave as possible. The Committee may also have in view the future erection of a chapel in the grounds. For these reasons it may be advisable to raise the entrance gateway to allow for the passage of a hearse as desired. Mr. Tarrer has previously pointed out that the gateway cannot properly be called a "lych gate," unless a table is placed under it on which the coffin should be deposited. The word "lych" means a corpse and is the same as the first syllable in the German word Leichnam which has the same meaning. It is the duty of an architect to carry out the instructions of a client, even if absurd, which they do not appear in this case, unless in doing it he may bring discredit upon himself.—HUGH McLACHLAN.

[6678.]—**O-Traps.**—If "Enquirer" will furnish me with one of the traps he mentions, I will do my best to test it with those I have in hand.—DANIEL EMBAGE, Dane-hill Sanitary Works, Margate.

[6679.]—**The White House at Washington.**—In Fenimore Cooper's work, "America and the Americans," published in 1836, I find the statement that the Capitol "is of a light greyish freestone, and it has been found necessary to paint it white in order to conceal the marks of the smoke left by the configuration of 1814." "The President's house," he continues, "is a neat, chaste building of the Ionic order, built of the same material, and painted like the Capitol. It stands in a public square, and in a considerable garden, and is 170ft. in length by 85 in breadth." This would make it just about the size, although entirely different in appearance, of Baron Grant's late mansion in London, Kensington House, or of Holford House, Regent's-park. A sketch of the White House appeared in the Graphic of 18 Nov., 1876.—H. Y. POWELL.

[6679.]—**The White House.**—The whitewash used for this building at Washington was made thus: 11 lb of a bushel of unslaked lime, slake it with boiling water, covering it during the process to keep in the steam. Strain through a fine sieve. Add a peck of clean salt, previously dissolved in warm water; three pounds of good rice ground to a thin paste, and stirred in while boiling hot. Half a pound of powdered Spanish whiting, and a pound of clean glue, which has been duly soaked and melted. Add five gallons of hot water. Stir it well and let it stand for a few days covered up; keep out dust, &c. It should be used quite hot. One pint is said to cover a square yard upon the outside of a house. It retains its brilliancy for years. Taken from the "Handbook of the Mechanical Arts."—H. O. W.

[6682.]—**Printed Reports in Competitions.**—In acknowledging reply to above by Mr. Bell, I think he has failed in giving the desired information. What I would like to know is: first, the conditions merely stating that a report was to be submitted along with the plans, and leaving it to the competitors either to furnish printed copies or otherwise as they thought fit—can my action in submitting printed copies be termed unjust? Of course, it lay with the committee to decide whether or not they should be distributed; and, second, should competitors only submit printed copies of report when such is specially mentioned in conditions? I know several architects of position who never compete but what their reports are printed, and this seems a course pretty generally adopted. I may state that in the competition referred to the remuneration did not affect the decision.—ENQUIRER.

[682.]—**Printed Reports in Competitions.**—"Enquirer" would have done better if he had left out the last clause in his question, it evidently shows that he feels himself very much hurt, the former part is right enough and much more sensible than many of the questions to be found in the "Intercommunication" column. Personally I would object to printed reports, unless each competitor is distinctly asked to submit them, though I agree that they are a help to members of committee and the press. If for no other reason I would urge this, keep down as much as possible the expenses of competitions, otherwise an advantage is given to the richer competitor. In a recent competition I was asked to enter in with a few other architects, I believe the successful one owed his success to having laid out more money than any of

his fellow competitors in perspectives: of course there was no professional referee. The late resolutions at the conference of British Architects in May last were a decided step in the right direction. No right-minded competitor should send in a report or any other written communication in his own hand writing if he thinks it can give a clue to his identity in any way; it is in fact sometimes forbidden. Mr. Bell's remarks as to committees and architects who are "black sheep" are rather unfair, though sometimes they will apply.—HUGH McLACHLAN.

[6684].—**Figures of Saints, &c.**—I believe there is a descriptive list in Gwilt's "Encyclopedia of Architecture," though not illustrated. In this I am trusting to memory alone. Illustrations are not very important, the emblems being what is wanted; they may be used with slight variations of positions.—HUGH McLACHLAN.

[6685].—**Variation of Compass.**—During the past few days I have been trying to find out this for a county in the north of Scotland, and shall be glad if some reader will explain how the variation can be calculated for different localities. Books which I have searched are somewhat perplexing. Cassell's "Popular Educator," Vol. VI., page 321, gives the "variations in England" as "about 21 points to westward of north." This is upwards of 25°. In a science textbook on Magnetism and Electricity I find the variation in London given as "about 20°" to west. Ogilvie's "Imperial Dictionary" says that in 1580 the variation in London "was 11° 15' east; in 1663, the needle pointed north, since which time it has travelled about 24° to the westward, and now (1850) it has begun to retire." Being unable to get any satisfactory information from books, I took an observation from the Pole Star the other night, and made out that here the variation is about 23° to west. I set up a pole in a straight line for the star from the corner of a tall building, and found that my compass varied to the above extent from this line. Failing precise information, P. Playfair may try this method, but it is somewhat difficult to work exactly without special instruments, and I shall be glad to be told if I am nearly correct.—L. L. U.

[6687].—**Chimney Shaft.**—Write to "The Superintending Architect" of the named corporate body. There are some recent byelaws, but I do not think they give the information desired. Drawings would have to be submitted to the District Surveyor for approval.—HUGH McLACHLAN.

[6697].—**Zinc Soakers** are used in the same way as lead soakers. They are about 9in. wide, and the length should correspond with the gauge and lap of the slates. One soaker to each slate, and turned up the wall as flashing with overflashing.—FRZD.

[6697].—**Zinc Soakers.**—These are usually cut about 6in. or 8in. wide, and the length of gauge of slates used plus the lap. One edge is then turned up 2in., and tacked to the joints of abutting wall. When slating is completed a lead flashing is put on in the usual manner; but instead of laying on the slates it is cut off in the angle. If properly done it is quite effectual.—O.

[6703].—**Boundary.**—"Accuracy" can build up to his line, but as regards eaves, a frequent puzzle in such cases, he can overhang and risk trouble and expense of altering. Keep them flush, very ugly, or either put a parapet or set off the wall near the top so as to gain room for eaves. Sometimes a few inches are left for eave, but unsightly spaces are thus left in the street.—O.

[6706].—**Shingles.**—Oak shingles for spire, &c., may be of any length from 14in. to 9in., and from 3in. to 5in. wide, the thickness tapering from 3in. to 2in. The width at top should be 3in. less than at bottom. The hips are worked the same as tiles.—FRZD.

CHIPS.

New schools attached to the Union Chapel, Grendon, near Northampton, were opened last week. They have been erected at a cost of £180 by Mr. James Underwood, builder.

The town council of Hereford passed, last week, a resolution expressing the regret with which they had heard of the death of Mr. George Coles, who for upwards of 22 years has held the appointment of city surveyor. It was resolved to offer Mr. Coles's successor the same salary as was recently paid—£250 a year.

Plans by Mr. W. Talbot Brown, of Wellingborough, were adopted last week for a Conservative club proposed to be erected in the High-street of that town.

The town council of Penrith received last week the offer of the valuable geological collection of the late Admiral Wauchope, which will be freely presented to the town on condition that it be made the nucleus of a public museum and library. The proposal was referred to a committee for consideration.

The window in the south aisle of the chancel of St. Mary's Church, Bury St. Edmund's, erected by the Queen in memory of Mary Tudor, was unveiled on Tuesday last; it was executed by Messrs. Clayton and Bell. Another stained-glass window, the sixth in the series, has just been erected in the same aisle, by Messrs. Heaton, Butler, and Bayne; it is of three lights, each occupied with two incidents in the lives of Samuel, David, and Solomon.

The Sudbury Archdeaconry Church Building Society, at its annual meeting, held at Bury St. Edmund's on Wednesday week, granted £20 towards the restoration of Bildeston church, £25 towards that of All Saints, Sudbury, £10 to Worlington church, and £10 to that at Pakenham, the latter for roof repairs. £25, being half the grant, had been paid in the case of Clare church.

LEGAL INTELLIGENCE.

"EXTRAORDINARY" TRAFFIC ON ROADS.—At the Gloucester county petty sessions, Mr. A. Estcourt, builder, of Gloucester, was summoned for £41 13s. 4d., being the expenses of repairing the Gloucester and Birdlip-road, which was alleged to have been damaged by extraordinary traffic on the part of defendant between Sept. 20th, 1880, and March 25th last. Defendant was the contractor for the erection of the Barnwood county asylum, and Mr. Drinkwater, surveyor to the highway board, proved that he had given orders for 300 additional loads of material to be placed on the Birdlip-road, in consequence of the extra traffic occasioned by defendant's carts. He also stated that the annual expenditure, which was generally about £277, rose last year to £400. The defendant was charged with the cost of obtaining and laying 100 tons. For the highway board, the complainants, it was argued that in March, 1880, Mr. Justice Lush interpreted the law to mean that those who made an excessive use of the highway, thereby increasing the cost of repairs, ought to bear a proportion of the expense. For the defence it was contended that complainants had to prove "extraordinary traffic," and the amount of damage which the extraordinary traffic did; and, in either case, it was urged, they had failed. The road was an important one, that from London into Wales, and they had not alleged that the weight of any particular load was excessive; whereas, they were bound to prove excessive weight. Building was, moreover, a recognised trade in the neighbourhood, and judges had ruled that highway authorities were bound, in making their roads, to have regard to the local industries. Mr. Justice Grove, it was shown, had laid it down that "extraordinary" traffic did not refer to the amount of user. Mr. Justice Lindley, in *Wellington v. Hoskins*, had said the question was, not what was the aggregate amount carried, but under what conditions was it carried, and how was the amount distributed? Moreover, in *Williams v. Davis*, Williams appellant, it had recently been declared that the use of a road for timber-hauling was legitimate. The magistrates held consultation, and on their return, Sir W. V. Guise said an unusual amount of material might have passed over the road, but the road was for all her Majesty's subjects, and the magistrates could not see that there had been any extraordinary traffic. The summons would, therefore, be dismissed.

STATUES, MEMORIALS, &c.

GENERAL SIR FREDERICK ROBERTS.—The bust of General Roberts, executed by Mr. Henry Harvey, was presented to Lady Roberts by Dr. Zeifli at the artist's studio, on Thursday week. General and Lady Roberts expressed themselves much gratified with the work.

STAINED GLASS.

BOXLEY.—The south-west window in the nave of Boxley parish-church, Kent, has been filled with painted glass by Messrs. Hardman and Co., of Birmingham and London, to the memory of the late vicar. The window has two lights. The subject depicted in that on the left hand is Our Lord with St. John in one boat, and St. James and Peter in another, fishing. The right-hand light represents St. Peter and John in the act of curing the lame man at the Beautiful Gate of the Temple. The upper tracery is filled in with the emblems of the two apostles, St. Peter and John.

ASTON.—There have been recently added to the church of St. Silas, Aston, near Birmingham, five stained-glass windows, which were designed and executed by Messrs. Camm Brothers, of Smethwick, near Birmingham. The subjects are coloured on grisaille ground, and are as follows—viz., St. James; St. John the Baptist; Christ feeding the Multitude; Charity of Dorcas; and the Good Samaritan.

TRIANGLE, HALIFAX.—During the past week three new stained-glass windows have been placed in the nave of St. John the Divine's Church, Triangle. They represent "Christ the Consoler"; "The Vision of the New Jerusalem"; and "The Redeemed in Heaven." In the first window Our Lord is depicted surrounded with the weary and heavy-laden, who are coming to Him for consolation. In the second, the angel and St. John are seen in the foreground; in the background is "the holy Jerusalem, descending out of Heaven from God." In the third window there are three groups of figures, representing the blessed in Heaven. In the first light are members of the three orders of the ministry, bishops, priests and deacons; in the next light there are angels; in the third, a typical group of old men, women, young men, maidens, and children. All these windows have been supplied by Messrs. Heaton, Butler, and Bayne, of London.

WATER SUPPLY AND SANITARY MATTERS.

THE DRAINAGE OF THE LOWER THAMES VALLEY.—At a meeting of the Lower Thames Valley Main Sewerage Board, recently held at Kingston, and presided over by Sir Thomas Nelson, a letter was read from the Local Government Board acknowledging the receipt of a copy of a resolution passed by the Joint Board with regard to the terms upon which the West Kent Main Sewerage Board were willing to arrange for the discharge into their sewers of sewage from the Lower Thames Valley district, and stating that the Board much regretted to learn that the last proposals of the West Kent Board were such that the Joint Board had felt themselves unable to agree to them. At the same time the Board could not but consider that under the circumstances surrounding the case the difficulties would best be met by an arrangement which would admit of the discharge of the sewage of the district into the West Kent system, and they asked whether steps might not be taken to bring about a conference between the two authorities with the view of reverting to the original proposal. The Board would afford every assistance in their power towards promoting such a conference, and they would be prepared to instruct one of their inspectors to attend it if his presence should be deemed desirable. In the course of a long discussion it was explained that the Board had already adopted a separate scheme of Mr. Hawksley's, and it was ultimately resolved by a large majority "That the West Kent scheme not being at present an assured success, and this Board having no knowledge of and being incapable of foreseeing the possible and probable results that may accrue from the construction thereof, are of opinion that it is not desirable to further consider the matter, having no guarantee that such a combination will prove either economical, efficient, or final." It was stated by the chairman that the time was very shortly coming when they would have sat there four years, and the only result they had to show for it was an unfortunate expenditure of a very large sum of money, which had absolutely resulted in nothing.

CHIPS.

The new line of railway from a junction with South-Eastern system at Appledore to Lydd, near Dungeness, was officially opened on Monday by General Hutchinson and Col. Yolland, C.B., the inspectors to the Board of Trade. Messrs. Walker and Sons were the contractors for the line, which will probably be opened in about a fortnight's time.

The foundation-stone of the Bennett memorial church was laid at Bournemouth on Tuesday by the Bishop of Winchester.

A permanent church of St. Luke is about to be built on the Redlands estate, Reading. The architect is Mr. J. Piers St. Aubyn, of London.

It is announced that Major-General C. W. Hutchinson, R.E., is about to vacate his appointment as Inspector-General of Military Works in India, and that he will be succeeded by Major-General R. Cadell, R.E.

Chaddleworth Church, Berks, was reopened last week after partial restoration, including rebenching, reflooring in nave, and rebuilding of south porch. Mr. Ewan Christian, of Whitehall, S.W., was the architect, and Mr. Aldridge, of Hannay, the builder.

A man named Brettell, in the employ of Messrs. Kellet and Bectley, the builders and contractors who are now erecting a viaduct at Stourbridge, has been remanded in custody on a charge of fraudulent conversion of £100 belonging to his employers.

Mr. Charles Baker, of Croxton, was last week elected road surveyor to the town council of Thetford, in the stead of Mr. H. Burke, resigned.

Extensive alterations and improvements are being carried out in the Christian Union Buildings, Dublin. The basement has been entirely remodelled, and a large hall, seating 1,800 persons, formed out of many small rooms, while in the great hall an orchestra has been provided behind the platform, which has been brought forward. Mr. Alfred G. Jones is the architect, and Messrs. Beckett, of South King-street, Dublin, are the contractors.

The ancient church of Combe, Hants, was reopened on Thursday week by the Bishop of Winchester, after restoration.

An extension of tramways, from Clifton-street, Cardiff, to Grangetown, was officially inspected by General Hutchinson on Tuesday. The line is 2½ miles in length; Mr. W. S. Yockney was the engineer, and the work has been carried out under the personal superintendence of Mr. T. R. Ward, resident engineer, by the contractors, Messrs. Jones and Jepson.

Our Office Table.

THE utilisation of canal courses as the line of route for railways is not quite a new idea. Many years ago there was a great deal of speculation as to whether the Kennet and Avon Canal, now the property of the Great Western Railway Company, might not be drained of its water and converted to some such purpose. No such scheme, however, was ever carried out. The Hereford and Gloucester Canal between Ledbury and Newent has recently been emptied, and is now being laid with rails as a Great Western extension. A plan is now under consideration by which the Regent's Canal would become a means of railway communication between the east and west of London. It is said on good authority that the Great Western Company will support an application to Parliament next session for authority to form a railway on the bed of the canal, and that the proposed new line will run from Poplar to Paddington.

At the last meeting of the City Court of Common Council, Mr. Tomkins asked the permission of the Court to withdraw his motion—"That the City Lands Committee be instructed to remove the damaged plaster-work of the Temple Bar Memorial, and to substitute plain panels pending the completion of the bronze castings," as the chairman and the architect had anticipated it to some extent. He wanted an assurance, however, that it was their intention to remove the whole of the plaster-work from the panels, and this was given him by Mr. Day. Why not let the plain spaces for advertisements? Good posters designed in the same style as the Griffin would really rather improve the "Memorial," and the revenue derived from their exhibition would help to pay the policemen.

On Sunday last one of the largest fires which has occurred of late years in Bristol, caused a serious archaeological loss, the well-known Canynges apartments, so long objects of antiquarian interest, having been involved in the ruin of the premises. The apartments were the only remnant of the great house in which the second William Canynges, the builder of Redcliff Church, described by Chatterton as the "pride of Bristowe and the Western lande," once lived. Of the hall and oratory of the ancient mansion, though sundry alterations had been made to fit them for the purposes of Messrs. Jefferies's business, yet sufficient remained to bear testimony to the ancient grandeur. The carved timber roof was well-nigh perfect, and the carved corbels were still in a good state of preservation. Behind this hall was a printing-office, in which traditional Canynges feasted King Edward IV., and in another portion of the building was a room fitted up in the style of architecture prevailing in the latter part of the 17th century. There was in this apartment, which was known as Canynges's Parlour, a highly ornamental Renaissance fireplace and richly-carved furniture.

The plans of the proposed new Tay Viaduct are now being exhibited in the North British Railway offices at Edinburgh. The plans have been prepared by Mr. W. H. Barlow, and are made for a double line of rails. The bridge, which is on the girder principle, will be about two miles in length, and will commence on the south, or Rife side of the Tay, about 60ft. west of the former structure. With the exception of the brick arches at the commencement of the south side the piers will be of wrought iron pillars braced together, and encased in iron plates of from three-eighths to seven sixteenths of an inch in thickness. Every effort has been made to give effect to the recommendations of the special commission on the Tay Bridge question, with a view to securing the absolute security of the structure. The navigable spans in the centre of the bridge are to give a clear headway of 77ft. above high-water mark, being 11ft. lower than the maximum height of the former structure. A windguard 5ft. high will extend the whole length of the bridge.

In a letter to yesterday's *Times*, Mr. E. P. Loftus Brock, F.S.A., the hon. secretary of the British Archaeological Association, draws attention to the fact that the churches of East Anglia are generally unprovided with lightning-conductors, and that as a consequence of this, coupled with their conspicuous positions on hills, and the large

and lofty towers of these churches, damage and destruction by lightning has been frequent, the list beginning in old times and ending with the fine Perpendicular church of Wells-by-the-Sea, burnt in 1879. Only a short time since, South Wootton Church, also in Norfolk, was greatly injured by lightning, but it has not been stated whether it was provided with a conductor. Mr. Loftus Brock deems this a matter demanding attention, both in the interests of the Church and of the antiquarian value of these buildings, and says the danger may be avoided at a very moderate outlay. In cases of new churches, or where a grant has been obtained from the Church Building Societies, this danger is reduced to its minimum, since a lightning-conductor is made a condition. In cases of old churches, no such pressure can be brought to bear, but the writer suggests that it is a matter well within the province of archdeacons, or failing this, some higher ecclesiastical authority might issue a commission for the collection of evidence in the first instance, and for the adoption of means of safety afterwards.

MEMBERS of the House of Commons will find the arrangements made for their private convenience materially improved when they re-assemble. The clerk of the works and contractors have well-nigh completed the conversion of the two committee rooms given up by the Peers to be used as dining- and tea-rooms by the Commons, and they are also carrying out alterations in detail which will put an end to many inconveniences. The new smoking-room will not be provided during this recess. The room the Lords have given up is occupied during term by the judges of the Court of Appeal, and their lordships' removal to the new building in the Strand must precede this addition to the conveniences of the Lower House. On the other hand, the committee rooms which the Commons have given up to the Lords are being connected to their lordships' house, and a new staircase and corridors have been formed, which afford access to them.

CHIPS.

A vestry meeting was held on Thursday week in St. Swithin's parish, Norwich, to hear a report by Mr. R. M. Phipson, diocesan architect, as to the condition of the church tower, which stated that the upper part is in a dangerous condition, and recommended that a story should be removed and a light wooden cover put over the bells. The whole church (which faces Princes'-street chapel) was, indeed, in so bad a condition that he would almost suggest that the parish be amalgamated with a neighbouring one, and the fabric dilapidated. It was resolved to apply to the town council to grant funds for removing the tower and throwing the site into the street.

The Portsmouth town council have adopted a committee's report in favour of erecting a new Custom-house at an estimated cost of £5,000.

A new section of tramways in Northampton, extending from All Saints' Church, the Draperies, in the centre of the town, to the Roman Catholic Cathedral, Kingthorpe-road, was formally inspected by General Hutchinson, R.E., of the Board of Trade, on Friday. It has been constructed from plans by Mr. S. Floyd, C.E., engineer to the Northampton Tramcar Co., under the superintendence of Mr. E. P. Binet, resident engineer. Messrs. Meston and Son were the contractors.

Mr. J. E. Millais, R.A., has been nominated as a foreign associate of the Paris Academy of Fine Arts, in the room of the late Herr Stracke, of Berlin.

Dissatisfied with the treatment he has recently experienced, Mr. George Hodson has resigned the position of surveyor to the Loughborough local board, which he has held for fifteen years.

The partnerships between Wills and Voisey and Voisey and Wills, Bristol, architects; Lloyd and Rose, London-wall, E.C., architects; Hook and Oldrey, Cowley-wharf and Pressland-yard, Kensal-road, W., builders; W. Watson and Son, Liverpool, builders; and Young and Summers, Woodford, Essex, builders, have been dissolved.

The town-council of Cheltenham have reduced the salary of the manager of the Corporation waterworks from £600 to £100 a year. The former salary was by the agreement of purchase guaranteed for three years, a term which has just expired.

A section of street tramways about a mile in length, extending from the High-street to Carmarthen-road, has just been completed at Swansea, under the supervision of Mr. Everingham.

In the annual statement made by the Chairman of the London School Board last week, it was mentioned that during the past year 25 new schools, accommodating 25,903 children, were built, bringing up the total accommodation within the board's district to 236,024 school-places.

The Islington Board of Guardians recently received tenders for adding a story to a children's ward at the workhouse. These proved considerably higher than the estimate, £275, and it was therefore decided to carry out the work without a contractor. At the meeting of the board on the 6th inst., it was reported by the visiting committee that the cost had proved to be under-estimated, and would probably be about £475, but for that sum greater accommodation would be provided.

A Freemasons' hall is about to be erected at Fowey, from the plans of Mr. A. S. Clunes. The tender of Mr. Smith, of St. Austell, has been accepted for the work, which will be carried out at once. The site adjoins the South Western Bank.

New Board Schools are about to be erected at Newburgh, Forevan, from the plans and designs of Messrs. Jenkins and Mare, architects, of Bridge-street, Aberdeen.

An organ, built by Messrs. Clark and Son, of Bath, was opened at Timbury Wesleyan chapel, near that city, last week.

The annual distribution of prizes in connection with the science and art classes at Ayr, took place on Saturday, at the town-hall of that borough. The reports presented were of a favourable character. That of the art classes stated that at the South Kensington examinations 2 third- and 11 second-grade prizes were obtained by local students, and 19 works earned the highest grant. At the May examinations 57 students were examined, and obtained 9 prizes and 38 pass-certificates.

The roof of St. Mary's Church, Billericay, Essex, having been found to be unsafe, a vestry meeting was held last week to consider the matter, when it was decided to call in Mr. E. L. Cutts, a London architect, to inspect the building and report.

The guarantee fund for the Central Northumberland Central Railway scheme having reached £8,000, the provisional committee have instructed Mr. W. Shelford, C.E., the engineer of the Hull and Bursley Railway, to make a survey and report on a line from Newcastle to the Tweed.

The town council of Burnley have decided to consider the question of the conversion of the markets, on which there has been a loss of £60,000, into a town-hall at a probable cost of £15,000.

The new lighthouse at Anvil Point, Dorset, inaugurated last week, stands on a cliff 140ft. high, and is, therefore, of but one story. It has been built of stone found on the spot, bedded in Portland cement. Mr. J. N. Douglas, engineer-in-chief to Trinity House, furnished the design, Mr. Arthur Ayres acted as assistant engineer, and the lantern, revolving lens, and clockwork were supplied by Messrs. Chance Brothers and Co., Birmingham.

Last week at the Rochdale town council meeting Mr. Samuel S. Platt, of Rochdale, was unanimously appointed to the office of surveyor, which had become vacant by Mr. Thomas Hewson having been elected lately as the surveyor of Leeds. Resolutions passed by several committees, testifying as to the ability of Mr. Hewson, and expressive of regret at his departure from Rochdale, were confirmed by the council.

The new R.C. church at Guildford is to be opened on the 19th inst. by Cardinal Manning. The completed portion of the structure (nave and sanctuary) will seat 200 adults. The south aisle and Lady-chapel remain to be added. The builders are Messrs. Mitchell Bros., of Shalford, and the architect Mr. E. Ingress Bell.

Memorial-stones of a new board-school have been laid on a site adjoining the Bowling-green, at Stainland, near Halifax. The architects are Messrs. Leeming and Leeming, of Halifax, and the clerk of works is Mr. Richard F. Farrer, from the same architects' office. The contractors are Messrs. Tayler and Hellwell, mas ns; Mr. A. Park, Stainland, carpenter and joiner; Mr. W. R. Crowther, Soward, plasterer and plater; Mr. J. Aspinall, Elland, plumber and glazier; and Mr. B. Townsend, Stainland, painter.

St. John's Chapel, Stonehaven, N.B., was reopened on Sunday, after alteration including the erection of new pulpit, choir-seats and platform, all of yellow pine and pitch-pine, and the removal of organ to a chamber, with vestry beneath, and the provision of new gas standards and fittings. Mr. John Watt was the architect, and the work was carried out by local tradesmen under contracts, that for masonry being taken by Messrs. Gregory, and that for carpentering by Mr. James Murray, jun.

The Liskeard rural sanitary authority adopted last week a scheme by Mr. Mallett, their sanitary inspector, for the improvement of gradients, trapping, and ventilation of the sewers in East Loe.

At the half-yearly meeting of the Gloucester and Bristol Diocesan Association, held at Bristol on Tuesday week, the following grants were made:—Churches: St. Paul's, Badminton, £60; Pilning, St. Peter's mission-room, £40; Blakeuey £35; Clifford's Mesne £100. Schools: St. Luke's, Cheltenham, £30; St. Mark's, Eiston, £30; Coleford, £60; All Saints', Gloucester, £25. Glebehouses: Shirehampton £100; Biddestone £20.

The Dean and Chapter of Lichfield announce that, in answer to their second appeal, promises of £2,700 have been received towards the restoration and repair of the west front of the cathedral, and a contract for the restoration of the upper part of the north-west tower has been entered upon, so as to enable the contractor to continue his work until next spring. This contract embraces the stage between the pinnacles and the stringcourse below the belfry. The further sum of £7,300 is required for the completion of the undertaking.

Sunnyside Baptist Chapel, Crawshawbooth, South Lancashire, was reopened last week, after having been painted and decorated by Mr. Cowpe, of Rawtenstall, and supplied with an organ built by Messrs. Griedrod and Co., Rochdale.

The London and North-western Railway goods station at Tamworth is being enlarged, and new sidings constructed, and an iron footbridge erected over the lines. The contract has been taken at about £8,000 by Mr. Evans, of Walsall.

The church of St. John the Evangelist, Irlans'-o'-th'-Height, Pendlebury, is about to be refitted, decorated in colour, and provided with stained-glass windows to nave, at the expense of Mr. O. Heywood.

The retiring mayor of Wolverhampton announced to the town-council, on Monday, his intention to present £500 as the nucleus of a fund for the purchase of specimens of art manufactures, to form a public museum.

The foundation-stones of the Bromley and Poplar Baptist Tabernacle were laid on Tuesday week. The building will be Byzantine in style, and will be constructed of brick, with Bath stone dressings. Accommodation will be provided for 366 persons at a cost of £3,500 only. Messrs. Spalding and Dixon are the architects, and Mr. W. Holland is the contractor.

The Prince of Wales opened on Wednesday the new sea-defence works at Hythe, Kent. They include a sea-wall about 6,000ft. in length, extending from Hythe to Sandgate, and a parade and road-way running the entire length, completing an uninterrupted low-level carriage-drive next the sea, from Hythe to Folkestone harbour. The wall is faced with large blocks of Kentish ragstone bedded in Portland cement, and is 8ft. in thickness at the base. Its depth is about 19ft., in some places 22ft., and it is calculated to resist any force of the sea that may be thrown against it. It has been constructed from the designs of Sir John Coode, and under the supervision of Mr. H. B. James, C.E. Mr. Good, of Hythe, was the contractor. The Prince afterwards laid the foundation-stone of the new deep-sea harbour at Folkestone. This will be formed by the extension of two large curved piers outside the present harbour: that to the west, close to the new Harbour railway station, will be 2,000ft. long, and that to the east will be carried along a natural reef from Copt Point to a length of 2,800ft. A water space of 100 acres will be inclosed in the harbour, which will have a low-water depth of 27ft., thus accommodating large steamboats. The enterprise will be carried out by the South Eastern Railway Company, from the plans and designs of Mr. Brady, their engineer.

Throat Irritation.—Soreness and dryness, tickling and irritation, inducing cough and affecting the voice. For these symptoms use Epps's Glycerine Jububes. Glycerine, in these agreeable confections, being in proximity to the glands at the moment they are excited by the act of sucking, becomes actively healing. Sold only in boxes, 7½d. and is 1½d. labelled "JAMES EPPS and Co., Homoeopathic Chemists, London." A letter received:—"Gentlemen,—It may, perhaps, interest you to know that, after an extended trial, I have found your Glycerine Jububes of considerable benefit (with or without medical treatment) in almost all forms of throat disease. They soothen and clear the voice.—Yours faithfully, GORDON HOLMES, L.R.C.P.E., Senior Physician to the Municipal Throat and Ear Infirmary."

Lamplough's Pyretic Saline is refreshing, most agreeable, and the preventive and curative of FEVERS, BILIOUSNESS, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by chemists throughout the world, and the Maker, 113, Mulberry Hill. Use no substitute. See Medical Testimony.

Holloway's Ointment.—A Cure for All!—This invaluable Remedy, if we rubbed into the system, will reach any internal complaint. By this means it cures sores or ulcers in the throat, stomach, liver, spleen, or other parts. For bad legs, old wounds, sores, gout, rheumatism, and all skin diseases, it is unequalled.

Doultong Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to **CHARLES TRASK,** Norton-sub-Hamdon, Ilminster, Somerset. —[Advrt.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates. General Repairs and Alterations Executed. Experienced Workmen always in readiness, and sent to any part of the country. —[Advrt.]

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE
CORSHAM DOWN
CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.
(See trade advt. on p. XXV.) Advrt.

TENDERS.

*. * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ABERDEEN.—For supplying new water-mains, for the town council:—
Edington, T. and Sons, Phoenix Ironworks, Glasgow (accepted).

ABERGAVENNY.—For extensive alterations and additions to the joint counties asylum, Abergavenny. Messrs. J. Giles and Gough, 28, Craven-street, Charing Cross, W.C., architects:—
Horsman and Co., Wolverhampton* £12,000 0 0
Accepted.

ASHBY-DE-LA-ZOUCH.—For alterations to the Cottage Hospital for the local board:—
Slater (accepted) ... £63 12 0

BARROW-IN-FURNESS.—For a deep sewer in Hindpool-street for the town council:—
Cleator, J. (accepted).

BARROW-IN-FURNESS.—For executing No. 2 contract of the Abbey Valley sewer, being that portion of the sewer from Salthouse to Parkhouse Farm, for the town council:—
Watts, Elijah (accepted).
[Lowest of three tenders.]

Bow.—For additions to stabling, Bow Common-lane, Bow, E., for the London General Omnibus Company. Mr. A. Josh, architect. Quantities by Mr. Bolton:—

Everard, C.	£1,135 0 0
Page, J.	1,129 0 0
Richens and Mount	1,127 10 0
Higgs, F.	1,068 0 0
Gentry, M.	995 0 0
Garrud, J.	993 15 0
Beale, W. J.	957 0 0
Parker, G. (accepted)	949 0 0

BURLEIGH, STAFFS.—For painting works, for the Burleigh School Board:—
For exterior of schools at Hill Top, caretaker's house; also, interior and exterior of board offices:—
Turner, S., Wolstanton (accepted) ... £28 0 0
[Lowest of seven tenders.]
For extensions in North-road, Middleport, and Longport schools:—
Turner, S. (accepted) ... 26 10 0
[Lowest of five tenders.]

CAIRNORRIE, SCOTLAND.—For additions to the public school at Cairnorie, with shelter sheds, &c. Mr. W. Clark, Methlick, architect:—

Accepted tenders.
Mason's work:—Davidson, W., Aberdeen.
Carpenter's work:—Ogston, J., Aberdeen.
Slater's work:—Ewen, G., Aberdeen.
Plasterer's work:—Hutcheon, J. and J., Aberdeen.
Total amount, £153 6s.

CARDIFF.—For the erection of a police-station at Grange-town, for the Cardiff town council:—
Marshall, H. (accepted) ... £1 989 10 0

CARDIFF.—For the erection of a police-station at Canton, for the Cardiff town council:—
Trotman, E. (accepted) ... £1,889 0 0

CHELSEA.—For paving Pont-street with wood, for the Chelsea Vestry. Mr. G. H. Stayton, surveyor:—

	Per yard super.
Lloyd and Co.	£0 10 4
Asphaltic Wood Co.	0 10 0
Improved Wood Paving Co.	0 9 10
Nowell and Robson	0 9 9
Turner and Son (accepted)	0 8 4

CHISWICK.—For tar-paving and kerbing works in Chiswick-lane, for the improvement commissioners. Mr. H. O. Smith, surveyor:—
Nowell and Robson (accepted) ... £200 0 0
[Lowest tender received.]

COLCHESTER.—For (a) laying down drains and (b) repaving the roads, for the Colchester burial board:—

	A.	B.
Dobson	£60 0 0	0s. 7½. per super yd.
Dupont	63 0 0	1 6 "
Howard & Coprin	45 4 10	0 7 "
Harden (accepted)	45 2 6	0 7 "

CREWE (CHESHIRE).—For forming, macadamising, kerbing, channelling, and paving footpaths in Edless-road, Thomas street, and part of Market-street; also for sewerage, forming, &c., and having footpaths in Hill-street, Mr. G. Watson, borough surveyor:—

Halsall, T., Aintree, Liverpool	£3,522 2 6
Kirk, T., Chester	3,385 0 0
Clarke, G., Hulme, Manchester	3,393 0 0
Moss, W. T., Stratford	3,340 0 0
MacKay, J., Stoke-on-Trent	3,260 5 10
Minney, G. H., Crewe (accepted)	2,777 12 0
Borough Surveyor's Estimate	£3,634 0 0

CROYDON, SURREY.—For alterations and additions to residence, near Croydon. Messrs. Bernay and Monday, architects:—

Lagg	£953 0 0
Coles	950 0 0
Smith	893 0 0

DEPTFORD, LONDON, S.E.—For erection of new stores at the Deptford Distillery, for Messrs. Holland and Co. Mr. Thomas Dinwiddie, architect:—

Hall	£2,865 0 0
Laing and Sons	2,842 0 0
Holloway	2,810 0 0
Redman	2,700 0 0
Jerrard	2,653 0 0

DEPTFORD.—For erecting a shed and tool-shed in Knott-street, Deptford, for the Greenwich district board of works:—

Lester, Deptford	£232 10 0
Wheeler, Greenwich	165 0 0
Hare, F., Croydon	159 3 0
Harrison, Loampit-hill	155 0 0
Wood, East Greenwich	135 0 0
Chafen, Rotherhithe	130 0 0
Hubble and Trott, Deptford (accepted)	125 10 0

DEPTFORD.—For paving Tresillian-road for the Greenwich district board of works:—
Etheridge, L. (accepted) ... £935 0 0

DULWICH.—For proposed villa, to be erected in Lord-ship-lane, for Mr. J. Henderson. Mr. R. Peters, Wool Exchange, Coleman-street, E.C., architect:—

Downs, B.	£1,430 0 0
Ennor, Julian and Co.,	1,395 0 0
Pierce and Banyard	1,390 0 0
Gillet,	1,350 0 0
Watson (accepted)	1,325 0 0

EDMONTON.—For the erection of schools for 834 children in Bretherton-road, for the School Board for Edmonton. Mr. A. R. Barker, architect. Quantities by Mr. W. B. Brown:—

Patman	£8,356 0 0
Lampreys	8,336 0 0
Killy	7,879 0 0
Dove Bros.	7,625 0 0
Bromwich, Foster and Co.	7,551 0 0
Wall	7,365 0 0
Saw	7,215 0 0
Gardner	7,000 1 0
Tongue (accepted)	6,854 0 0

[Cost of school buildings (including covered playgrounds, walls, outbuildings, and fences), £4,514; total cost per head of school buildings (including covered playgrounds, walls, and outbuildings), £8 3s.]

FARNBOROUGH.—For stables, loose boxes, &c., at the Oak Brewery, Farnborough, Kent, for Messrs. J. Fox and Sons. Mr. G. St. Pierre Harris, architect and surveyor:—

Halsman	£429 0 0
Wood	427 0 0
Wright	424 0 0
Treadwell	387 0 0

FLEETWOOD.—For the erection of the new railway station:—
Gabbott and Son, Liverpool (accepted).

FOVEY, CORNWALL.—For erection and completion of a Masonic lodge at Fovey:—

Littleton, Folperro	£607 0 0
Smith, St. Austell (accepted)	498 0 0
Godfrey, Liskeard	493 0 0

GREAT GRIMSBY.—For filling-in brick pits on the estate of the Right Honourable the Earl of Yarborough, New Clee, Great Grimsby. Messrs. Maughan and Cuxson, London and Great Grimsby, surveyors:—
Simons, C. (accepted).

GREAT CLIFTON, CUMBERLAND.—For erection of an infant school at Great Clifton, for the Great and Little Clifton School Board. Mr. W. G. Scott, William-street, Workington, a architect:—

	Accepted tenders.
	Mason's work:—
Hyde, J., Workington	£753 17 11
Carpenter and joiner:—	
Robinson, P., Cockermouth	229 10 0
Slating:—	
Whitfield, J., Workington	119 0 0
Plumbing and heating:—	
Walker, D. M., Workington	100 10 0
Plastering:—	
Jolley and Perrin, Workington	38 10 0
Framing and glazing:—	
Carmichael, I. E., Workington	31 4 6
	£1,274 12 5

GREAT GRIMSBY.—For paving footways to new roads on the estate of the Right Honourable the Earl of Yarborough, Great Grimsby. Messrs. Maughan and Cuxson, London and Great Grimsby, surveyors:—
Brown, J. (accepted).

GREAT YARMOUTH.—For dredging over 4,000 tons of soil from the River Bure, and depositing the same to fill up disused muckholes. Mr. H. H. Baker, town surveyor:—
Pumfrey, J., Great Yarmouth (accepted) £210 0 0
(Only tender submitted.)

GREENWICH, LONDON, S.E.—For erection of a pair of houses in Burney-street, Greenwich. Mr. T. Dinwiddie, architect:—
Bridel (accepted) ... £1,050 0 0

GREENWICH, LONDON, S.E.—For erection of new inclosure wall at the Greenwich burial-ground, for the Board of Governors and Directors. Mr. T. Dinwiddie, architect:—

Disney	£137 0 0
Bridle	103 0 0
Wood (accepted)	86 0 0

GREENWICH.—For the erection of a school to provide accommodation for 800 children in Nynhead-street, Clifton-road, Greenwich, for the London School Board. Mr. E. R. Robson, F.S.A., architect to the board:—

Higgs and Hull	£9,500 0 0
Atherton and Latta	9,450 0 0
Tongue, W.	9,319 0 0
Grover, J.	9,236 0 0
Chappell, J. T.	9,277 0 0
Kirk and Randall	9,215 0 0
Jerrard, S. J., Lewisham (accepted)	9,193 0 0

[Cost of site (area 32,670 square feet), £3,479; (a) cost of school buildings only, including closets, £9,735; (b) cost of tar pavement and playground, £1,937; (c) cost of boundary walls and gates, £918; (d) cost of teachers' rooms, £500; (e) cost of schoolkeeper's house, £350; special expenditure chargeable to site:—(a) special extra depth of foundations, £337; total, £9,193; cost per head of £28s. 4d.; total cost per head, £118s. 18d.]

HAGGARD.—For competition plans, with estimates, for stone or iron bridge over the Wear, at Haggard, near Lastgate, for the Weardale District Highway Board:—

Stone	
Evans, T. D., South Shields	£1,230 0 0
Munro, D., New Shildon	1,194 0 0
Lee, T., Side Foot	210 0 0

Iron	
Iyall, D. C.E., Darlington (accepted)	£81 7 3
Wear Valley Works, Darlington	600 0 0
Bainbridge, T., Stanhope	480 0 0

HAMPSTEAD, N.W.—For sewers and roads on the west side of Sir Spencer Wilson's estate, Hampstead. Messrs. Farebrother, Ellis, Clark and Co., surveyors:—

Anderson	£1,672 0 0
Wilson	1,430 0 0
Maxwell	4,434 0 0
Culverhouse, A. and F.	4,290 0 0
Noswell and Robson	4,018 0 0
Watts	3,752 0 0
Killingback	3,195 0 0

HARDEN, BIRMINGHAM.—For erection of school in Bearwood-road, for the Harborne and Smethwick School Board:—

Harley and Son (accepted)	£1,293 0 0
---------------------------	------------

HECKMONDWIRE, YORKS.—For levelling, flagging, paving, kerbing, channelling, and repairing Blanke Hall-street, for the Local Board. Mr. T. Gledhill, surveyor:—

Parkin, W. H., Ravensthorpe	£290 0 0
(Three other tenders received)	
* Accepted.	

HORNSEY ROAD, N.—For lowering, widening, sewerage, metalling, &c., a portion of Shepherd's Hall-road for the Hornsey Local Board. Mr. T. De Courcy Meade, surveyor:—

Walker, Upper Holloway	£2,879 0 0
Meston, J. E.	1,450 0 0
Pizzey	1,397 0 0
Dunmore	1,389 0 0
McKenzie, Williams, and Co.	1,338 0 0
Strachan and Co.	1,250 19 4
Rowley, T.	1,220 0 0
Randall and McDowell (accepted)	1,160 0 0

HULL.—For supplying and fixing heating apparatus in Charterhouse-lane school, for the Hull School Board:—

Parkin and Son (accepted)	£238 12 8
---------------------------	-----------

HULL.—For supplying furniture and fittings to the Chart-house School, for the Hull School Board:—

Dickinson, T., Driffield (accepted)	£129 0 0
-------------------------------------	----------

HULL.—For erection of a building in Blanket-row, Hull. Mr. B. S. Jacobs, Lincoln's Inn-buildings, Bowland-lane, Hull, architect:—

Pearson, R., Grey-street	£307 19 10
Habbershaw and Son, West-parade	285 4 6
Stanley, A. W., Midland-street	285 0 0
Hockney and Liggins, Witham	281 8 0
Brown, A., Princess-street	275 18 0
Southern, T., Wright-street	257 8 0
Garbutt, J. W., Heale-road	250 0 0
Goates, A., Beverley-road	250 0 0
Harper, M., Freehold-street, Hull	246 0 0

* Accepted.

ISLEWORTH.—For erection of a villa at Isleworth. Mr. C. F. Fenton, 41, Orbel-road, Surrey-lane, Battersea, S.W., architect:—

Warr, F., Croydon	£566 0 0
Beauchamp, T., Brentford Road	554 0 0
Barnes, R. P., Chiswick	517 0 0
Hiscock, T., Hounslow	191 0 0
Sagdeh, R., Egham	427 0 0
Prentice, W. B., Shepherd's Bush	390 0 0

* Accepted.

LEICESTER.—For construction of shed (38 yards long and 14 yards span), with iron columns, retaining wall, &c., at the Cattle Market Siding, Leicester. Mr. J. Gordon, borough surveyor:—

Hutchinson and Son, Leicester	£1,098 0 0
-------------------------------	------------

* Accepted.

LEWISHAM, LONDON, S.E.—For new Mission Church, Albion-road, Lewisham:—

Collins and Sons	£3,678 0 0
Holland and Haugen	3,611 0 0
Jerrard	3,571 0 0
Gold and Sons	3,563 0 0
Blake	3,555 0 0
Barry and Co.	3,485 0 0
Patman and Fotheringham	3,375 0 0
Havell	3,320 0 0

LODO, CORNWALL.—For the extension of the quay at West Looe, for the Looe Harbour commissioners:—

Finch, T. (accepted)	
----------------------	--

[Lowest of three tenders received.]

LEYTON.—For the enlargement of the Hatrow Green schools, Leyton, Essex, for the Leyton School Board. Mr. J. T. Newman, architect. Quantities supplied by Messrs. R. L. Curtis and Sons:—

Hoskings, J. G.	£1,645 0 0
Reed, J. A.	1,623 0 0
Morter, J.	1,593 0 0
Hearle and Son	1,523 0 0
Caines	1,415 0 0
Airler	1,429 0 0
North Bros.	1,365 0 0
Reed, A.	1,360 0 0

LONDON.—For Messrs. Spicer Bros. warehouses, King Edward-street, Blackfriars, E.C. Mr. R. Roberts, architect. Quantities supplied by architect:—

Wheeler	£27,421 0 0
Woodbridge	22,700 0 0
Parker	22,171 0 0
Young, Cochrane and Co.	22,090 0 0
Martin, Wells and Co.	21,965 0 0
Brinley and Son	21,848 0 0
Spencer and Co.	21,825 0 0
Marshall	21,866 0 0
Saley and Co.	21,350 0 0
Crockett	21,321 0 0
Staines and Son	21,281 0 0
Tyerman	21,185 0 0
Jones, E. C. and Co.	21,072 0 0
Saule Bros.	21,000 0 0
Batley	20,492 0 0
Kelby	20,389 0 0
Hart, H.	20,373 0 0
Morley	20,557 0 0
Pack Bros.	20,511 0 0
Grover	20,389 0 0
Kirk and Randall	20,365 0 0
Stephens and Bastow	20,069 0 0
Perry and Co.	19,987 0 0
Roberts, L. H. and R.	19,977 0 0
Shumair	19,911 0 0
Higgs and Hill	19,949 0 0
Peto Bros.	19,735 0 0
Chappell	19,687 0 0
Wall, C.	19,510 0 0
Gregor	19,174 0 0
Nightingale	19,433 0 0
Richardson	18,990 0 0
Rider and Son	18,888 0 0
Ireson	18,492 0 0
Reading, C.	18,888 0 0
Craker	18,828 0 0
Asby and Horner	18,600 0 0
Shaw, G.	18,103 0 0
Gentry, M.	17,990 0 0

LONDON, W.—For alterations and additions to 5, Wimpole-street and Harley-mews. Mr. A. E. Hughes, architect. No quantities supplied:—

McLachlan and Sons	£2,770 0 0
Shupson and Sons	2,620 0 0
Williams and Sons	2,515 0 0
Downs	2,217 0 0

LONDON, W.—For repairs, &c., to 27 and 27a, Skeville-street. Mr. Wimperis, architect. Quantities supplied:—

Curtis	£1,218 0 0
Patrick and sons	1,215 0 0
Scrivenor and Co.	1,199 0 0
Fish	1,174 0 0
McLachlan and Sons	1,134 0 0
Langmead and Way	1,017 0 0
Hatfield and Sons	960 0 0

LOUGHBOROUGH.—For supplying the board with 2000 tons of broken granite:—Ellis and Everard, X 8s. per ton at Loughborough Station; XX 8s. 6d. per ton at the station—Mountsorrel Granite Co., X 5s. 6d. and XX 6s. 6d. per ton at the station; at the Quarries X 4s. 6d. and XX 5s. 6d. per ton—Charnwood Granite Co., X 6s. 6d. and XX 7s. 2d. per ton delivered at Loughborough, where required for spreading; X 5s. and XX 5s. 6d. per ton at the Quarries—Eliza Cook, Loughborough, X 4s. 8d. and XX 5s. 8d., delivered at Loughborough Wharf—Robert Sh-rwin, Loughborough, X 4s. 8d. and XX 5s. 8d. at Loughborough Wharf. The tender of the Charnwood Granite Co. was accepted for 1,000 tons, and that of Mr. R. Sherwin for the remainder, providing that the latter would enter into a contract to supply stone of the same quality as the samples of the Mountsorrel granite before the board.

MARKET HARBOUR.—For construction of nine miles of earthenware pipe sewers from 6in. to 24in. diameter, for the Local Board. Mr. E. G. Mawbey, engineer, Corn Exchange, Market Harborough:—

Ottaway, Oxford	£21,135 0 0
Ward, Leicester	19,071 0 0
Noswell, London	18,056 0 0
Dovener, Burton-on-Trent	16,394 0 0
Rowles, Acton	15,829 0 0
Neave, London	15,829 0 0
Walker and Co., London	15,771 0 0
Hill Bros., Beckenham	15,712 0 0
McKenzie, Williams, and Co., London	15,471 0 0
Smith, London	15,245 0 0
Nelson and Co., York	15,000 0 0
Botterill, London	14,989 0 0
Palmer, Birmingham	14,718 0 0
Siddons and Sons, Oundle	14,689 0 0
Cordon, Nottingham	14,245 0 0
Fawkes, Bros., Southampton	14,070 0 0
Curral & Lewis, Birmingham	13,294 0 0
Hunter, London	13,665 0 0
Lt. Kidderminster	12,905 0 0
Barlow, Rothwell	12,891 0 0
Smart, Nottingham	12,806 0 0
Fotherby and Sons, Burnley	12,776 0 0
Bottoms Bros., London	12,340 0 0
Holland, Leicester	12,268 0 0
Musgrave, Hull	12,186 0 0
Stevenson, Ekeington, Chesterfield (accepted)	11,650 0 0

Engineer's estimate, £12,065.

MANCHESTER.—For alterations to two houses in Moseley-street, Manchester, for Mr. W. Roberts, Messrs. Tate and Poplewell, 20, Cooper-street, Manchester, architects. Quantities supplied:—

Gerrard, Swinton (accepted)	£1,112 0 0
-----------------------------	------------

MARLBOROUGH.—For the enlargement of Manchester street School by 300 places, for the London School Board. Mr. E. R. Robson, F.S.A., architect to the board:—

Oldrey, Wm. (accepted)	£1,574 0 0
------------------------	------------

[a) Cost of enlargement, including closets, £1,814. Special expenditure chargeable to site:—(b) extra foundations, £60; total, £1,874; cost per head, £6 4s. 11d.]

MATLOCK.—For erection of a footbridge in Dale road for the Matlock Bridge Local Board:—

Goddard and Massey, Nottingham (accepted)	£350 0 0
---	----------

METHUEN.—For alterations and repairs at the Free Church, Methuen. Mr. Clark, Methuen, architect:—

Accepted tenders.

Mason's work:—Davidson, W., Aberdeen.

Carpenter's work:—Webster, J., Aberdeen.

Painter's work:—Mason, J., and Son, Aberdeen.

Heating work:—Taylor, J., Aberdeen.

Total, £300.

METHUEN.—For additions to public school at Methuen, with shelter sheds. Mr. W. Clark, Methuen, architect:—

Accepted tenders.

Mason's work:—Davidson, W., Aberdeen.

Carpenter's work:—Webster, J., Aberdeen.

Slater's and plumber's work:—Ewan, G., Aberdeen.

Master's work:—Hutchinson, J., and J., Aberdeen.

Total, £361 8s.

MIDDLESBROUGH.—For alterations at Gunnergate Hall, near Middlesbrough. Mr. W. H. Blesley, Middlesbrough, architect. Quantities supplied:—

Painter's work:—

Taylor	£117 15 0
Lewis and Scott	115 0 0
Westgarth	88 10 0

Other trades:—

Sturdy Bros.	476 0 0
Johnson	470 0 0
Allison Bros. (accepted)	463 10 0

MIDDLESBROUGH.—For forming inclosure round the Bolekew Memorial at Middlesbrough. Mr. W. H. Blesley, architect:—

Stonework (exclusive of granite kerb):—

Fidler	£155 0 0
Lord (accepted)	141 15 0

Iron railing:—

Macfarlane and Co., Glasgow	101 10 0
Handyside & Co. (Limited), Derby	90 0 0

* Accepted.

MILLWALL.—For extensions of factory, for Mr. J. T. Morton, under the superintendence of Mr. W. Eve, 10, Union-court, Old Broad-street, E.C. Quantities supplied:—

Boyce	£18,773 0 0
Nightingale	1,772 0 0
Crabb	1,761 0 0
Monter	1,759 0 0
Nabett	1,750 0 0
Hall, Beddall and Co.	1,719 0 0
Abraham	1,697 0 0
Macey	1,616 0 0
Lawrence	1,579 0 0
Harris and Wardrop	1,571 0 0
Crisp and Tomlin	1,517 0 0
Shumair	1,485 0 0
Salt, Lincoln (accepted)	1,472 0 0

MORESBY, CUMBERLAND.—For erection of school and master's house at Moresby Park. Mr. W. Carmichael, architect. Quantities by the architect:—

Accepted tenders.

Mason's work:—

Davidson and Son	£782 0 0
------------------	----------

Joiner's work:—

Shaw	350 4 7
------	---------

Slater:—

Tyson	119 7 10
-------	----------

Plasterer:—

Tyson	86 2 0
-------	--------

Plumber:—

Stannern	83 10 0
----------	---------

Ironmonger:—

Hardle	78 15 6
--------	---------

Painter:—

McCorm	37 8 9
--------	--------

Total, £1,537 8 8

NEWPORT, MON.—For constructing a sewer in Bridge street, for the town council:—

Francis, J.	£625 0 0
Blackburn, W.	500 0 0

(Borough surveyor's estimate, £647.)

* Accepted as amended, on account of error, to £514.

NEWPORT, MON.—For the paving of Rapera-street, for the town council:—

Francis, J.	£78 0 0
Cox, H. (accepted)	74 11 0

(Borough surveyor's estimate, £74 11s.)

NEWPORT, MON.—For the improvement of Temple-street, for the town council:—

Cox, H.	£201 10 0
Francis, J. (accepted)	285 0 0

(Borough surveyor's estimate, £290.)

NORTHAMPTON.—For erection of a disinfecting-room at the Urban Sanitary Authority's yard in Scarletwell-street, Northampton:—

Heap, G., jun., Northampton	£97 0 0
Woodford and Son, Northampton	94 0 0
Wingrove, J. T., Northampton	82 4 0
Law, J., Northampton	79 4 0
Fisher Bros., Northampton (accepted)	77 0 0

[For remainder of TENDERS see page XVI.]

THE BUILDING NEWS.

LONDON, FRIDAY, OCTOBER 21, 1881.

GALE-PROOF ARCHITECTURE.

THE recent gale, the destructive fury of which has left its marks of havoc in nearly every town in the United Kingdom, affords a lesson to builders. In the records of the damage done on land we find evidences of a nature to show that where the full force of the wind was unimpeded every conceivable form of destruction ensued. Not only were the lighter kinds of erection overthrown with considerable violence by the hurricane, their fall doing damage of a serious kind, but we hear of thick walls being blown down, chimney-shafts overturned or seriously affected, shop-fronts blown in, and roofs dislodged or lifted off the buildings they covered. Sheltered streets fared no better than open districts in many instances, for wherever the wind found a channel for its force the effect was intensified. Wind as an agent is often neglected by the architect and engineer in their calculations. The recent Tay Bridge examination undoubtedly pointed to a structure which had been designed without any reference to a pressure such as that which overturned it. Engineers are accustomed to look upon a hurricane in this country as such a natural phenomenon as to conclude apparently that they may ignore it altogether so long as they provide for a pressure equal to from 50lb. to 55lb. on the square foot. But a lower figure has been usually adopted, the consequence being that when we get a gale such as we had last Friday, and the force of which amounted to nearly 60lb. on the square foot, many buildings could no longer stand before it. But what may be learnt as well from the accidents of last week is, that in nearly every building there are a number of points quite powerless to withstand a sudden gust or pressure of wind. The accounts which have reached us show that chimney-pots and stacks and loose slates are not the only things liable to be dislodged. Roofs have been lifted from walls, and, in some instances, carried bodily away; roof-coverings have suffered in a more general manner by the wind finding an entrance beneath, tearing them up and scattering the slates or tiles like so many cards. Lead or zinc roofs are quite as liable to this disturbance as those of slates or tiles, for the wind in many instances we know of has torn the sheets up and blown them away like thin pieces of paper. Being impervious, any wind which finds an unguarded joint or flashing enters and rips up the sheets, its action being like that of a wedge. We have seen dormer roofs completely uncovered in this manner, showing the importance of taking care that edges are well turned down or secured. Verandahs on the windward side of houses are common objects of wreckage; in several cases the roofs have been torn off their supports, being simply lifted by force, owing to the wind accumulating under them with no outlet for its energy. In many more instances the zinc coverings have been torn off or left partially hanging like so many shreds of paper, or boarding and rafters broken up like so much tinder. Destruction of this kind, experienced in numerous instances, affords ample testimony to the insufficient strength of architectural structures, and ought to make architects more careful in securing the plates of their roofs to the walls or pillars, in seeing that rafters are properly spiked at the ends, and in providing in all exposed positions where

flat pitches are used extra means of keeping down the rafters and plates by straps of iron or screw-bolts. It is almost inviting destruction to leave flat roofs trusting to their bare weight resting on a wall-plate without the slightest tie. Where windows have been left open the force of the gale has been known to blow out the walls or raise the roof bodily. Many railway-sheds, vestibules, and station-roofs have suffered from the wind of last week owing to a wedge-like or expansive force such as we refer to. The weight and extra precaution taken to wind-brace roofs of this kind have made some of them secure against sudden attacks, though we question if all railway roofs are quite safe in case of a hurricane or a sudden gust of wind entering them at the end.

Walls, as well as roofs, have been seriously shaken and damaged; we hear of many houses having been partially destroyed, and of walls having been blown down. Such accidents certainly need not occur if the most ordinary precautions are taken; but they are not. We see houses built every day with parapets which a pressure of half that of the gale of Friday last might bring down; gable ends only half a brick thick, and chimney-stacks of such height and width that they must fall if pressure on their flat surfaces of a few pounds to the foot is suddenly experienced.

Not a few disasters were due to windows and shop-fronts having been blown clean inwards. In one case in the City a front was blown in, to the danger of those in the shop, and several similar accidents have been recorded. It is quite evident that builders and shop-front fitters neglect to look after the secure fixing of their wood frames and plate-glass. Happily, wind does not often blow directly against a shop-front, or many large sheets of plate-glass would be blown in at the risk of those near. At least the fact of two or three fronts having been blown in, points to the necessity of fixing laterally by ironwork, and not merely blocking up, the frames of such windows, and of making the rebates in the bars deep enough to take the glass, and to allow of a fillet to be screwed on. The bars or mullions themselves are generally much too small in section to resist a cross strain; and there, also, some care should be taken. A light cast-iron stanchion, placed edgewise and perforated, is almost a necessity in lofty fronts, and these ought to be well fixed to the bressumer, and, indeed, might be made to render it some support. Casements are also dangerous, and householders ought to see that they are securely hung, and admit of secure fastenings; guttering, zinc-work, and finials need also constant attention, repair, and painting, if they are not to become dangerous appendages in time of strong winds. The rules for calculating the effects of wind upon structures are simple, and, if not well known, can be acquired by reference to any good textbook. It is hardly necessary to inform the reader that the whole surface of a flat wall is exposed to a pressure equal to the extreme wind-force multiplied by the number of square feet the wall contains, and that the greatest effect of that accumulated pressure acts at a point near its geometrical centre. When this has been obtained, it will be seen how powerful a force is brought to bear against a building, or its weakest points, which, if they were not stiffened by floors and other means, would be enough to blow in or destroy many walls which are still standing. An ordinary window is exposed to a pressure of about 1,500lb., under such a wind as we had the other day, and this pressure acts in its centre. Can we wonder when we hear of innumerable windows having been blown in? Rotten or insecure beads give way, or the whole frame loosened from the brickwork by constant shaking, or through decay or shrinkage, is blown in-

wards. We have said enough, however. Architects and engineers, are responsible to the public for the safety of their buildings and are looked to for the exercise of skill and care not only in large, but small matters. Wind-pressure of unusual violence is certainly a subject for more serious consideration than it receives, and those who have the designing and construction of buildings, ought not to ignore the power of a hurricane because it happens to be of uncommon occurrence in this latitude.

DOMESTIC FITTINGS AND FINISHES.

FEW things contribute more to the completeness, convenience, and comfort of a house than those small finishes which make up the trades of the plasterer, joiner, ironmonger, and decorator, in the usual specification. Yet, oddly, they are frequently left as a margin in the contractor's bill, by which he often manages to recoup himself for extras and omissions. What with the sums allowed for grates, ironmongery, door-furniture, and the other odds and ends of a house, the builder can often make a little profit by substituting inferior articles for those specified or priced out. Some contractors manage to take advantage of these little things, and, in so doing, the house is spoilt. How often, for instance, a little apathy and indifference on the part of the architect becomes a source of gain to a builder in such matters as door furniture, window-fastenings, details of joinery and plastering, &c. Architrave mouldings and cornices of a certain girth are specified, or they are to be worked to detail drawings supplied; but pressure of business or indifference supervenes, and advantage is taken of introducing mouldings of a very inferior character, or fastenings of the cheapest description. The builder has the happy knack of talking over his employer or architect at the right moment, and of telling him that he has some cornice moulds of the exact girth and design, or some kind of fitting which will answer perfectly; the innovation is promptly made, and the architect soon becomes aware that his compliance has cost dearly, and that the builder has misplaced the confidence reposed in him. It is rather of the value and use of details or "trimmings," as they are sometimes called, that we now speak. Who has not observed the meanness and penurious appearance of a large room without a cornice? It may even be well furnished, and its walls adorned with pictures; yet it has a niggardly and unhandsome look. Can we imagine one without a skirting? Such a room would not only appear mean, but it would be incomplete and uncomfortable. No carpet or furniture, however costly or artistic, can make amends for the want of this fundamental finish to the walls of a room. We do not see many well-built houses without these details, but we often find otherwise expensive residences spoilt by poor apologies for them. To take the ground-floor of a few suburban villas, there is a spacious vestibule and hall, but a small insignificant torus-skirting is put round, and the architrave mouldings of entrance doorway and reception-rooms are small, and were never intended for the position they occupy. Instead of being bold and more massive than the architrave mouldings round the doors of the reception-rooms, we find they are worked from the same plane, and the eye, if not the mind, is at once struck with a sense of disproportion. The same mouldings prevail in all the rooms: we find the morning-room with a cornice as large and bold as that in the dining-room; the doors are finished in the like style. It is one of the consequences of machine labour and steam mouldings, that

a saving builder will make one moulding and one pattern do for all the rooms.

In large buildings the value of multiple features like the same size of window and door-frames, and the same set of mouldings throughout cannot be doubted—a great saving is effected thereby; but the principle can be carried too far, to the sacrifice of appropriateness and artistic meaning. It is not uncommon to find a heavy cornice in a small room, dwarfing by its size everything else; or a small cornice in a large apartment. The eye instantly detects a want of fitness in such a disregard for scale, and we feel that every room is but a multiplication of the same details. It was not so in those periods of art we take for our guidance: every room was ordered by its size and height, and a general scale of proportion regulated by the height of the order, and the purpose of the apartment was adopted. Such a discernment at once shows a method in art, and that each part of a house has been regulated by some principle founded on common-sense and fitness. Architects, nowadays, seldom study the interior effects of their houses, and, except for decorative purposes, it is not usual to make elevations of the principal apartments and entrance-hall. Houses of a certain class are turned out from a plan, and perhaps a single elevation of the front; a kind of conventional treatment is adopted inside, which is left to the mercy of the builder. Can we wonder at the result of this kind of house evolution? A regulation interior is the consequence, with all the defects we have hinted at above. A few marginal sketches of moulding in the specification may be useful, if builders can be made to observe them, though even details to scale are not always scrupulously followed, unless careful supervision of the joinery and other details is made.

The selection of chimney-pieces, door and window furniture, and paper-hangings are almost of greater importance than the skirtings, cornices, and architraves. The chimney-pieces are generally priced out at a lump sum, or reserved, to be chosen by the employer or the architect; this reservation, however, as a rule, means simply that the builder shall not put in inferior goods. Good taste is out of the question, so long as the marble mason of Euston or Edgeware-roads is consulted, and it is not an unusual thing to find that a Gothic designed house has been fitted with marble chimney-pieces of purely "Classical" taste, with columns, entablatures, and all. Gothickesque, or non-descript kinds of chimney-pieces are the most pernicious forms the architect intrusted with small means has to contend against, for such articles are frequently left to the caprice of the wife of the employer, with consequences often very painful to dwell upon. A fancy or variegated marble is the chief recommendation, and plenty of carving or tiles in the jambs and mantel. The manufacturers of so-called art chimney-pieces have to indulge this taste, and we cannot wonder when we see at exhibitions designs after Mr. Talbert or Mr. Norman Shaw, which would shock any disciple of the schools of which those artists are the reputed leaders. With regard to over-mantels and sideboards, the most atrocious imitations of Gothickesque and "Queen Anne" find their way into houses which have been designed, or rather planned, by architects, but of which they never see the completion.

In the selection of door and window furniture, Brummagen manufactures are preferred; the door knobs, finger-plates, bell levers, and fastenings being of the commonest description, and in the worst possible taste. Imagine a house designed after the 17th-century style, with painted china or gilt knobs, and finger-plates to the doors, and yet such houses may be seen by

the dozens in the suburbs. It is less easy now to choose atrociously bad papers than it was 20 years ago, yet there is a redundancy of feeble imitations which have sprung up since the introduction of the recent schools of decoration, and we may do well to caution architects against specifying a certain manufacturer's paper without seeing that it is procured for at least the principal rooms. The mistakes made in selection of such fittings and decorations as we have pointed out are sufficient to upset, from an art point of view, the architectural design of a house; for if correct principles guide the designer in the arrangement and proportions of the rooms and elevations, it is more necessary that correctness and good taste should follow to the minor appointments, and pervade the details of the interior. It is hardly conceivable that people paper houses in the Italian style with Gothic patterns, or buy furniture of a modern, flashy kind for rooms after Queen Anne taste; but the fact remains, and is one worthy the attention of a social science meeting.

It is in these, if we so call them, minor art matters our French and Continental neighbours beat us. The English builder or tenant of the middle class regards them as trivial and unworthy of attention; and yet he feels their quiet influence at home. Well-fitting bolts and fastenings contribute tangibly to one's convenience and comfort. Why should not their design be regulated by common principles, and instead of being bedizened with flowers and meaningless ornament, made to agree with those ideas of utility which have invariably become the foundation of good taste?

THE TURNERS' EXHIBITION.

THE yearly competition among turners and others, for the silver medal and Freedom of the Company, and other prizes offered by the Worshipful Company of Turners, which has just taken place, increases in interest, and the exhibition at the Mansion House, last week, drew a great many visitors and connoisseurs. Something is due to the master, wardens, and hon. secretary of the Company, for the public spirit they have shown in thus exhibiting the works submitted, and the result of these annual displays is already evident in the improved taste and workmanship. The competition in wood is particularly meritorious, and shows many qualities which were almost absent in previous years. One of these is the improvement in design, the fitness of the work for the proposed end. The judges in this department have shown some discretion in their selection, and, on the whole, few will be disposed to find fault. Turning is an art in which a great deal depends on technical qualities and dexterous manipulation, hence these merits have in former competitions unduly influenced the selection. We do not find this time that such consideration has exercised so great an influence, and it may be generally observed that artistic merits have had weight.

The first prize, the silver medal and freedom of the company and of the City of London, has been awarded to J. S. Coulson, Kirkgate, Thirsk, the winner of the bronze medal last year, for four turned vases in acacia and purple-wood. The shape of the vase is well proportioned, and of pleasing outline; the body is of an ovoid shape, and as an example of symmetry and exactness of copying, there are certainly no specimens which can compete with it. The author satisfies all the requirements of the company in these respects. The most noticeable point in the production of these vases is the ingenious manner in which the artist has availed himself of the technical re-

sources of his art. The body of each vase has been turned out of the solid acacia, the square block appears to have been overlaid with slices of purple-wood, &c., and the whole being turned to an oval shape, the purple-wood has assumed the form of elliptical or oval rings, which in their shorter axes do not quite touch each other. Thus the body presents four ovoidal-shaped rings of a darker wood enclosing small panels of intersecting circles in the centre of each—a very simple and artistic kind of ornamentation, produced entirely by the lathe, and resembling inlaid work of the most perfect and exquisitely-finished kind. The neck and mouth, as well as the stem and base, are relieved by small discs of lighter wood, similarly formed by the lathe, producing in one case circular dots where they have been cut at right angles and oval forms on the splayed face of base where the circular pieces have been cut obliquely. These vases surpass those of the same competitor last year in artistic form and finish.

The second prize—bronze medal and four vols. of Holtzapffel's "Turning," is won by Mr. F. Nickolay, of Russell-street, Haymarket (who took the first prize last year), for a pair of paraffin-lamp stands and a pair of ewers to match, in ebony and a light hardwood. The design and execution are both creditable to the artist; the shape of the lamp base is appropriate, and the ornament is confined to simple and effective means of relief. The third prize (first certificate of merit and four guineas) is given to Thomas Macdonald, Millwall, for a rosewood vase, with dish and a pair of vases, relieved by white inlays and chequerwork. The principal vase is adapted for trinkets; the body is well shaped, with side handles, which join the upper dish-shaped receptacle. W. Kilminster, of Omega-place, N.W., receives the fourth prize (a certificate of merit and three guineas, &c.) for a pair of satin-wood vases on ebony bases, shaped to an octagonal form, the sides being turned or hollowed by the lathe. Both in outline, symmetry of shape, and novelty of design, these vases reflect credit on the artist. There are seven other prizes for work of more or less merit. Among these designs we notice a pair of vases, turned in pine, by ordinary lathe without rest, with slender stems, but of elegant shape. The artist obtains the seventh prize. A pair of grey ebony vases, inlaid with tulip-wood, boxwood on ebony and pitch-pine pedestals, are worth mention in this class for elegance of shape; also an inkstand and pair of candlesticks in pitch-pine and ebony, relieved by ivory and red-wood inlays. A pair of cups and vase in ebony, with carved applied figures of gladiators, were among the exhibits claiming attention, not so much for novelty of design as being exact copies from a Roman cup in the Guildhall Museum.

As clever pieces of mechanical manipulation, we may draw attention to a pair of cigar-stands, with spill-cups and ash-trays, in ebony and sycamore, the whole being turned; an ornamental stand, also entirely the work of the lathe, except the spiral stem of a basket at the top, relieved by inlaid work; a pair of twisted-stem candlesticks, and a flower-stand of ebony and ivory, with a centre stem, supported on three lower pillars, connected by arched buttress-like pieces. A rather heavy design for a jewel casket, temple-like in form, exhibits skilful turning but is poor as a conception of fitness of design. The Company has received several works from amateurs in the art, and Mr. Samuel Morley, M.P., and others have enabled the master and wardens to increase their prizes in this direction. In this class we notice, on a side-table, several specimens of wood-turning. The first prize is given to L.

Lewis, of Mile End, for a tankard in ivory, of considerable merit. We notice also some well turned and carved balusters, under the motto "Nec Aspero Terrent," and a clock-case of walnut, relieved by brass mounts. J. Satchell, of Watford, Herts; R. V. Burbidge, Coventry; and W. H. Payton, Hoxton, receive prizes in this department.

In the class of Pottery, the judges include the names of J. J. Holtzapffel, C.E.; Horace Jones, City architect; C. F. Newton, C.B. (British Museum), Geo. Wallis, F.S.A. (of the South Kensington Museum); and the first prize (Freedom of the company and of the City, &c.) has been awarded to Alfred Dupuis, Prince's-road, Lambeth, for some vases thrown on the wheel in one piece, without joints, and not afterwards shaved or turned. In form the pottery is creditable to the artist, and the execution leaves nothing to be desired. The other successful competitors in class A are Thos. Ellis, of Vauxhall-road, who obtains the bronze medal for a vase of ovoidal shape; W. Bolton (first certificate of merit), Battersea, and H. Bryon, Clapham-road. The silver medal in the next class goes to Henry Hollins, of Bromley-by-Bow, for a large terra-cotta vase, rather lumpy in form, but executed in accordance with the condition that the throwing and turning were both to be the work of the same person. Thomas Blyth, of Vauxhall, takes the bronze medal, A. Dupuis (Lambeth) the third prize, and H. Mashman, of the same parish, the fourth. In class C, in which the condition required that the pottery was to be turned or shaved, ornamented by hand-tool or incised, and glazed or coloured, Thomas Colbeck, St. Mary Church, South Devon, is the winner of the silver medal. The bronze medal goes to Marshall Watson, of the same place, for a red terra-cotta epergne. The above are the principal winners of prizes; but these classes of pottery have a higher interest for the general observer. Apart from execution, these examples of fictile skill show us a variety of types of plastic design from coarse copies to Greek elegance. Several white and buff-coloured terra-cotta vases may be mentioned, the bodies of which are of ovoid shape, but the proportions are not pleasing in all. We noticed a pair of red terra-cotta vases, of Greek form, with handles, in Class C. "Cœur de Lion" is the motto of some large vases of rather heavy outline, while one of the prize works (W. Millard's) shows a very small base.

The competition in metal is not large. The qualities required are truthfulness in turning, and accuracy in fitting and finish. Pure hand-turning is preferred to the use of the slide-rest, and accurate copying and elegance in form are demanded. The judges in metal included Sir Henry Bessemer, C. H. Gregory, C.M.G., Col. W. Haywood, and R. P. Williams. We find the first prize has been given to A. E. Nelson, Canonbury, for a pair of flattening-rolls for flattening pendulum spring wire, the work being turned with a diamond. The bronze medal has been gained by H. A. Alexander, Camberwell-road, for a hall joint, showing accuracy in fitting and finish. The third prize, won by C. J. Barber, Fitzroy-square, is for a tazza vase in brass; the fourth prize (Stephen Davall, Essex-road) is for a pair of pedestals, surmounted by birds; and another contribution is a pair of library branched candlesticks, the separate pieces of which are all turned in brass. We notice also a new compensation-balance for a chronometer, in which the compensation is managed in a more simple and economical method. It is a noteworthy fact, that many of the successful competitors in wood-turning last year have again won prizes. We have already mentioned the names of the first and second prize-winners, who have changed

places this time. T. Macdonald, the third-prize winner, takes this year the same prize, while W. Kilminster, who won the fifth prize last year, takes the fourth. We also notice the names, in this year's list of successful competitors, of two or three other artists whose works have been conspicuous on former occasions. We do not see any examples of intaglio engraving and stone cutting, like the collection exhibited last year, and the horological specimens are absent.

DANGEROUS CHIMNEYS.

THE gale of Friday last developed, among others to which we have more generally referred elsewhere, a danger not hitherto regarded as one of a very serious or alarming character. In the account of accidents caused by this unusually early and severe storm, a considerable portion of the casualties (at least so far as the land is concerned) was due to the fall of chimneys. There is in the metropolis a comparative paucity of industries requiring the aid of lofty shafts to encourage and assist in the combustion of fuel for generating steam; and we are, therefore, the more surprised at the extent and character of the recent disasters in that direction. In the great manufacturing centres of Lancashire and Yorkshire, much attention is given to the construction of the high chimneys, which occupy an important position, for without their aid steam could not be forthcoming, and the industries dependent in its potent agency would speedily collapse. Hence the care bestowed on the erection of these lofty "stalks," their construction being confided to special workmen, who deftly rear them up, producing some of the best examples of brick construction in the country. The Lancashire chimney builder does all the work of construction "overhand," operating from foot-holes inside the stalk, up which all the materials are hoisted. The best and most general form of these excellent chimneys is circular, thus securing not only facility of construction, but a capacity to withstand external pressure during storms. The two well-known high chimneys at Glasgow were built to overcome the damages caused from the outflow of deleterious gases in the extensive chemical works of which they now form an important and indispensable adjunct. These great chimneys are highly creditable examples of brick construction, exceeding in their height St. Paul's, and may be regarded as creditable monuments to the industrial enterprise which led to their construction.

Chimneys so circumstanced suffer but little damage from the most violent gales, and when an exceptional disaster takes place, its cause is generally traceable to defective foundations or a too hurried uprearing of the superstructure. Small chimneys, whose functions being of limited character, are, generally speaking, built up in the most hurried and careless manner, and in such positions as to render them specially liable to the damaging influences of sudden and violent gusts of wind. Not less dangerous, and perhaps more subject to disaster, are the slender and attenuated chimneys of the dwelling-house, which, owing to the obtuseness or indifference of the architect, are placed in all positions in and around the modern villa. Central stalks or chimneys are not now much the fashion, although past experience proves they best provide against many of the inconveniences resulting from back-draughts and their inseparable accompaniments of smoke. Many a well-constructed grate and fireplace is blamed for inefficiency where the true cause of their faulty action is due to damp and cold flues in external and badly-clothed chimneys. To maintain the true action of a chimney-shaft of any kind it is necessary that it should be

protected against weather-dangers, or, in other words, built with sound and non-absorptive materials, and thus rendered capable of resisting the insidious influences produced by abnormal gales or rainfalls.

Although, unfortunately, the late gale caused much damage to many fair to look at chimneys, the "pots" also, in a greater degree even, helped to swell the long list of disaster and death. The chimney-pot proper receives but scant attention in the metropolis, from its being regarded as a matter of little import, its shape and capacity being left to the whim or caprice of the bricklayer. This question is not so treated in such cities as Glasgow and Edinburgh, where special provision is made on the roofs of the houses, commanding ready access to the chimney shafts for the purposes of reparation, or other necessary attention, to what is regarded in the North as an important part of the building. Chimney-pots are looked upon as ornamental factors in the scheme of London house-building, and, from their variety and grotesqueness, it would appear as if some artistic efforts had been applied to their design and fabrication. Their prominent position, stuck or placed on the top of a brick stalk, is frequently ludicrous; but the smile which their appearance is calculated to create is speedily repressed when it is considered how much danger lurks behind their ornate nothingness. Chimneys and chimney-pots are in themselves sufficiently alarming and dangerous in their effects when tilted from their ill-chosen and imperfectly-protected position; but the more widely-spread disaster they occasion in breaking through roofs and crushing weak walls, is the most damaging outcome during storms.

There are an innumerable lot of small detached chimney-shafts in every populous town, placed in out-of-the-way corners, which have been recklessly constructed, being used in connection with bakers' ovens in the midst of dense populations, which, from their position, are more liable to be overthrown in exceptional weather. In London there is a sort of "roving commissioner," or some such officer, who, aided by the police, pounces down upon unfortunate bakers who are found neglecting the consumption of the smoke from their oven-flues. Such an authority should be supplemented by an experienced builder, who should examine these numerous frail structures, and where found deficient in stability, order them to be pulled down, and thereby avert the dangers which they now too frequently cause. The passer-by along the main streets cannot see, and therefore knows nothing of, these dangers lurking in secret places beyond his "ken"; but let him step aside, and, in such districts as Whitechapel, a very little trouble will convince him that there exists in such quarters a state of things hardly credible. He will find some very eccentric-looking structures, many of them bolstered up and kept together by singularly-contrived combinations of wood and iron, which, under ordinary circumstances, suffice to maintain them in a fairly perpendicular position.

It is surprising that the chimney dangers, although capable of comparatively easy avertibility, receive but scant attention at the hands of architect and builder, from which it may be inferred that they regard the question as one of slight importance. A chimney to be capable of performing its main functions, should be solid and substantial in character, having a capacity of securing—under all circumstances—perfect draught and comfort to the house in which it is built; with perfect freedom from smoke and back-draught. The chimney hitherto has been mainly considered as the prime heat-producing agent of the household; but in the not far distant future it will become an important factor in the needful schemes of ventilation which are now gradually

moving to the front. When that time arrives, the architect must give more heed to the question of the chimney, and properly provide for its stability and efficiency. The foundation on which it will be based must be solid and durable, and not only competent to withstand the pressure placed on it, but it must also be built of such materials as will prevent the ascent of ground-moisture from below, and resist insidious climatical influences from above. When the chimney and its proper functions are better understood, and accounts taken of the future work it has to perform in warming as well as purifying the house, more attention must be given to its character and details.

THE INDIAN PUBLIC WORKS DEPARTMENT.

SOME time since we noticed a small pamphlet, by Mr. Alexander R. Binnie, M.I.C.E., in which that writer exposed the large expenditure connected with the present Public Works Department in India, and hinted how its functions might be improved and economised. We have now before us a reprint of a minute by Sir Andrew Clarke, R.E., K.C.M.G., &c., late public works member of the Council of the Governor General of India, in which a scheme of reorganisation for that long mismanaged department of the public service is sketched out. The suggestions it contains were printed as long ago as 1878 in the *Indian Public News*, and coming from so competent and experienced a member of the department in India, we may accept them with some confidence. In this reprinted minute Sir Andrew Clarke sketches the early history of the department, showing that the whole of the engineers were drawn from the army, either from the local corps of military engineers or from the officers of other branches of the East India Company's army. In 1852 the engineers were recruited by the past students of the Thomason College, and in later years English engineers of some experience were sent over under an agreement with the Court of Directors. The young men known as the Stanley Engineers were selected by competitive examinations in 1855; but the supply being inadequate to meet the demands of the operations of the department, the Government of India requested the Secretary of State to advertise for engineers of different grades. Cooper's Hill College, established in 1870, failed to supply the number required, partly from the strictness of the examinations required; and recourse was had to the employment of eligible men who might be leaving the guaranteed railway companies. The present sources of supply of engineers are, according to this return:—1, officers of Royal Engineers; 2, civil engineers from the Indian Colleges; 3, civil engineers from the Royal Indian Engineering College; 4, special appointments. From those sources the number from Cooper's Hill is put down at 45 annually, and only 12 from the Indian colleges. It is also estimated that for the present time the maintenance of the department and the control of guaranteed railways require a total of 1,358. This estimate is based on an annual expenditure of £2,700,000 on State railways, and £1,300,000 on irrigation, and an ordinary expenditure on buildings and roads of £1,500,000. The existing strength at the time of this minute was 1,250. Sir Andrew Clarke assumes that in a year or two, at the present rate of supply, the strength will become commensurate with the expenditure. At present there is an excess of engineers on the staff, attributable to the want of a liberal scale of pension, which would have induced engineers to retire. This reluctance hampers the Department, and does not allow for passed students to enter. By re-

taining on the staff engineers in excess of actual requirements, the establishment cannot transfer to other branches of the service, and the result is that certain provinces object to have to pay for more officers than are really wanted on public works, and rightly argue that the expense should fall on the Imperial revenue. These objections are strongly made by the Bengal Government on account of their irrigation works, and other provinces have an equal right to urge the transfer of the excess of engineers; but, as will be seen, if these proposals are accepted, the Department would be burdened with officers on full pay with no work to do. The minute calls upon the Secretary of State to defer the supply from Cooper's Hill, and to reduce the number of engineers. As may be imagined, there are a number employed who are not up to requirements, and the older engineers are not equal to the demands of modern engineering, having been employed when the work was easy. Sir Andrew Clarke very forcibly recounts the results of incompetence from either physical incapacity to supervise work, or from other causes. The amount of mischief thus caused is incalculable, and it is cheap to remove such men. The mistakes are irremediable, and the money spent on bad work is wasted. Engineers, above all other officers, have to keep abreast of modern science.

The slowness of permanent promotion from these causes is urged as another reason for the reduction of the number, and the writer enters into the means that ought to be taken to insure it. The Pension Code is inapplicable, as it does not apply to engineers of the department, and never contemplated a large reduction, while the very framing of the code implies a permanence of engagement, and its terms have no doubt hindered any officer retiring on pension. By the code no person could voluntarily retire on pension until he had served 30 years in India, or had reached 60 years of age, except in case of infirmity. It is truly pointed out the hardship of compulsory retirement on those civil engineers who have been born and educated in England, and have accepted Government service in India. The service is only professional employment, in fact, open to them, for there is no chance for a civil engineer to practise privately in a country whose works are under Government.

Sir Andrew Clarke proposes that the least useful of the engineers should be compelled to retire on similar terms to those of the Government in the case of the Civil Service officers. The amount of pension is regulated according to the Superannuation Act, but we have not space here to enter into the figures. The minimum pension is proposed at £200 a year for executive engineers, and a bonus of one month's pay for each year's service in cases of removal.

The annual saving effected by the retirements thus proposed is, according to this statement, about £50,000 in round numbers, besides the increased efficiency of the department. After discussing the rate of promotion and the existing pension-rules of Royal and civil engineers, the minute enters into the special requirements of military and civil engineers, and the value of Thomason College. Sir Andrew Clarke does not approve of the institution of a special Civil Engineering college in England for the supply of engineers to the Public Works Department—an opinion many besides ourselves have shared in. It was an insult to the Institution of Civil Engineers, and to the Indian colleges who have supplied competent men for the service. With respect to the training of natives, the recommendations are strongly in favour of educating natives as engineers. They exhibit less self-reliance than the English engineer, but their association with Europeans is important. Of natives, the up-country people are con-

sidered more practical and energetic than the Bengalis. With regard to Cooper's Hill College, we agree in thinking it is not needed for India, as it compels the Department to take a number of assistant engineers, whether they are wanted or not. The practical part of their training is ineffectual, and it is quite evident the student learns to become more of an accomplished theorist than a practical engineer. Articleship is suggested as a remedy, and the college course limited to two years. After the prescribed test of knowledge is passed the student might be articulated to a civil engineer in practice, the premium being partly paid by the student. Referring to Cooper's Hill, the minute expresses the opinion that its scope might be enlarged for the education of youths for the profession generally, and so made a national school of engineering.

Such, in short, is the gist of the recommendations made. The permanent staff could be supplemented by engineers of special experience for short terms, larger salaries being given to them if necessary. By these means the present surplus would be diminished, the most efficient of the staff maintained, the military works branch would be placed on a military basis, and the Department be made to work with more economy and certainty.

STONEHENGE.—II.

WE have given (p. 420) a Section of Stonehenge, with some account of it, or rather of the uncertainties of it, as a memory of the distant past of things. We now add, to make matters a little clearer, a plan taken from an old engraving, made in the last century, when Stonehenge was in a somewhat more perfect state than it now is. It shows, we believe, with some approach to accuracy, what the plan of this primeval temple was when first built, or rather when its huge monoliths were raised, and dedicated to their purpose, whatever that may have been. It would be somewhat curious to speculate on the methods adopted in those early days of architectural practice in the setting out of such structures as Stonehenge, for there must needs have been some difficulty here. In the plan it is seen as a circle of huge stone blocks, some hundred feet or more; for the dimensions, as given by divers measures, do not quite agree in diameter. These are thirty in number, and may be, indicate a something in this very number of them. They are from 11 ft. to 20 ft. in height, and are covered by a stone coping or "cornice," each block of it reaching from the centre of one supporting monolith to that of the next, forming thus a complete circle, in no way interrupted by any special sign of a doorway or entrance, the circle of stone blocks, being thus simple and complete. Thus it is that the outer wall, if we may so term it, of this so-strange temple is built up. Immediately within this outer wall, and at about seven to eight feet from its inner face, is another circle of much smaller blocks of stone, thirty-six in number. These are about 4 ft. in height, and are certainly not the least curious part of this strange structure. If we but dared to speculate as to their use, we should be inclined to say they marked out the bounds of a "processional" way, for all goes to show that in the primitive and by-gone faiths, whatever they might be, processions always formed a marked feature in them, and that, to join in one of them was in itself a religious act. We venture but to hint at this by way of explanation, for, of proof we have, of course, none whatever. This brings us to the oval of the great trilithons, and which immediately inclose and surround the altar; and here again most surely there is mystery enough to puzzle the most

curious and exacting of those who like architectural curiosities. The altar itself is nearly in the centre of this circular temple, and all the authorities would seem to be agreed as to its use—that of sacrifice, probably human sacrifice. It will be noticed that these huge masses of stone are in pairs, five in number, but their covering stones, or cornice, if that be a better term, are not, as above, continuous, but each trilithon is complete in itself, and distinct, and must needs have had its signification.

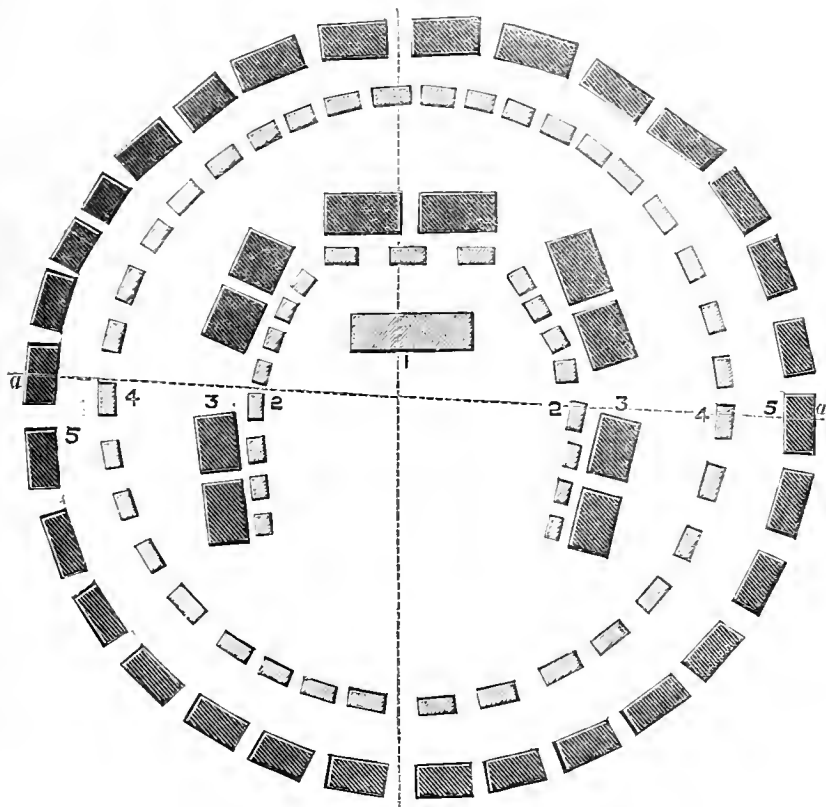
But between this altar and the great trilithons there is a row, or half-circle, of monoliths, about 8ft. in height, the use or meaning of which is, as it would seem, as impossible to define as is the import of the other circle, as above indicated. They must, it is sufficiently clear, have had some most significant meaning and import, if not use, or they would hardly have been so placed, and in such close contiguity to the altar

and want of a quite accurate plan; and the more this so strange structure is looked at and into, the more will this want be felt. Indeed, as we attentively examine it, the further we find ourselves from accuracy, and from, as it would seem, possibility of getting at it, certainly from books. The height of the trilithons range from 16 to 22ft., and, somewhat strangely, rise in heights from the entrance, or open way opposite the altar, as do the stones of the outer circle. Thus, generally, is the altar end of this strange temple built up of larger monoliths, the ruling idea of the whole structure being to concentrate the mental impression made to this altar and its nearest surroundings; and thus, without doubt, to those who ministered at it. It is hard to say whether a structure such as Stonehenge is most significant when in use, or when in ruins. Originally, it was made up of 240 stones, the outer circle of 60 stones, 30 up-

with its altar and surrounding trilithons. It may also, as has been thought, have been used as a burial-place or cemetery, and was certainly regarded as sacred ground. Stonehenge could hardly be thought complete without this "nave" to it. The earthen wall round it is some 15ft. in height. Not the least curious item in this architectural problem is the uncertain heights of its several parts and details. Was this intentional or the result of accident? The trilithons range from 16ft. 3in. to 21ft. 6in. The outer wall stones are 14ft. about, while the inner line of stone blocks are but about 4ft. in height. May-be, and it would be a curious fact in "architectural practice," that the very material, the very stones as found on the earth's surface, though from a distance, governed to some extent this strange and rude idea of a temple.

We need hardly say how much more needs to be inquired into before any really definite idea of this rude temple, built up long before the "historic period," as the geologists have it, commenced—a but too limited outlook, as it would seem. Stonehenge, strange and beyond the reach of written record as it is, does not stand alone in the world, for there is good evidence to show that in it and in other structures (if we may use that term) like it, we do, indeed, find the beginnings of at least stone-built architecture, and through it, of a desire to express something and a somewhat in ponderous stone, the which could not be done in any other way. Stonehenge, as we say, does not and did not stand alone. All over the world, on wide open plains and in the very midst of dense forests, primeval forests, as Humboldt terms them, there are yet to be found these huge stone masses, singly and in pairs, and in the form of trilithons, one stone on two others. In the French Carnac, on the coast of Bretagne, are yet to be found ranged in long, straight lines, eleven in number, some 30ft. apart, no less than four thousand of such monolithic blocks on a wild sea coast, far from human habitation, and where the motive for such building must have been indeed powerful. Powerful must that impulse "to build" have been, when the distances are known from whence these huge and ponderous blocks of stone were brought to their final destination—a right curious problem in architectural art; a glimpse at the work of prehistoric humanity.*

C. B. A.



PLAN OF STONEHENGE.

1, altar; 2 2, inner circle of small stones; 3 3, trilithons (five in number); 4 4, circle of small stones within. a, a, ground 300ft. across, bounded by the "vallum."

itself. Here at least the "imaginative faculty," as Ruskin has it, may revel at will, and as long as convenient, for these blocks of stone certainly do not help the impression made by the great trilithons. Doubtless they had an important symbolic meaning, as well as probable use, for whatever the merits of the old-world architectures, as compared with the things architectural of the present, they at least possessed this one—that of a never-forgotten utilitarianism and purpose; all was planned and built up for a practical use, and ornamented and named afterwards. These smaller and inner monoliths are built up as seen, almost touching the great trilithons, and they certainly do not indicate, as do the outer circle, a "processional way." These two inner and smaller circles of stone blocks, or lesser monoliths, so close to the larger masses, do not more surely help us to a clearer insight into this old-earth memory in stone, but the reverse; but of one thing we do feel quite sure—they had a definite use and purport.

We have already made note of our sad need of further and accurate measurements,

right blocks and thirty imposts, of which only 24 now remain, seventeen upright and seven fallen. Eleven uprights have still their imposts, or cornice blocks, on them. There are 40 stones in the inner circle, of which only 19 remain, and but 11 standing upright. The Adytum is of 10 stones, from 16 to 22ft. in height, with 5 imposts. Within these are the 19 smaller single stones, of which there are but six still standing. The altar is nearly in the centre, and is simply a flat level stone.

We may now, missing much, come to what we must suppose the "congregational" portion of this so strange prehistoric temple—viz., the large space of ground round and outside the outer circle of monoliths and within the line of the vallum, or high mound of earthwork surrounding the whole of it. This is some 300ft. across, is circular in plan, as the temple itself, and the purpose of it was evidently to insulate the more sacred temple and precincts, and to provide space for those who worshipped, and is evidently as much a part of Stonehenge as is the very temple itself,

THE BRITISH ARCHEOLOGICAL ASSOCIATION.

AUTUMNAL LONDON MEETING.

THE provincial members of the British Archaeological Association, accepted last autumn an invitation from the council to spend a few days in London. The experiment proved very successful, and has during the past week been repeated. About sixty ladies and gentlemen took part in a series of visits to old buildings extending over four days.

FRIDAY.

The opening visit was paid to *St. Paul's Cathedral*, when a large party were received at the western entrance by the Rev. Dr. W. Sparrow Simpson, F.S.A., who conducted them round and throughout the building, pointing out the leading features in lecturettes at intervals. The remains of the chapter-house and cloisters, discovered four years ago by Mr. F. C. Penrose, were shown; Dr. Simpson remarking

* It is not a little curious to note here that Mr. Darwin points out, in "Worms and their Economy in Nature," that even Stonehenge itself, sturdy as it looks, has not been by time alone brought to its present state of falling ruin, but that a portion at least of this has been brought about by the slow though so sure action of the earth-worm, which has undermined it, stone by stone, and that the very monolith which Sir G. Antrebus has propped up, has probably been put out of the perpendicular, not by time or the iconoclast or destroyer, but by the slow action, century after century, of the worm that dieth not.

that the drawings by Hollar and others, showed that the octagonal chapter-house had the peculiarity of two open, unglazed stories; these were covered in by a truncated roof, which, he had recently ascertained, during the public records inquiry, lost its spire by the same fire in 1861 which destroyed the great one on the central tower. The churchyard cross had been found to be much nearer the N.E. angle of the former cathedral than the old plans and views represented. Passing into the crypt, which, Dr. Simpson mentioned, had only recently been opened out and freed from the hydraulic apparatus of the organ, the few fragments of Medieval sculpture still left were shown, and the visitors entered the south aisle of choir, where has been set upright on a niche in south wall, the only perfect pre-Reformation effigy, that of Dr. John Donne, Dean, close to the statues of Bishop Heber and Blomfield, and Dean Milman's altar-tomb. Passing into the chancel, the high-class workmanship of Huntingdon Shaw's Sussex iron gates (which have been illustrated in these pages) was alluded to, and Grinling Gibbons' flower, fruit, and cupid carving in the stalls and divided organ-case pointed out. When in the library, Dr. Simpson mentioned that almost all the ancient MSS. and books were lost in the Great Fire, and the silver binding of an ancient volume was stolen, together with all the plate, in 1810. There were two chained books, both classics of no great value, a large-paper copy of Walker's Polyglot Bible, presented by the Duke of York, and a few other valuable works. From under lock and key Dr. Simpson exhibited a copy of "Regulations" for Henry VII.'s Chapel, Westminster, richly bound in velvet with silver mountings, and mentioned that one of the other six copies, similarly printed and bound, could be seen at the British Museum. An examination of Wren's original model for St. Paul's, and of Mr. B. E. Ferrey's elevations and plans of Old St. Paul's, pronounced by Dr. Simpson to be the most accurate yet prepared, was followed by a walk round the Whispering Gallery, where the lecturer recommended his hearers to attentively study Thornhill's paintings, as cartoons were now being prepared by artists for replacing them with mosaics—a substitution which he thought was not to be regretted, as the paintings were not well drawn or conceived, and had been so much touched up by Paris, that they exhibited little of Thornhill's actual work. At the close, a hearty vote of thanks was passed to Dr. Simpson for his interesting descriptions.

After luncheon, the members proceeded to the priory church of *St. Bartholomew the Great*, Smithfield. Here Professor T. Hayter Lewis, F.S.A., delivered an address which he opened by remarking that they had assembled in the remains of the choir of a great Norman building, in which, although much had disappeared, little had been added during restoration, so that it would be comparatively easy to follow its history. He would at once point out that the modern replacements were two circular shafts facing each other, behind the pulpit and reading-desk, the two central piers in the apse, and the tracery of clerestories and of the north aisle windows. The building was founded during the reign of Henry III., early in the twelfth century, by one Rahere, prior of the Augustinian Canons, who also founded the adjoining hospital. The building of the church was begun in 1103, the choir was consecrated in 1123, and the rest, whatever that might signify, ten years later. It was thus coeval with the naves of Durham (1099-1128) and Norwich (1121-45) and the choir, its aisles, and the transepts of Peterborough (1118-1133). The choir of Norwich was somewhat earlier (1096) and both it and Peterborough, like this priory, had apsidal ends. The church at the first had also an eastern apse with a processional aisle round it, and it once, according to a seal, an impression of which attached to a charter of 1133 had been shown him that attributed for the first time (although copies of it had often been engraved) had three towers. Prof. Lewis discussed the question whether the nave was built in Norman times, and from an incidental reference in Matthew of Paris's narrative of Archbishop Boniface's visitation in 1250 to "the middle of the church—viz., the choir," concluded that it was actually erected. In the thirteenth century this western part of the church was rebuilt in the style then prevalent, and great alterations were made in the church early in the sixteenth century by Prior Bolton,

to whom we owed the picturesque oriel on the south side, the tomb (as it now appeared) of Rahere, and the clerestory tracery. In 1544, Henry VIII. sold all the priory buildings, but directed that the chancel should be parochial, as it still continued. The nave, however, was pulled down, and the site converted into a burial-ground. The piers to south aisle of nave were standing till 1856, when they were taken down to widen the path, but the bases remained, and these have recently been brought to view by lowering the soil. The unsightly brick tower, at the present west-end, was said to have been built in 1622-8 in place of the steeple, then pulled down to its foundations; but he doubted whether at that period the public taste would not have been too good to sanction such a structure. The whole church was doomed in the early part of the present century, on the plea that it was dangerous, and was only preserved by the energetic efforts of an architect, Mr. Hardwick, an ancestor of the architect of that name now living. He would next refer to the church and its surroundings, and the alterations which they had undergone. At the east-end of choir, beyond the apse, were considerable remains of a large building, evidently entered from the church by an opening about 20ft. wide; the piers, with Perpendicular capitals, and the side walls, existed even now. This room appeared to be contemporary with the straight wall which still stood off the upper part of apse, but of which the lower third was removed in the restoration of 13 years since. On the south side of the church in which they were assembled had been the buildings of a complete monastery, and of these an excellent notice appeared in the *Gentleman's Magazine*, Vol. 79, pp. 226-7, describing their state in 1791. Prof. Lewis here exhibited a large block-plan of the church and its adjuncts, prepared by Mr. Tavorer Perry, and showed that the nave was formerly flanked by a cloister 100ft. square; that east of the south transept was a chapel, and from it extended in a long narrow line southward a range of groined buildings, above which was the dormitory. Of the cloisters, ninety years ago, when the article he referred to was published, only the east walk remained, and was then used as a stable; it fell in 1833, and had now entirely disappeared. On the east side of the cloister was the chapter house, an oblong department built in the 13th century and of which 3ft. to 4ft. height of walls remained in 1791; they were now destroyed and the space built over. Directly against the south transept, to the east, was a small chapel, of which no trace but the doorway from choir-aisle now existed. To the loss of the nave three centuries since he had already referred, and the south transept had also been removed more recently. The last feature lost was the series of vaults abutting south on the chapter-house, which were 130ft. in length by 30ft. wide; they were, he distinctly recollected, groined from the walls on to a central row of pillars alternately round and octagonal. Indeed, he (Prof. Lewis) showed it in a plan and report he drew up in 1868. When he recently visited the place, he found, to his surprise, not a vestige remaining, and that the site had been covered by an ordinary building erected for parish purposes. He had written to the architect about it, but would not expose his name. The restoration of 1868 was next described, Prof. Lewis mentioning that he was associated with the late Mr. Slater in the work. The floor was lowered between 2 and 3 ft., the site drained, and a column on either side of the building, which was being crushed by the weight, was replaced by another, the stones being intentionally used of larger size and differently treated to mark the new work. The apse, then, was cut off by a 15th-century straight wall, the upper part of which, occupied by a fringe factory that encroached into the church, they were unable to remove. They had, therefore, to make the best of it, carried the obnoxious wall on an iron girder and columns, and opened out the eastern aisle. In the wall were found worked up a great quantity of Norman caps and mouldings, which were now shown at the east end of south aisle. Where the two central piers should have been was a deep channel-hole filled with bones. They, therefore, had to supply these from the foundations. The wall of north aisle was then needed, forced to an upright position, and underpinned, but the north triforium space still continued to be used, as they had rudible demonstrations at that

moment, as an infant's school. All the wall were cleaned from whitewash, as far as it could be done without effacing the original tooling of masonry. The lecturer referred to some detail of the building, including the remains of the Early English nave, the Perpendicular reworking of the western corbels of central tower-arches, the eastern ones still retaining their Norman appearance; and the curious fact that whereas the east and west tower-arches were circular, those to north and south were pointed. He believed them to be later insertions. As illustrating how easily even a careful student of architecture might be imposed upon, Prof. Lewis mentioned that some time since he saw a well-known writer, who had done good service to archaeology, carefully measuring the south aisle with some assistants. He had since been surprised and amused to see that the writer in question propounded a theory, based on his measured drawings of the south aisle vault, that the 12th-century architect was inspired by Byzantine influence. Undoubtedly the vault was semi-dome, but the writer did not seem to be aware that it was built in lath-and-plaster in the year of our Lord 1830, by one John Blyth, district surveyor.

Mr. E. P. Loftus Brock, F.S.A., hon. sec., gave reasons for believing that the nave existed in Norman times, and showed that, as in some other churches, the monks' stalls extended west of the central tower. He endorsed Prof. Lewis's theory as to the date of the side arches in central tower, and described, in detail, the two most interesting monuments in the church: the 15th-century one to Prior Rahere, and that in the south aisle to Sir Walter Mildmay, founder of Emmanuel College, Cambridge, remarking of the latter, that it was interesting to find, at so early a date as 1589, all Gothic mannerisms completely abandoned, and a stately monument erected in good Classic style, with an Elizabethan feeling of picturesque, and a lavish use of variegated marbles, gilding, and applied colour.

The members then proceeded to the *Courtyard of St. Bartholomew's Hospital*, where the clerk to the governors, Mr. Crose, had arranged, on a long table, a fine series of charters and deeds, some of which, he said, had never been uncovered in his time. Most of these had their seals, or portions of them, still attached. The earliest was on the grant to Rahere in 1136, and showed the Norman church to which Prof. Lewis had alluded, but which Mr. Brock and others considered to be merely a conventional representation of a church of the period. Two great seals of Henry III., one dated 1255, another of the 21st year of Edw. III., and the final grant of the church and monastic building by Henry VIII. (1544), a lengthy and well-penned document, were among the more interesting charters.

The day's proceedings were concluded by a visit to the remains of the Roman villa and hypocaust under the Coal Exchange. These, Mr. Brock remarked, were preserved by the efforts of the British Archaeological Association in 1848, when the exchange was rebuilt.

SATURDAY

Morning was spent in the City, *Barber Surgeons' Hall*, Monkwell-street, being the place of assembly. In the hall they were received by the present master, Mr. Woolley, and by Mr. Charles J. Shoppee, past master. It is an oblong room, with Renaissance plaster enrichments, and good panelling; it was built by Inigo Jones, and repaired by the Earl of Burlington. It is decorated in green and gold, and has a central elliptical lantern, constructed about sixteen years since by Mr. Shoppee, who, as the premises were being rebuilt, also removed the fine hooded doorway which formerly faced the street, to the interior of the courtyard. Mr. Geo. Lambert, F.S.A., read a lengthy paper upon the history of the company, and called special attention to the principal picture on the walls, that by Holbein representing King Henry VIII. granting the charter combining the barbers and surgeons into one company in 1541; it is 10ft. 3in. by 6ft., and contains, besides the portrait of the King, which is of the conventional type, those of eighteen members of the guild, most of them distinguished by names written on the face of the picture. Shoppee says in his diary that he proposed to buy the picture for £200. Amongst the other noteworthy pictures are a portrait

of Inigo Jones by Van Eyck, and one of the Countess of Romsey by Sir Peter Lely. Mr. Shoppee exhibited the fine collection of plate belonging to the company, including a drinking-cup and cover in silver gilt, presented by Henry VIII., and of which cup, Mr. Lambert showed, the upper portion was a modern restoration; a more elaborate silver cup, given by Charles II.; a tankard, the gift of Queen Anne; silver coronets to velvet caps of Master and wardens (the former of whom retains the privilege in the presence of the sovereign). Master's gavel and badge, rose-water dishes, mulls, and a tea-urn of last century, which had been reproduced in facsimile at South Kensington Museum. He also showed an embroidered cloth worked with the company's arms, of about George II.'s reign, and some old china.

At *St. Giles's Church, Cripplegate*, Mr. Loftus Brock gave an address, in which he pointed out that this church was rebuilt in the middle of the 16th century, and escaped the Great Fire; with its continuous wide nave and chancel, divided from spacious aisles by lofty arcades, it was a good example of a City church of that period. On the south side, opposite the second pier from the east, was the blocked-up doorway into rood-loft. The church was rich in good specimens of monuments from Elizabeth's to Charles the Second's reign, and possessed plain ones to John Speede, John Foxe, and John Milton; it possessed a carved pulpit of the Grinling Gibbons school, and a reredos of a somewhat later date. It had recently been fully restored by Mr. Edmund Woodthorpe, to whom the excellent roof and some other features were due. In the vestry the entries of the burials of Sir Martin "Furbisher," Milton, and Defoe, and the marriage of "Oliver Cromwell & Elizabeth Bourchier" were inspected, but it was urged that the books containing these entries had been rewritten at a later date. Mr. Lambert remarked that in many German walled towns, including Nuremberg and Ratisbon, there was, as in London, a gate of cripples, and close by it a church dedicated to their patron, Saint Giles. Outside the church, the well-known bastion provoked some controversy, some maintaining it to be Roman, while Mr. Brock said, although a few Roman tiles were re-used in it, the lower part of the masonry was of the 13th century, and the upper stage as late as the 15th century, with patchings of all periods to the present. It marked the N.E. angle of the early city (of Cripple-gate there were Saxon records), and to the south two other bastions yet existed, one by Barber Surgeons' hall, and another behind some house in Castle-street, Falcon-square; the latter, by far the largest and finest fragment, was almost unknown to the general antiquary.

After inspecting the fragments of masonry in *London-wall*, the *Church of St. Mary-le-Bow* was visited. The interior of the church is at present in the hands of the renovator; and most of the visitors, in inspecting it, were more careful to avoid the dust, and the mortar thickly strewn on seats, and the projecting scaffolds and planks, than to observe the fine proportions, the vaulted ceiling, or the monuments to Dr. Newton, Bishop of Bristol, Dame Dyonis Williamson, and others. In the vestry, Wren's model of the church, as he proposed to build it, lacking the elegant spire, and with flanking wings to Cheapside, was seen, and the members descended to the crypt, which, Mr. Brock remarked, was the earliest Norman remains in the City, and still possessed two cushion capitals, some vaulting, and masonry of small stones and wide joints, all characteristic of its period. No record existed of the church in Domesday; but the roof was known to have been burnt in 1090. Sir C. Wren, in his "Parentalia," stated that, in the rebuilding after the fire, became upon the walls and pavement of a temple of Roman workman-hip; but he concurred with the late Mr. Gwilt in thinking that all Wren found was the crypt in which they were then assembled. Mr. Geo. Patrick called attention to the early character of the Norman work, and Mr. John Reynolds compared it with Gundulph's work at Rochester and Malling. *St. Etheldreda's Chapel, Ely-place, Holborn*, was afterwards seen. Father Loebhart acting as *cleverone*, and telling the story of its foundation as an adjunct to the former palace of the Bishop of Ely, the desecration of the crypt as a porter-stores, and the use of the upper chapel by the Wel-h community, its purchase a few years since by the Roman Catholic Fathers of the Order of Charity, and its restoration under Messrs Young and Wheelan. The

west window and the entrance-doorway were illustrated in the *BUILDING NEWS* for June 1, 1877.

The afternoon was well devoted to *Sir John Soane's Museum, Lincoln's Inn Fields*. The party was too numerous to allow of comfortable examination of its treasures, or even of easy perambulation; but Mr. James Wild, the curator, and a staff of assistants, showed sections of the members over the building, pointing out the more interesting exhibits. The rooms are in a pseudo-Pompeian style, and silvered plate-glass is fixed in semi-lunar recesses beneath the cornices, in pilasters, and in angles, so as to increase the apparent size of the building; all the wall-surfaces, and every nook, cranny, and corner are occupied by casts, coins, busts, china, pictures, and other works of art, collected by Soane during a long lifetime. In the library and dining-room Mr. Wild showed some of the best books, including a copy of Pennant's "London," in 6 folio volumes, illustrated by collected plates, pencil and water-colour sketches; it was formerly in the possession of the banker, Fauntleroy, and was purchased by Soane, in 1823, for 650 guineas. Of yet greater interest was the book containing original drawings by John Thorpe, the architect of Elizabeth's time, a volume of 280 pages of folio size, filled with autograph plans and elevations, both drawn oddly enough in perspective and executed in brown ink. (In Vol. XXXIV. of this journal Mr. Maurice B. Adams described Thorpe's book in detail, and gave a series of fac-simile reproductions; these will be found in the issues for Jan. 25, Feb. 8 and 22, 1878.) In an adjoining room were seen a number of paintings by Hogarth and Caldecott, and Sir John Soane's remarkably heavy design for new Houses of Parliament. In the basement the principal attractions were the royal sarcophagus, covered within and without with painted hieroglyphics; it was discovered near Thebes, in 1817, by Belzoni; some painted Dutch glass in the windows, and casts of Greek and Gothic details. On the upper floor Hogarth's "Rake's Progress" series, the china, and some terracotta Caryatides attracted most notice.

MONDAY.

The members reassembled in augmented numbers, opposite *Cleopatra's Needle*, Victoria Embankment, which was described by Mr. G. Lambert, reference being also made to the mode in which it was brought over and re-erected. The *Water Gate, York Stairs*,* was next seen, its present neglected and, indeed, threateningly dilapidated condition awakening considerable comment. It not only remains sunk several feet below the surface of the gardens and Buckingham-street, but the base and lower fourth are buried in earth, and the inclosure is littered with dead leaves and dirty paper. The flags are broken and upheaved, and there is evidently a settlement towards the east; the key-stone of the arch has dropped several inches, and a crack through the masonry above appears to be widening, while the lions on either side have been almost defaced by the weather. Mr. G. R. Wright said, that association could not be blamed for the condition of this beautiful work by Inigo Jones, for as far back as 1873 he prepared a memorial to the Metropolitan Board of Works, which was presented by the late Mr. J. R. Planché, in which they were asked to raise and underpin it, and throw it open as a thoroughfare from the street to the gardens. The Board considered the matter, but were unable to take any action, as the gate was claimed as private property by an individual who objected to restoration. The subject was revived three or four years since and again during the past few weeks, but without result. Mr. Wright then described old York House, which formerly faced the river at this point, and to which, early in the 17th century, this gate was added as a water entrance, from Inigo Jones's designs, for George Villiers, the extravagant and dissolute Duke of Buckingham, who soon after had to part with the estate. The gate had been said, in Gwilt's *Encyclopædia* and elsewhere, to be the work of Nicholas Stone, assistant to Sir Christopher Wren, but his investigations did not tend to confirm this theory.

Chelsea Hospital was afterwards visited, the members assembling in the great quadrangle. This is surrounded on three sides by buildings

of stock brick with red brick reveals to windows; the centre, the oldest part, has a projecting centre of Portland stone, the upper floor carried on four Doric columns, and behind the pediment is the well-known cupola. A distylar colonnade, with covered piazza, runs along this front, and upon the entablature is a long Latin inscription giving the leading dates. The wings are somewhat later in character, but range with chief elevation, except that the central portions, of Portland, have pilasters in place of columns, and are not brought out, while the roofs are broken by dormer lights. In the centre of the quad is a bronzed statue of Charles II. disguised as a Roman warrior, by Grinling Gibbons. Mr. Lambert mentioned that the hospital occupied the site of a college for polemical divinity, established by James I.; but which, within half a century, was rebuilt as a military asylum and hospital by Charles II., the real originator being Sir Stephen Fox, paymaster-general of the forces and ancestor of the Holland family. Sir Christopher Wren, then in the height of his powers and fame, was the architect and one of the commissioners; the foundations were laid exactly two centuries since, and the building was opened in 1692 with some enlargements of the original designs. The present accommodation was for 535 persons. The members then proceeded over the buildings under the guidance of the chaplain, the Rev. Sydney Clark. The main building has a central entrance hall, with chapel to east and hall to west. The former is a large parallelogram with apsidal east end. A high dado of wainscot surrounds the walls; the surface above, as well as the coffered ceiling, being distempered with Roman plaster-ornaments picked out in white; the seating is by modern open benches. At the east end is an architectural composition of a lofty pediment supported by four Composite columns; this and inclined wings are executed in wainscot oak, and inclose a panel of stained-wood marqueterie, containing the sacred monogram; above the altar, in the domical vault, is a fresco of the Resurrection by Sebastian Ricci. At the west end is a shallow gallery, and beneath it, on either side of entrance, the governor's and lieutenant governor's pews. The side walls are hung with over half a hundred flags captured in battles in the Peninsula and the Netherlands, East and West India, China, and Canada, all tattered, torn, and moth-eaten, many merely a few rags hanging at intervals of network. In the vestry was seen a valuable service of silver-gilt plate of James II.'s time, and possessing the elaboration and occasional debased features of that period; it includes massive candelabra for super-altar, as well as the usual chalices, flagons, and patens. The hall, now used as a general day and reading-room, on the opposite side of main entrance, corresponds in size except that the further end from door is square instead of apsidal, and is hung with a large painting, by Verrio, representing Charles II. on horseback, with the hospital in background. The walls are hung with a collection of decaying standards like those in the chapel, and beneath these is a collection of engravings of distinguished generals. A case of unclaimed medals contains some examples, otherwise very rare. One of the ranges of berths was taken as a sample of the whole, which accommodate some 510 men. Facing a range of windows is a series of continuous wainscotted cubicles, each containing a bed, table, and stool, with shelf above; attempts at decoration had been made, in most cases, with prints and photographs; but the ventilation of the ward appeared far from perfect. The chaplain's private apartments, with beneath them the quadripartite plastered vaults, the sole remains of the former theological college, and the infirmary were next seen. The visit closed with an inspection of the great drawing-room of the governor-general, where Sir Patrick and Lady Grant, the present occupants, described the valuable paintings on the wall, including Van Eyck's portrait of Charles II., with his Queen, Henrietta, and their children, Charles and Elizabeth: the first three Georges and their Consorts, and her present Majesty. A sculptured head of Buddha, found on the site of a former monastery at Takht-i-Bahn, Afghanistan, was stated to be the highest type of Asiatic art. It is supposed to have been buried in the fifth century A.D., at the time of the Mahomedan invasion; the features are regular, almost feminine, and finely chiselled.

* A perspective drawing which gained the Royal Academy silver medal, by Mr. R. Gibson, appeared in the *BUILDING NEWS* for Nov. 14, 1879.

The *Old Parish-church, Chelsea*, was next seen, under the guidance of Mr. Brock, who claimed for the well-known red-brick tower considerable merit, although it had been greatly injured by the loss of its cupola. It had, he said, the boldness, simplicity, and dignity of a Norman building. Inside, the building is of very unusual proportions, comprising a nave wider than it is long, a short chancel, with north and south chapels, the latter of transeptal form. The oldest portion is the north, or Lowndes chapel, where the windows are of the middle of fourteenth century; the south chapel was built by Sir Thomas More when Lord Chancellor, but the majority of the churchwork dates from the rebuilding in 1667-9, when the nave was lengthened. The capitals of arch opening into the More chapel bear the Chancellor's arms, and are dated 1558, but are, Mr. Brock remarked, quite French Renaissance in feeling, and are artistically carved. The monuments, very elaborate and numerous, include a large altar-tomb, of Late Renaissance character, to Reginald Bray, 1563, the architect to Henry VII., for his chapel at Westminster and Windsor Castle; a monument to Lord and Lady Daeres, 1595, Jacobean in style, and of variegated and costly marbles; another, of heavy Ionic character, by Bernini, to Charles Cheyné, Viscount Newhaven, who died 1698.

Holland House, Kensington, was seen in the afternoon. Driving up the great avenue, now littered with fine elms uprooted or snapped through the trunk or branches by Friday's gale, the house was seen standing to the left; it is built of brick, with carvings and festoons of free-stone and Portland stone. The mass on plan is broken up by two angle-towers with steep-pitched slated roofs and a cupola, by crow-stepped and multicurved gables, and by oriel and balconies on the chief front. The entrance is on the east side, which is a blank wall, having pilasters of carved stone, the three orders being used in succession at the intersection of strings. In the great hall the visitors were received by Mr. Lane, house-steward to Lady Holland, who conducted them through the principal apartments. The house contains 87 rooms, and is a very storehouse of art treasures collected by the occupiers during several generations. Portraits, rare volumes (the library numbers 27,000 volumes), tapestries, antique furniture, rich decorations, and relics of eminent personages combine to make up an artistic whole that it was impossible to do justice to in an afternoon. Not only so, but the historic associations of a house that had for nearly three centuries been "the favourite resort of wits and beauties, of painters and poets, of scholars, philosophers, and statesmen," could not fail to be deeply interesting, apart from the material attractions with which in these columns we have chiefly to concern ourselves. Noting a sedan chair in the hall, and late tapestries in one or two intervening rooms, the Journal room was seen—a long apartment, well furnished, and hung with many portraits, of which the most noteworthy were those of Prince Talleyrand, Sir James Mackintosh, and the late Princess Liechtenstein—the last by Mr. G. F. Watts, 1857. In the next, the China-room, was a great deal of Dresden and Sevres ware, and some Chelsea china given to Dr. Samuel Johnson: from the centre of the moulded and gilded ceiling hung a large chandelier of Venetian glass. In the West room are two Hogarths, the "Play of the Conquest of Mexico" and "Ranelagh Gardens," together with a framed receipt from the artist to the Hon. Henry Fox for two guineas, for these and several other paintings, in which the "March to Finchley" heads the list, being priced at 10s. 6d. In the next, the music-room, were portraits of M. Guizot, Thiers, and other French statesmen. The ceilings in most of the rooms in this suite are very simply treated, having a white ground with a small portion raised, and picked out by gilding; and passing up a narrow side staircase the visitors came to the library, a long narrow apartment, extending the whole breadth of the house, and, until modern times, only lighted by end windows, the remaining space being given up to book-shelves. The ceiling was, however, formed into a series of vaults for the late Lord Holland, and these have each a single sheet of obscured glass, the concave surfaces beneath being coloured blue, and powdered with stars. In the north-west corner is Addison's writing-desk, and in the chamber to the east, now the family dining-

room, the gifted essayist died. This room is hung with portraits of Lord John Russell, in youth, by Hayter, several Ladies Holland, including the mother of Charles James Fox, painted by Sir Joshua Reynolds, and the present holder of the title, by Mr. Watts. In the common drawing-room were seen a St. Francis, by Murillo, two of Teniers' genre subjects, and a portrait of C. J. Fox, with a receipt by Reynolds for 100 guineas for the painting. Several relics of the First Napoleon having been inspected, the members came into the gilt drawing-room, in which the decorations on walls and ceiling are in a brilliant and almost garish key, although it was stated they had not been repainted for two centuries (*sic*). Here, Mr. G. R. Wright read an historical account of Holland House, which he showed occupied the site of the old manor-house of Abbots Kensington, the residence of the De Veres. The older position of the existing residence was built in 1606 by Sir Walter Cope, groom of the bed-chamber to James I., and by him left to his son-in-law, Henry Rich, afterwards created Baron Kensington and Lord Holland, who employed Inigo Jones, then rising into notice, to add wings and arcades, and changed the name from Cope Castle to Holland House. In a lucid manner Mr. Wright followed the fortunes of the house, and the families who have possessed and inhabited it from that time to the present day, showing how General Fairfax, William Penn, Joseph Addison, and his wife the Dowager Countess of Warwick and Holland, Henry Fox, the Whig statesman, first Lord Holland of the new creation, and his more talented second son, Charles James Fox, had in turn lived within it. Mr. G. Lambert followed with a paper upon Inigo Jones, in which he traced the career of James Evans, the son of a Cheapside mercer, from his early struggles to his appointment as surveyor-general, and referred to his works in this house, at Whitehall, the portico of Old St. Paul's, York-stairs Gate, and St. Paul's Church, Covent-garden. Mr. Loftus Brock mentioned that at the Soane Museum on the previous day, while turning over the pages of John Thorpe's book, he found a plan entitled "Plan of a house at Kensington for Sir Walter Cope by me, J. T." This agreed so nearly with the arrangement of Holland House that he was convinced Thorpe was its architect, and the treatment corresponded with that in his book and in other works assigned to Thorpe. The later work by Jones could easily be distinguished by the introduction of Portland stone. After the visit the members accepted the invitation of Mr. and Mrs. Brock to tea at their home in Colville-square.

TUESDAY.

On this, the closing day, two palaces, those at Fulham and Hampton Court, were visited; but the greater part of the day was lost in loitering, owing to an unfortunate mistake in the carriage arrangements. At *Fulham Palace*, which is still surrounded by its moat, the members were welcomed in the hall by the Bishop (Dr. Jackson), who said although the site had been that of the residence of the Bishops of London for eight centuries, he had unfortunately nothing to show the members earlier than the time of Henry VII., when the quadrangle through which they had just entered, now used as domestic offices, was built by Bishop Fitz-James. The hall in which they were met was of that period, and formerly possessed an open roof in place of the present plaster ceiling, but was altered and rearranged to serve as a chapel by Bishop Sherlock in the time of George II., and was again changed and refitted as a library by Dr. Howley, half a century since. When a new and more commodious chapel was built by Dr. Tait, fourteen years ago, the apartment was again used as a place of assembly and reception. The oak (Jacobean) screen at the lower end was brought in recent times from Doctors' Commons. The bishop then conducted the party over the house and grounds. Returning to the quadrangle, it was seen to be on all four sides of two-storied continuous buildings of red brick, diapered with diamond patterns of black bricks, and having tiled roofs. The south side of quadrangle was refaced by the late Bishop Blomfield in the old style, except that buttresses were added, but the Tudor brickwork, visible elsewhere, is of excellent quality. A low carriage entrance is pierced through the west-side, and faces a squat clock-tower, also of red brick; in the centre is the carved

stone base of a fountain now filled with flowers. Some of the rooms on upper floor of the south-side, now used as a laundry and bedrooms, were visited, but contained no traces of Bishop Fitz-James's work except the linen pattern panelling remaining here and there. The outer front of this side, facing the river, retains its original carved barge-boards to the three gables, and although very plain, is not without picturesqueness. To the east, and beyond the quad, is the new private chapel, erected from the designs of Mr. W. Butterfield in 1866. It is Early English in style, seated stallwise, and appeared somewhat inadequately lighted; all the windows, which are in the west front and the east end, being filled with stained glass. The internal walls, above dado level, as at Keble College, display the use of coloured brickwork with which the architect's name is associated, and over the altar is a mosaic of the Adoration. Between the lawn and kitchen-garden is a gateway of moulded brickwork, of Bishop Fitz-James's time, and the desolating work of the recent storm on the old trees was visible; thirty-seven have been blown down or broken off, including a locust-tree planted in 1682. The east, or chief front of the palace, that to the lawn, shows a plain building of two stories with a parapet concealing roof, and eight uniform square windows on each floor, the lower ones carried down to garden level; these rooms, the library and dining-room, contain portraits of all the bishops since the Reformation, the most interesting being those of Bishops Ridley, Bonner, and Laud, Juxon (by Van Eyck, the most valuable picture in the collection), Tait (a full-length subscription portrait, by Sydney Hodges), and the present bishop (by Richmond). All the earlier ones to Bishop Compton, 1675, wear black caps, while Bishop Gibson, 1723, appears in a full-bottomed wig, a headress retained till Bishop Blomfield.

On leaving the palace, the members should have proceeded by road to Kingston; but the carriages had been sent, it was found after much delay, to Lambeth instead of Fulham palace, and the breaking of a trace on Putney-hill further detained the party. These accidents necessitated the cutting out of Wimbledon camp from the programme, and even then, after a hurried luncheon at Kingston, *Hampton Court Palace* was not reached by the first section of the party till 4.30. Mr. Graham, the superintendent, and Mr. Chart, the clerk of works, had been awaiting the members for two hours, the latter provided with plans and particulars, but although the official hours of closing were past, they escorted the members over such parts of the buildings as could be seen by the failing light, Mr. Chart showing where the work of Sir Christopher Wren and Inigo Jones was built into that of the palace erected for Wolsey, both in the courts and in the chapel, where, although the general proportions, richly gilded pendentive wooden roof and gallery of Henry VIII.'s time remain, the wall surfaces, altar, and fittings are by Wren. In this chapel a large picture of the Adoration, by an Italian artist, is at the present time placed in front of the altar, by Mr. Robinson, for the inspection of the high chamberlain, as it is proposed to re-fill the altar-piece, now occupied by mere parquetry, with some work of art from the national collection. In the great hall, Mr. Reynolds said that we had here one of the latest examples of a Medieval hall, still perfect, although the dais had been removed and the old communication with the buttery in the north wall closed, and a modern door cut in the centre of east wall into the withdrawing room—the "common room" of Oxford, and "combination room" of Cambridge Colleges, where the same arrangement might still be seen. The rich oriel on the south side near the east end was simply the recess for the sideboard. After some further remarks by Messrs. Chart, Reynolds, Wright, Lambert, and Patrick, the members proceeded by train to Streatham-hill, concluding the London meeting by a visit to the residence of Mr. Morgan, F.S.A., the hon. treasurer.

ARCHITECTURE AT UNIVERSITY COLLEGE.

(Continued from p. 488.)

YOU shall now hear exactly what is done and is to be done in the classes. They include three courses, denoted A, B, and C, and treating

respectively of art, science, and professional work.

The art-class—Class A—approaches architecture as a fine art from the side of history, and necessarily so. You can hardly in any other way understand the subject. The design of every great group of buildings—nay, to a greater or less extent, of every single building of importance—was largely influenced by the design of buildings previously existing, and, in its turn, exercised an influence on what was built afterwards. An English church, for example, is planned in the manner familiar to you all, with a nave and aisles, mainly in consequence of that arrangement having been in use near the Christian era in Rome for courts of justice. In short, there is little about a building that cannot be better understood by knowing its history than in any other way, and there is much which is quite unintelligible without such knowledge.

Course A, as given by my learned predecessors, has embraced that series of architectural styles which stand in some sort of relationship to the architecture of modern Europe. That is to say, the ancient architecture of Egypt, Assyria, Persia, Greece, Etruria, and Rome, and architecture since the Christian era,—of the styles known as Basilican, Byzantine, Romanesque, Saracenic, Gothic, and Renaissance. This is an immense field. It certainly shuts out the vast and extremely interesting architecture of India and Japan, but with this exception it leaves very little of interest unnoticed. Professor Donaldson used, I think, to bestow most of his attention on the Classic styles of the ancient world—the field where his laurels as an investigator and a discoverer were won. Professor Hayter Lewis, if I mistake not, lent more in the direction of Early Christian and Saracenic art—subjects to the study of which he has devoted much time abroad as well as at home. Possibly my own inclinations, and my studies on the Continent, may induce me to devote a rather larger proportion of attention to Renaissance work; but I shall endeavour to follow my predecessors in giving fair and honest attention, so far as time will permit, to each part of the field in turn.

It is, of course, not possible, in dealing with so large a subject, to treat much of it in great detail; but though a comprehensive view is sufficient for the ordinary purposes of the student, I am convinced that he ought to be taught some one style more thoroughly, partly with a view of putting him in the way of studying other styles for himself with equal thoroughness, and partly also in order to prepare such students as intend to offer themselves for examination at the Institute. I propose, accordingly, as an experiment, to expand one portion of the course, and treat one subject at greater length, or at least in more minute detail, than the rest, endeavouring to pursue it far enough to make the class somewhat familiar with the mouldings, ornaments, and more minute details of the style, as well as with the general architectural forms and the leading features of the buildings.

I propose for the present session to select the subject of Greek architecture for this treatment. Greek is the architectural style which, within certain narrow limits, approaches nearer to absolute perfection than any other, and it may, with perfect truth, be called the fountain-head alike of modern and of all Classic architecture. Should the result of this attempt seem to warrant it, I shall propose, in another session, to expand, in the same manner, the treatment of some other part of the course.

The course B deals with the science of architecture, that is to say, with materials, and with construction (as the art of putting materials together in a building is called). We shall take the principal natural building materials, such as timber, stone, and marble, and the principal manufactured ones, such as bricks, cements, and iron, and try to become familiar with their appearance, their properties, their strength, their fitness for use in a building, and the indications of their being of good or bad quality; and when we know something about each material we shall try to follow it out in the building, and consider the parts of a structure in which it may be best employed. Thus, after timber will come floors, roofs, and various framings. After bricks and cements, we shall consider brickwork and such subjects as the bond of bricks and foundations. The building-stones lead us to walling, masonry, arches, vaults, and the most difficult constructions that the builder has attempted;

while, after considering iron, we shall learn something about fireproof floors, iron roofs, and other applications of iron to building.

These lectures on materials and construction are included in the course of study recommended to civil engineers. The materials and methods employed by the builder and the architect are, to a large extent, the same as those with which the engineer has to deal, though they are usually employed in larger masses in his structures than in ours, and under different conditions, requiring, more often, very close calculation of the stresses they have to resist. I trust that the engineering students who may attend the course will give the work of this class a due share of attention. Some of them have carried off the highest prize which it has to offer. Others have failed to obtain a certificate, and have been chagrined at their failure. Yet the lecturer, the professor, the examination papers, and the system of making answers, are the same for all. Success depends solely upon the pupil. It may be impossible for him to be the first in any given year; but, with ordinary abilities, nothing but application is required to secure a certificate of having passed the examination with credit.

Want of time has prevented hitherto, and no doubt will still prevent, much attention being given by this class to joinery, plasterers' work, and the other finishings of a building; but some care will be bestowed upon the construction of drains and the sanitary fittings connected therewith, though for the full study of sanitation I must refer you to the lectures of my accomplished colleague, Professor Corfield.

I shall throughout direct attention, also, not only to the properties and use of these materials, but to their defects and failure. It cannot be too strongly impressed upon the mind that from the day the workman leaves a building the tooth of Time begins to attack it. Forces of all kinds tending to produce decay and ultimate destruction are at work, and while structures of colossal strength, like the pyramids of Egypt, may keep them at bay for thousands of years, ordinary buildings are not long before they begin to suffer. The failure of buildings, and the precautions to be taken to avert it and to remedy it when it has become serious, will therefore form one of the subjects of this course.

The collection of diagrams illustrating courses A and B, prepared through many years, as I have already stated, by Professor Donaldson and Professor Hayter Lewis, now reaches to many hundreds of examples, chosen with special reference to the purposes of these classes, and represented in drawings of great excellence. These are, by the kindness of the two past professors, still available for the purposes of the class. The larger portion of them relate to the art course, but there are a considerable number bearing upon construction.

Some useful specimens of building materials of various sorts are available for illustration of the lectures on construction. The series of specimens is, however, not extensive, and I am taking steps to increase it, so as in a short time to make it very serviceable as an aid to instruction.

The collection of illustrations is also constantly increasing. I have added, and shall add, diagrams, prints, and photographs, and I hope occasionally to make use of photography in another way; that is to say, to exhibit once, if not oftener, some illuminated photographs, by way of giving a more vivid representation of ancient buildings than is possible by the aid of drawings or photographs seen in the usual manner.

Course C.—The course of lectures on practice is not so long a course as either of the others, and is intended chiefly for giving men who have become to some extent familiar with the routine of professional work, and especially for those who are about to start in practice, or have recently begun practice on their own account. It is my desire in this course to put the student in possession to a certain extent of the results of experience, so that he may know what he is likely to have to do or encounter when acting as an architect on his own account. I need hardly point out that a pupil or assistant, especially in a large office, while probably enjoying ample opportunities of working on plans and specifications, is not always—in fact, not often—brought into contact with the negotiations that the architect with whom he is has to carry on, may not see much of the supervision of works; and in short, looks at the transactions relating to a

building from the point of view of an irresponsible employé, and not that of a responsible professional man. The aim of these lectures is to teach students some of the things which they would otherwise have to find out for themselves when entering practice, and which they had far better know beforehand.

The course travels over the following subjects, beginning with what is most likely to be familiar, at least in part, and proceeding to questions that are more and more special:—the preparation of plans and specifications and the ordinary routine of building operations, including planning for special purposes and requirements; the preparation of all the required documents, conditions of contract; the principles on which estimates are prepared, the supervision of buildings, the usual mode of stating building accounts, and the professional charges which the architect is entitled to make. The next series of subjects in this course deals with those aspects of architectural practice which relate to law. First, and of great importance, the London Building Act, and other Acts regulating buildings which have been founded upon it. Then the law of light and air, of contract, of the tenure of land and houses, and some account of arbitrations and of such questions as are most commonly litigated in connection with building operations.

Lastly, I shall endeavour to give you a brief account of that class of professional work which all architects are liable to be called upon to perform in connection with existing buildings, such as surveys for dilapidations and various purposes, valuations, and the like.

I am sure that it will be of service to many a young architect to be warned and instructed beforehand about his routine, his charges, his Building Act difficulties, the restrictions he has to cope with when building on leasehold land, or the risk he runs where ancient lights are interfered with: rather than to have to buy his experience in these and similar matters at an expense of money to his client and of vexation to himself.

To this outline of the courses of lectures I propose to add some account of the method pursued.

The objects to be kept in view are twofold: first, to convey information; secondly, to make the students think for themselves.

A large portion of the lectures is unavoidably devoted to giving information. It is of great importance to fix in the minds of the students those facts relative to their future profession which are most useful for them to know; so, of necessity, much of the time which the professor and his classes spend together is devoted to telling, or illustrating, or recalling the most important of those facts.

I am very desirous of inducing the students to draw. It is by the pencil that an architect learns as well as designs, and if it is possible to stimulate the use of the pencil to any extent by what passes in this class-room, it will be most satisfactory to me and serviceable to yourselves. I trust that the sketches which I made on the black-board will be always copied in your notebooks, and that you will make sketches from the diagrams hung up. I shall continue the practice which Professor Donaldson established of lending the diagrams to students, and I shall be delighted if they are much borrowed and much copied, and I shall have pleasure in offering prizes for the best sets of sketches illustrative of the lectures A and B, and shall hope to find that there is a keen competition.

But the most serious part of my task remains behind. Can I teach the students not merely to know something about buildings or parts of buildings, or to draw them, but to understand them;—feel their value as works of art or as specimens of construction, and penetrate through the outward and tangible aspect of a material thing to that inspiring something—that reason, or design, or contrivance, or historic import which gives to a congeries of bricks and stones and mortar a value which in some cases is literally beyond all price? Can I make you understand why the choir of Westminster is lovely, or what the secret principles are which hang the fretted roof of its Lady Chapel in mid-air? Can I enable you to study, and to some extent comprehend, ancient designs, and so take the first step towards yourselves becoming designers? I do not know, but it will be my endeavour to do something of this sort, and if I can see that even to a very small extent I have been successful in making you think for yourselves, I

shall be far more satisfied than if I find your minds crammed full of facts and dates, and matters which can be learned by rote, and which it is often possible to know without understanding them.

The method of lecturing established by Professor Hayer Lewis will be continued, at least through this session. It is a method more serviceable to the student than agreeable to the Professor; but I believe it affords a very good means of learning what is taught, and reduces to a minimum the risk of mistakes in your notes. The plan is this: The notes of a portion of the lecture will first be dictated slowly, sentence by sentence, and are to be written down by the class as I read them out, and then, after this is done, I shall go over and explain the portion of the subject which the notes cover. This ought to ensure correctness in your notes, and gives an opportunity for revising them to a certain extent; but I value it chiefly because it leaves the students free to listen with their eyes as well as their ears (and, believe me, the eyes help you to understand wonderfully what is said, without being distracted by the effort to follow the lecturer and fill the notebook at the same time.

I may perhaps now and then vary this plan for a single lecture. Occasionally, at any rate, it will be desirable for you to hear, and me to give you, a connected discourse not disturbed by the breaks to continuity which such a system entails. I shall be sometimes glad, especially when trying to show you the principles that underlie architectural rules or practice, to be as uninterrupted as possible, and you will probably be the better for having occasionally to give continuous attention. When this is done I will take care that an outline of the heads of the lecture is provided for each of you, so as to leave you free to follow me.

It has been the custom, and one which I hope to follow as an additional means of interesting and instructing the classes, to take the students to one or two of the great buildings of London and to some large builder's yard, when the opportunity will occur of seeing in actual fact some of the matters which form the subject of our lectures, and where, perhaps, the habit of examining buildings and works in progress may be encouraged, and the method of investigating ancient work learned.

A notice of the method pursued here would be incomplete were I to omit the examination and prizes. The examination, the results of which determine the prizes, takes place at the close of the session: it is entirely in writing or by sketches, the questions being printed, and the prizes are publicly presented at the College. An alteration has been made this session, by which the work of the entire year will be treated as one whole. Formerly it was divided into two portions, and the arrangements were such that only half the work done by a student was the subject of the final examination. An attempt to remedy this last year by holding two examinations was found inconvenient in practice, and this time the examinations at the close will cover the work of the whole session in each class. An examination, properly looked at, is an admirable feature in a course of instruction. It enables a student to recognise the progress that he has made, and compels him to make some use of what he has learned. I shall probably, therefore, introduce one additional examination during the session in each of the classes A and B, not to be counted towards the award of prizes, but solely for the purpose of aiding students. Let me add that it is most desirable that every person attending the class should attend the final examination, and do his best to obtain, if not a prize, at least a certificate. The prizes given include two silver medals given by Professor Donaldson, and bearing his name, together with valuable prizes of books. The certificates are given to as many students as obtain a certain proportion of marks out of the total possible; and it is fair here to point out to you that the best way of obtaining a good proportion of marks is not to write long answers, and to bring in irrelevant things which the student knows, but which form no part of the correct answers to the question—but to write accurate and clear replies which shall on the one hand answer every part of the questions, and on the other, shall not travel beyond the questions, and to illustrate them, wherever possible, by well-drawn sketches. Where an answer is given, wholly or partly, by a sketch, I always,

in marking the paper, first allot as many marks to it as would have been due to a correct reply in writing, and then add something more for draughtsmanship if the sketch shows any merit.

Thus far it has been my aim to show to you, gentlemen, what this college has been doing for years past, and what I, as its professor, propose to endeavour to do in the coming session for such of you as become students. I must not close without some remarks upon what you must do for yourselves, and upon the degree in which our work here may be an aid to you in that which occupies you during the greater part of your time.

I have already said that in an office you learn practice—in the classroom you learn principles. If this be so, it is not difficult for you to see that as you master principles here, you will find they enable you rapidly to get a firm hold upon practice elsewhere.

Take the most important branch of your work, in the office or out of it—your drawing. The arrangements of these classes do not, it is true, provide for instruction or, except just incidentally, for practice in drawing; but there is hardly a part of either the construction or the architectural treatment of a building which you will not draw far better when you know the reasons for its taking the shape it does. The simplest parts of your work, the working out of plans, will explain what I mean. The beginner is often in difficulties as to the thickness of brick walls. I hope, when he has been through the part of this course which refers to brickwork, that the sizes of bricks and the mode of combining them into walls, will be made clear to him for life. Another illustration may be taken from a more advanced sort of work. The elevation of a building ought to have—I think will have—more interest for a student who knows something about the features employed, than if he simply copy them unintelligently. For example, if the Orders occur, he who knows something of how and where they originated, what their earliest forms were, and where they were matured, will draw with more understanding and pleasure, and will, therefore, be sure to draw them better than one who only knows that he has gone through a rather irksome task in drawing them out after some typical example. The man who has some general acquaintance with the forms of architecture and its history, will be prepared to deal with whatever period or style he has to work at, as something not quite strange to him. The same thing is true of materials and construction. When, for example, you understand the reason of the shapes and relative sizes of the timbers in a roof, and why their joints are shaped as they are, and what purpose each part has to serve, you will feel more interest in drawing such roofs as you may have to put into plans, and you will undoubtedly draw them with fewer mistakes. When you have been told what are the main peculiarities of the leading building stones, or the sorts of timber most used, and when you know what marks indicate good quality, and what the reverse, you will not only find a walk round a building instructive, but may soon become able to make yourselves useful in aiding, to some extent, in the superintendence of buildings. At any rate, after having mastered some of the elementary principles of materials or of construction, you will be able to take in and assimilate the information which the accidents of practice bring within your reach.

As a general rule, I believe that a young man who has already spent some months or a year in an office is more likely to get benefit from these classes—especially from the Construction class—than one quite new to the subject. On the other hand, I believe, as I have stated, that to a youth just fresh from school or college, the opportunity of some systematic and scholastic teaching on subjects connected with his profession is of importance—so much so as to outweigh any disadvantage arising from his being new to the subject. A student so circumstanced should attend the Art class, and that only, in his first year, and should take the Construction class the year after. If, however, a student has been a year in an office (much more if he has been a longer time) it may be advantageous to him to attend both classes in the same year. This is, however, partly a question of the amount of time he can give to

the work at home which attendance here involves.

I hope it will be distinctly understood, and always borne in mind, that the student who wishes to get real benefit from these lectures must devote some time to them at home each week, besides attending his hour here. The notes should be carefully written out in ink—from the rough notes made in the room—and the sketches made from the black-board should be carefully and neatly copied into the permanent note-book. The books named should be consulted; but most and chiefly, everything connected with the subject of the lectures of which illustrations can be found should be drawn. The diagrams afford a mine of wealth of this sort, and the generous practice of lending them, under proper restrictions, to copy affords an opportunity of making the fullest use of them. Much information may be gained by copying, sketching, or reducing these diagrams; but the student who wishes to make the most of his opportunities should also draw or sketch such illustrations in other books, or such photographs, or such pieces of actual work as come under his notice, and are of a nature to elucidate the subjects being treated. I have had the pleasure to see excellent sets of illustrative sketches in previous sessions, and I repeat that I sincerely hope this may be the case in the present session.

Allow me to express my hope that most, if not all, students will attend the Art class. I believe it to be of the greatest possible importance, and that attendance at the Science class alone is a very incomplete and one-sided mode of education, even for an engineer or a surveyor, much less for an architect. It is hardly possible to convey to you how keenly a critical observer is sometimes made to feel the disgraceful want of knowledge which English architecture too often betrays. Features which are inaccurate are constantly to be met with in designs, otherwise so simple, that a very small amount of education would have insured correctness. Features that are incongruous are frequently put together, and spoil the effect of many a building which, had its author's cultivation only been such as his talents deserved, might have been a complete success. Of course, attendance in the Art class is no guarantee of correctness; but a very considerable amount of such information as no architect, no draughtsman, no civil engineer ever ought to be without, is put within the reach of the students of that class, and I can venture so far as to say that no young man of intelligence who has gone through the course and worked at it fairly and thoroughly, ought to be able—I think I may say would be able—to design such monstrous elevations and details as would be found, if we went to look for them, within a hundred miles of the centre of this great metropolis.

As to the Professional Practice course, it is not designed for beginners, and probably few students who have been less than three years in an office will be able to reap the full advantage of attending it; while, I hope that to many who are much more advanced these lectures may be serviceable. They have been attended during the short time that they have been given by architects in practice as well as by senior students, and, as already explained, they will be directed specially to the requirements of those who are beginning, or are hoping soon to begin, practice.

In conclusion, perhaps, I may be pardoned if, passing away from the subject which has occupied our attention, I say one or two parting words about work and study outside these walls; in fact, I feel as if I could hardly close without some allusion to your own studies. Many topics might be touched upon; but I will limit myself to a passing remark or two upon each of four: Drawing, Practical Work, Books, and the Study of Ancient Buildings.

Before anything else, it is of importance to you to draw—and to draw well. You ought to be able to represent, fairly well, anything you see. And if you wish to attain this power nothing is so useful as studying the human figure. The Slade school here is the best school for the purpose that I know; but those who cannot give the time in the day-time, may be able to draw at one of the schools of art where the antique is studied in the evening.

With your drawing instruments you ought to be able to work as easily as an ordinary draughtsman using the pencil alone. To laud

the tee-square and dividers thus readily requires long practice; but till this facility is completely attained, the instruments will always be a little in your way. Long before that time, however, you ought, so far, to master the use of them that all your ink lines shall be true and even, all your circles really round, and all your right lines really straight; and if this degree of steadiness has been perfectly mastered in a student's first twelve months, it is a not discreditable performance, and perfect command of the instruments will follow in time. Practice sketching things you see, especially portions of buildings; and, in short, strive to become, in every sense of the word, skilful, artistic, and rapid draughtsmen. Above all things, practise yourselves in designing. The power of originating architectural compositions may be latent in many of you; but effort is as much required to bring out that power as to make manifest any other latent capacity or gift. Design is fostered by study; but a man may be studious without a particle of inventive power, or may perhaps neglect invention for the attainment of knowledge, and by so doing impair his ultimate success as an architect. Practise designing therefore.

Next in importance to drawing comes practical work of any sort. The most useful of all is to go into a workshop and learn to make something belonging to a building. By the time he has become able to make a four-panel door, a youth can gain such an acquaintance with construction as will prevent his making half the mistakes which disfigure most working drawings turned out by young hands. But whatever piece of practice of any sort is within reach, examine it, and get a share in it. The commonest office work done intelligently may impart valuable knowledge. To trace drawings or copy specifications, if only the young clerk determines to understand all that goes under his hands, is a means of gaining all kinds of instruction, and a six roomed house, if only it be watched closely from day to day, would afford a fund of information as to materials and construction. Do not, therefore, neglect or despise the humblest opportunity of seeing or sharing in any sort of practical work which comes in your way.

The use of books has already been considered at some length. I should like to suggest that the student should not only by degrees form a library of the best books of reference (taking care to get the best), and that what he buys he should read; but that he should make use of the fine public libraries accessible in London, and in not a few of our great towns. There are a few good architectural books in the library of this college, free to students. There are some, I believe, at Sir John Soane's Museum; and the three great art libraries of the Royal Academy, the South Kensington Museum, and the Royal Institute of British Architects, supplemented by the Library of the British Museum and the loan library of the Architectural Association, furnish the London student with the means of consulting every book of reference that exists, and every illustrated treatise on our art, with little inconvenience, in some instances at absolutely no expense, and in other cases at a merely nominal fee. Do not, therefore, neglect the magnificent opportunities for making use of good books which exist within your reach.

Last, but by no means least, comes the study of ancient buildings. This is alone the source of inspiration and of accurate knowledge for the architect. Set it down in your minds that your best opportunities are those which give you time to measure or sketch some good example of English or foreign architecture, and that your training will remain incomplete unless one good long journey, or more than one shorter one, shall have enabled you to study examples on the Continent of Europe as well as English ones. It is not buying prints and photographs which puts knowledge into your minds; it is the process of patiently watching, examining, and, so to speak, absorbing the peculiarities of your subject while you draw it, that enables you really to know it; and, let me add, this is much more thoroughly accomplished by the process of making a set of geometrical drawings from the solid work than by representing it in a perspective, however cleverly and prettily that may be done.

If the variety and extent of study which is here hinted at—prolonged, as it ought to be, through a series of years, and, in fact, more or less kept up through life—

seem formidable, let me remind you, that the profession of an architect is not an easy one, and that it is only by unremitting, careful, and studious work that the student can fit himself for the discharge of its various duties and render himself equal to its responsibilities. But in almost every department of these studies there is much to interest and even to fascinate the mind. There is hardly any amusement undertaken for pure pleasure which is so enjoyable as a sketching tour through a district rich in works of architecture. There are few occupations where the anxieties and hard work inseparable from all the real business of life are lightened by so many occupations of a kind which it is a pleasure to engage in, and none, so far as I know, where the advantages of variety of employment are so fully enjoyed. A calling such as you will find architecture to be, if you heartily throw yourselves into it, demands that those who engage in it should fit themselves for it by sufficient training and assiduous study. It will be my part to attempt to offer to my students a portion of this training, and I trust that those of you who join my classes will come prepared to study with such assiduity as to command, as well as deserve, success.

SPECIFICATION OF IRONWORK.

IN the specification of ironwork it is very useful to know what are the market forms and qualities. By specifying for the brand and trade-mark of a well-known maker, the purchaser or engineer may be protected from imposition, though it is not seldom that with the utmost care he may suffer from the trickeries and fallacious marks known only to the trade. There are certain tests which only good wrought iron can stand, and these ought to be known. Bar-iron, for instance, may be notched and bent cold to show the fibre. B and BB bars should stand a tensile strain of 22 tons per square inch with the grain of the iron, or 18 tons crosswise thereto. Flat bars not exceeding $\frac{3}{4}$ in. thick may be bent with the grain to a radius of $2\frac{1}{2}$ times their thickness without fracture; they should also be able to stand punching and drifting without fracture. Engineers require certain tests; one of the best is to find the ductile quality by the amount of contraction of the area of section before tearing asunder under a tensile strain. Kirkaldy's experiments have shown that the contraction of area at fracture is an essential element in estimating quality, and is more reliable than the breaking strain. For both strength and ductility, the iron for structures should be specified not to break with a tensile stress less than a given amount, and that before breaking it ought to elongate not less than a certain proportion of its original length. The measurement for elongation is soon found, while the reduction of area at fracture is not so readily determined. The iron which shows the greatest tensile strength is generally the hardest, but has the least ductility or power of stretching; but both these qualities are necessary in certain members of a bridge. For plate-iron, the bending tests, when hot, are useful as rough tests. Plate-iron may be bent either hot or cold, with or across the grain, and the angle through which the plate should bend without cracking depends on the thickness and quality of the iron. According to the Admiralty tests BB plate-iron, grain lengthwise, $\frac{1}{2}$ in. thick and under, can bend 120° when hot, and from 15° to 70° cold, the last angle being for $\frac{3}{4}$ in. plate. Crosswise, with grain, the plate will bend, when hot, to 90° , and from 5° to 30° cold, according to the degrees of thickness from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. For B plate, the angle bent through is 90° hot, and from 10° to 55° cold, while crosswise of grain, the angle through which the iron can be bent is 60° when it is hot, and it will bend from 5° to 20° cold from $\frac{3}{4}$ in. to $\frac{1}{2}$ in. thick. The angle referred to is that through which the plate is bent from the horizontal. Rivets of good quality should double when cold without fracture, and their heads ought to be capable of being hammered down without cracking when hot. Again, the physical appearances of iron ought to be known. Wrought iron, when suddenly broken, presents a crystalline appearance—when gradually a fibrous one; but it has been shown that good iron may be either crystalline or fibrous, according as the stress which caused fracture was sudden or gradual. Bad iron is never fibrous, but no

criterion as to quality can be arrived at without knowing how the iron has been treated, and the strains have been applied.

Bars are round, square, or flat, and the ordinary sizes are $\frac{1}{2}$ in. to 3 in. diameter, or sizes increasing by 1-16 in. Flat bars are generally from one inch by $\frac{1}{4}$ in. to 6 in. by $\frac{1}{2}$ in., the width increasing by $\frac{1}{4}$ in.

Among the sections kept in stock are half-round, oval, convex, octagon, and hexagon. Such bars can be had up to 22 ft. in length without extra charge. Ordinary bars are sold at usual rates from $\frac{1}{2}$ in. to 3 in. wide; below these dimensions the rates increase 5s. to 10s. per ton for every 1-16 in. reduction. Above 3 in. the prices also increase. Bars of L or T-shape are rolled from $\frac{1}{2}$ in. to 8 in. wide. For sections thinner than $\frac{1}{2}$ in., 10s. to 20s. extra per ton is usually charged, and the same increase is incurred for sizes over 8 in. wide. In most of the large manufacturers' lists, however, sections of every useful size can be obtained at ordinary rates. Most of these forms of iron can be obtained in lengths up to 40 ft., above which a few shillings more per ton is charged for every 5 ft. of extra length. This length, of course, depends on the rolling-mills, which vary from 20 ft. to 40 ft. for L bars, and 20 ft. to 30 ft. for T bars. It is stated on good authority that the iron in L bars is of better and more uniform quality than that in T bars, as the pressure in rolling is more equally applied. Channel iron, used in lattice girder bridges, is made of several sizes, but the rolled iron joist or I-shaped girder is one of the most useful sections in construction, and is manufactured in a variety of forms, proportions, and sizes. It is rolled in depths of from 3 in. to 14 in., but every manufacturer publishes his own sections, with the weight per foot run and the distributed weight each section will bear. The uses of this favourite section are too well-known to need mention; it may be remarked that its employment for fireproof floors and large roofs on the Continent increases yearly. Small and narrow sections are the cheapest. Beyond 9 in. deep and 4 in. wide the price increases from £1 to £2 a ton. If wider flanges than 6 in. are required, the price is greater. For constructive purposes joists of more than 12 in. deep are better in riveted iron, though sections up to 20 in. deep are used on the Continent, and by riveting two sections together, either side by side or vertically, rolled joists of this section can be applied to almost any ordinary purpose. As regards length, the small sections are rolled up to 25 ft. without extra charge, and the larger sections up to 20 ft.; beyond these lengths the price often increases, and lengths up to 40 ft. are now commonly supplied at little additional cost. These joists are generally cut to the required length, hot as they leave the rolls; if cut to a length, cold, a sum of a few shillings per ton extra is charged. Architects who require to specify these forms of iron do well to find out the dimensions kept in stock by merchants before writing; these vary, but lists are generally obtainable giving sections with weights and every particular, which may save much useless trouble and calculation.

The memorial-stone of a Sunday school now in course of erection near the Upper Brook-street Free Church, Manchester, was laid on Saturday. The school has been designed to harmonise with the church, which is in the Early English style, and was built some 40 years ago, from the designs of the late Sir Charles Barry. The whole of the elevations are faced with stone, and a feature has been made of the octagonal staircase, which faces Upper Brook-street. The work is being carried out by Mr. Herd, of Ardwick, from the plans and under the superintendence of Mr. J. W. Beaumont, architect, of Manchester. The estimated cost of the school is about £2,200.

At the seventh half-annual meeting of the New-haven harbour company, held on Friday, a report was received from the engineer (Mr. F. D. Baister), stating that the capital expenditure for the improvement of the harbour, including purchase of property, now amounts to £198,716. The breakwater, which is intended to be 3,000 ft. in length, now extends 700 ft. seawards, and concrete blocks for the foundation have been deposited for a further length of 200 ft. The new eastern quay is nearly completed, and the two new eastern piers to harbour will be finished during the ensuing autumn. 118,000 tons of mud have also been dredged from the harbour during the half-year. Mr. Carey is the resident engineer of harbour works, and Mr. H. Jones, surveyor to the company.

CONTENTS.

Gate-proof Architecture	515
Domestic Fittings and Finishes	515
The Turners' Exhibition	516
Dangerous Chimneys	517
The Indian Public Works Department	518
Stonehenge.—II	518
The British Archaeological Association	519
Architecture at University College	522
Specification of Iron	525
Our Lithographic Illustrations	526
Geological Maps	526
Chips	526
An Elevated Railway for Vienna	526
Glasgow Institute of Architects	539
The New Town Hall at Huddersfield	539
Trap	540
The Technological Examinations of the City and	
Guilds of London Institute	541
Slate Quarrying	541
Our Common-place Column	541
Building Intelligence	542
Archæological and Archaeological Societies	543
Competitions	543
To Correspondents	544
Correspondence	544
Intercommunication	545
Legal Intelligence	546
Stained Glass	546
Our Office Table	547
Meetings for the Ensuing Week	547
Tenders	547

ILLUSTRATIONS.

ALBERT HALL MANIONS, SOUTH KENSINGTON.—RESIDENCE
FOR G. NODDER, ESQ., MILFORD MANOR ESTATE, SALIS-
BURY.—NEW MIXED SCHOOL, PENCOEED.

OUR LITHOGRAPHIC ILLUSTRATIONS.

ALBERT-HALL MANIONS, KENSINGTON, W.

This building, which has lately been erected in Kensington Gore, is situated close to the Royal Albert Hall. Its scheme, being somewhat complicated, and therefore difficult to explain without diagrams, we publish herewith plans of two floors and a section, which will make clear the arrangements. On referring to the section, it will be observed that the front or north side is divided into seven stories, whilst the back portion has nine floors in about the same height. The object of this is to place the whole of the principal or reception-rooms so as to overlook Hyde Park, and by the lesser number of stories to obtain greater height, whilst the back of the building being occupied by bed and dressing rooms, kitchens, &c., a less height, such as 10ft. 6in. or 11ft., is for all practical purposes as good; and by this arrangement a considerable amount of accommodation is gained. The variety of levels which thus arise make the plans, unassisted by a section, difficult to understand. The portion already built, and shown in our perspective view, consists of three entirely separate blocks. In each block are eight large separate suites, and in the upper part eight smaller suites, which may easily be altered into four larger suites, if desired. Each of the larger suites is complete in itself, with front door opening from the principal stair, and back door from the service stair. Two lifts are provided: one for passengers, and one for coals, provisions, &c., situated close to the tradesmen's entrance. It will suffice to describe two floors, as all the others are very similar. The ground-floor consists of outer and inner entrance-halls, dining-room, and drawing-room, each 20ft. by 17ft.; three bedrooms and w.c. on same floor. A private stair leads up to three bedrooms, bath and linen room, w.c., &c., on entresol. In the basement, also reached by a private stair, is a kitchen and scullery, pantry, two bedrooms, larder, and coal-cellar. The rooms belonging to the ground-floor suites are marked in the plans and section by the letter A. The suites on the first floor have each outer and inner entrance-halls, a drawing-room, 20ft. by 17ft., and a dining-room, 21ft. by 17ft., two bedrooms, and a dressing-room on the same floor, and a private stair leading down to a kitchen, pantry, bed and dressing room. The rooms of this suite are marked B on plans and section. On the section the letter C shows the rooms of third floor, and D those of the fourth. Ample carriage and spare rooms are provided for all the suites in the basement. The whole of the work has been carried out by Mr. Thomas Hussey, of High-street, Kensington, from the designs of Mr. R. Norman Shaw, R.A.

RESIDENCE, MILFORD MANOR ESTATE, SALISBURY.
THE house illustrated upon the adjoining page has been recently built for Mr. George Nodder

upon the Milford Manor estate, which has been recently sold by the Ecclesiastical Commissioners. The building stands at the north end of the property, where it abuts upon the new road to Laverstock. The house is built of brick, faced with the Fisherton white bricks and Bath stone dressings. Messrs. Young and Sons, of Salisbury, were the contractors, their tender being £1,500, exclusive of the boundary-walls. The interior decorations have been tastefully executed by Mr. H. D. Martin, under the direction of the architects, Messrs. John Harding and Son, of Salisbury.

MIXED SCHOOL, PENCOEED.

THREE schools, which accommodate 170 children, were recently erected from the designs and under the supervision of Mr. Henry C. Harris, A.R.I.B.A., architect, Cardiff, by Mr. George James, builder, Bridgend, at a cost of £1,500, inclusive of furniture and boundary-walls. The materials used were red bricks and terra-cotta from the adjacent works of the Pencoeed Brick and Tile Company, for the walls, with small green slates for the roofs.

GEOLOGICAL MAPS.

FOR engineering purposes good maps are essential, and a map of a district with the physical features laid down is one of the first necessities. Hills, rivers, streams, geological boundaries, and heights above the sea-level ought to be shown, so that the line of any intended railway can be laid down in the most economical manner. Maps for this purpose are issued by the Ordnance Survey. One of these is drawn to a scale of 1 in. to a mile, and is large enough for a general indication or a preliminary survey; if greater accuracy and detail is necessary the 6 in. scale map may be used. The Geological Survey have also issued sheets of maps to the same scale, though some parts of the country are not yet published. The sheets to the larger scale represent about twenty-four square miles, and are about 18. to 68. persheet. In addition to these maps, geological sections are published to a general scale of 6 in. to the mile, traversing England and Wales, Scotland and Ireland in various directions. These are sold with descriptions in sheets, representing about 36 lineal miles, and numbered for reference. Contour lines are given on the large scale maps of the Ordnance. These lines, as may be imagined, represent all the points cut by a horizontal plane at certain heights. Contour lines convey in a very graphical manner to the eye, the physical conformation of a district—the hills and valleys are clearly indicated by the lines and their contour. The following principles ought to be remembered in using contour lines:—(1) The boundary lines of horizontal strata exactly coincide with the contours; the lines, in fact, may represent the boundaries; (2) The boundary lines of strata dipping towards a hill are less winding than the contours; (3) The boundary lines of strata dipping from a hill are more widening than the contours. From these principles it is easy to determine the boundary of strata, if the beds continue the same; but dips and "faults" interrupt a boundary line, and these require personal survey by the aid of borings and trial holes.

CHIPS.

In our account last week, on page 513, of the new sea defence works at Hythe, an error occurred. It should have been stated that the works were carried out from the designs of Sir John Coode, under the superintendence of Mr. H. D. Good, C.E., of Dymchurch. The constructor was Mr. H. B. James, C.E., of Westminster.

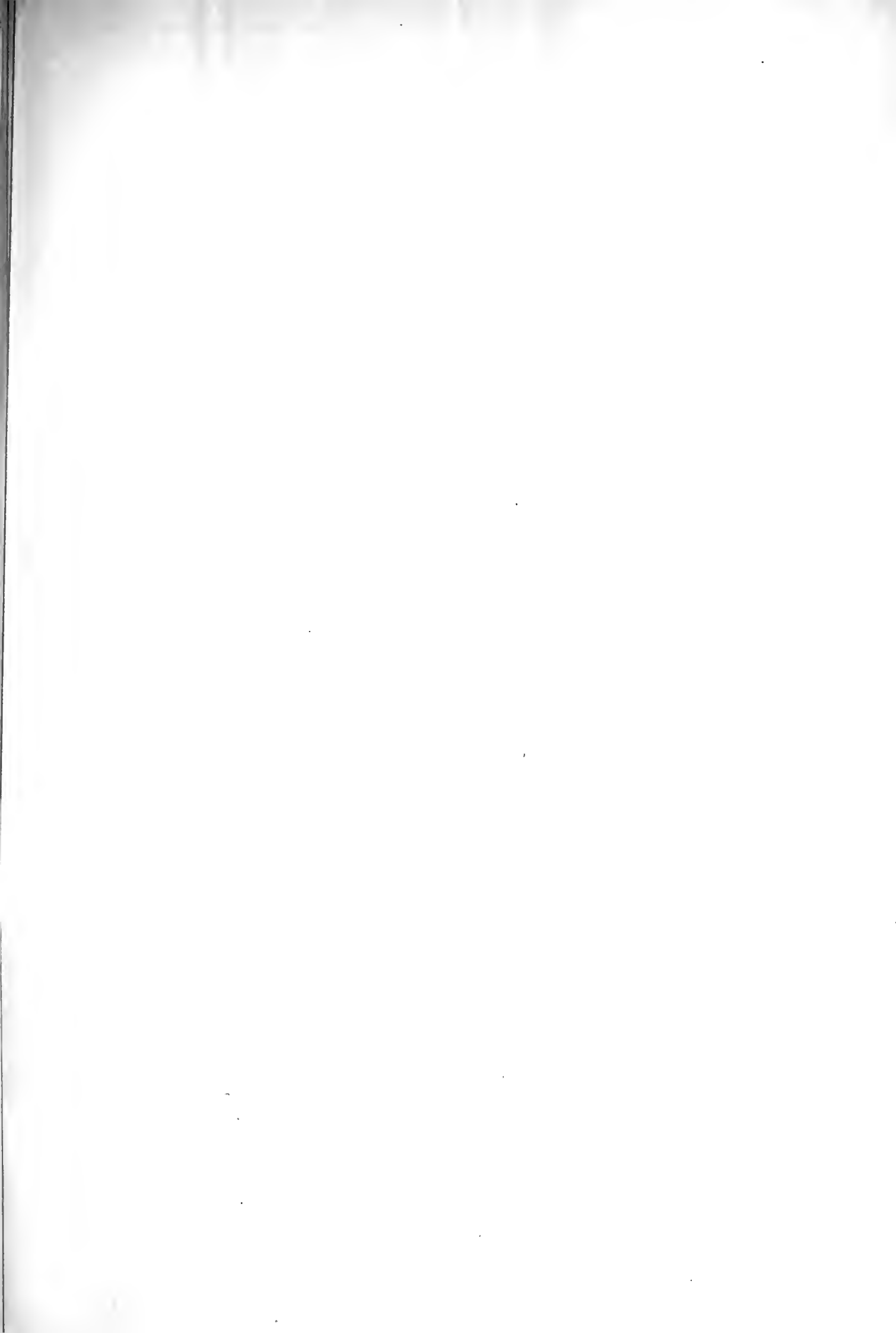
Mr. F. A. Fawkes, author of "Horticultural Buildings," has been retained to give a course of three lectures at the Crystal Palace School of Gardening, at 5 p.m., on Nov. 16th, 23rd, and 30th, to the students and the public, on the construction, fittings, and heating of greenhouses and other horticultural structures. These lectures will be illustrated by numerous diagrams, &c.

A bazaar has been held in Walworth-road Wesleyan Chapel, Camberwell-gate, in connection with the reopening of the building after renovation and improvement effected at a cost of £1,000. Of this work Mr. Charles Bell, of Old Broad-street, was the architect, and Mr. Goad, of Camberwell, the contractor.

AN ELEVATED RAILWAY FOR VIENNA.

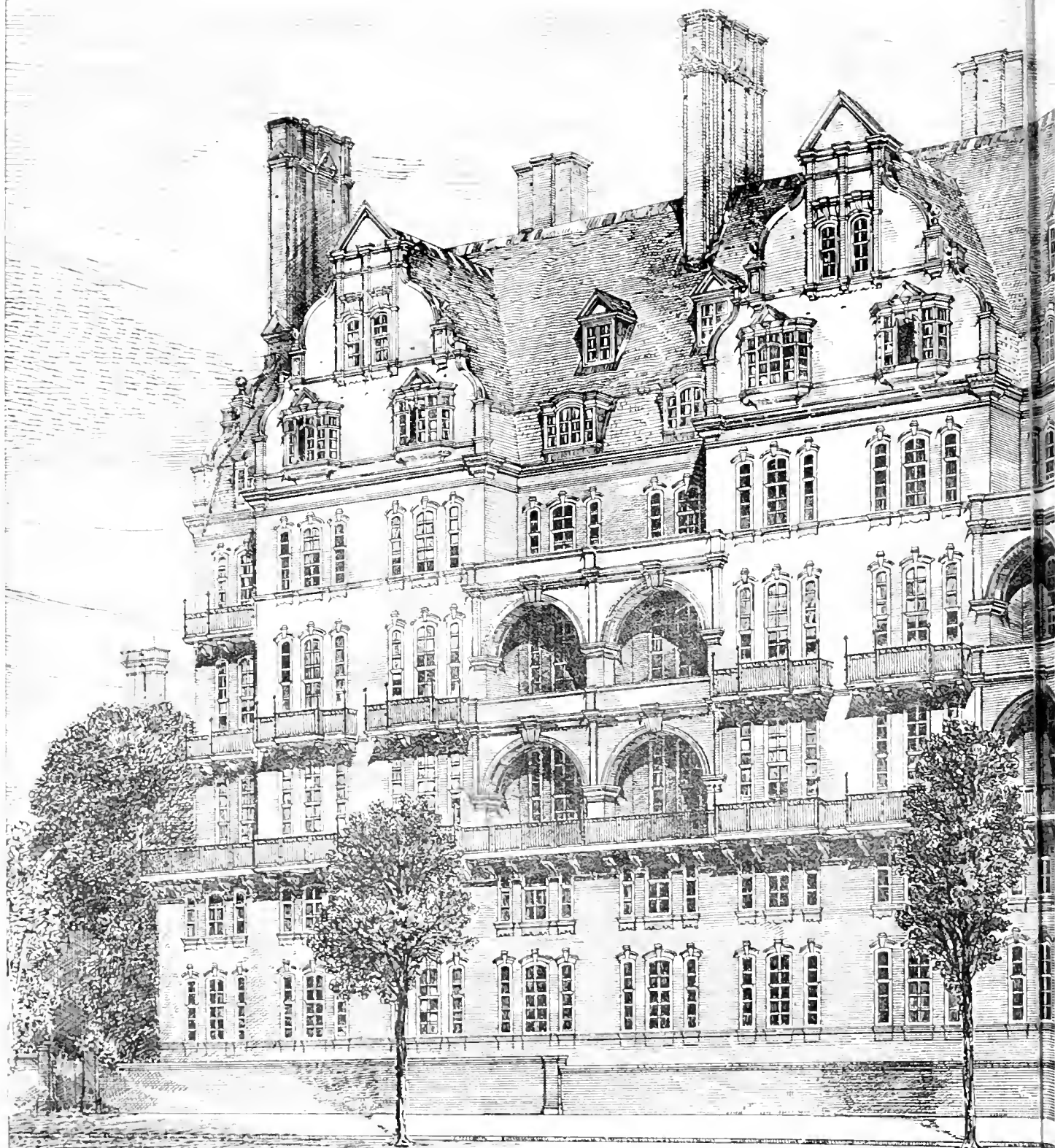
A PROJECT is on foot for constructing a circular intra-urban railway for Vienna, which, wherever it may be possible, shall be carried above ground on iron columns, with such improvements in the method of construction as may have been suggested to the engineers by their experience of railways of this kind already in operation in New York and Berlin, and one of more recent construction in Rotterdam. The length of the circular railway as projected is about 8½ miles (English), but it is proposed to make six branches, which would give it a total length of about 28 miles. These branch lines, diverging in various directions, would connect with the circular line (and so with one another), the termini of the other railway systems, the Government arsenal and storehouses to the south-east, and a system of tramways which it is proposed to lay down to serve the rapidly-growing suburbs to the south-west of the city. To meet the objections of the Viennese to anything which might destroy the beauty of their city, great attention has been paid to the appearance of the stations, viaduct, and other works, by Mr. Joseph Fogerty, M.Inst.C.E., the engineer of the scheme, under whose direction the details of construction and designs for stations, &c., have been prepared. It is proposed to erect a large central station in the Franz Josef Park on the right bank of the Danau Canal and near the Bourse. The building, to be 750ft. by 250ft. in width, would be of an ornate character, and to compensate the people for the loss of some of the public park, it is proposed to use the space under the railway platforms and offices of the station for a fish, fruit, and flower market, while the extension of the station at each end used for sidings, &c., would be converted into a covered children's playground, or devoted to other public purposes. A device is suggested for lighting the space beneath the stations, by forming the vertical faces of the platforms of reflecting lenses. At this point, too, wharfage accommodation would be provided for the steamboat traffic. There would be two other large junction stations, and 16 smaller stations on the circular railway. The roadway of the elevated portion of the line would be of open or griciron pattern, formed of large balks of timber on which would be laid heavy steel rails. It is believed that by adopting this method of construction the noise from the passing trains would be reduced to the minimum. This part of the line would be carried at an average height of 16ft. to 18ft. from the ground on cast-iron columns of 11 in. diameter, placed in clusters of three. They would be bound together in the centre, and connected at the cap and base in such a way as to render the use of "lugs" unnecessary—a point to which attention was specially directed by the Tay-bridge catastrophe. These groups of columns would be 60 to 80ft. apart, the lattice-girders on which the roadway would be borne being surmounted by a light ornamental railing. The width of the elevated portion is designed to be 28ft. over all. The principal streets would be crossed by arched ornamental bridges. For 70,000 tons of the ironwork which would be required, the custom duties being practically prohibitory of its importation, a provisional contract has already been made with the Witkowitz Iron Company, of Austria, represented by Messrs. Rothschild and Guttman, of Vienna. The locomotives, weighing 25 tons, would be of the kind introduced by Messrs. Lamme and Franck—fireless and charged with steam from stationary boilers. The cost of carrying out the scheme is estimated at from four to five millions sterling.

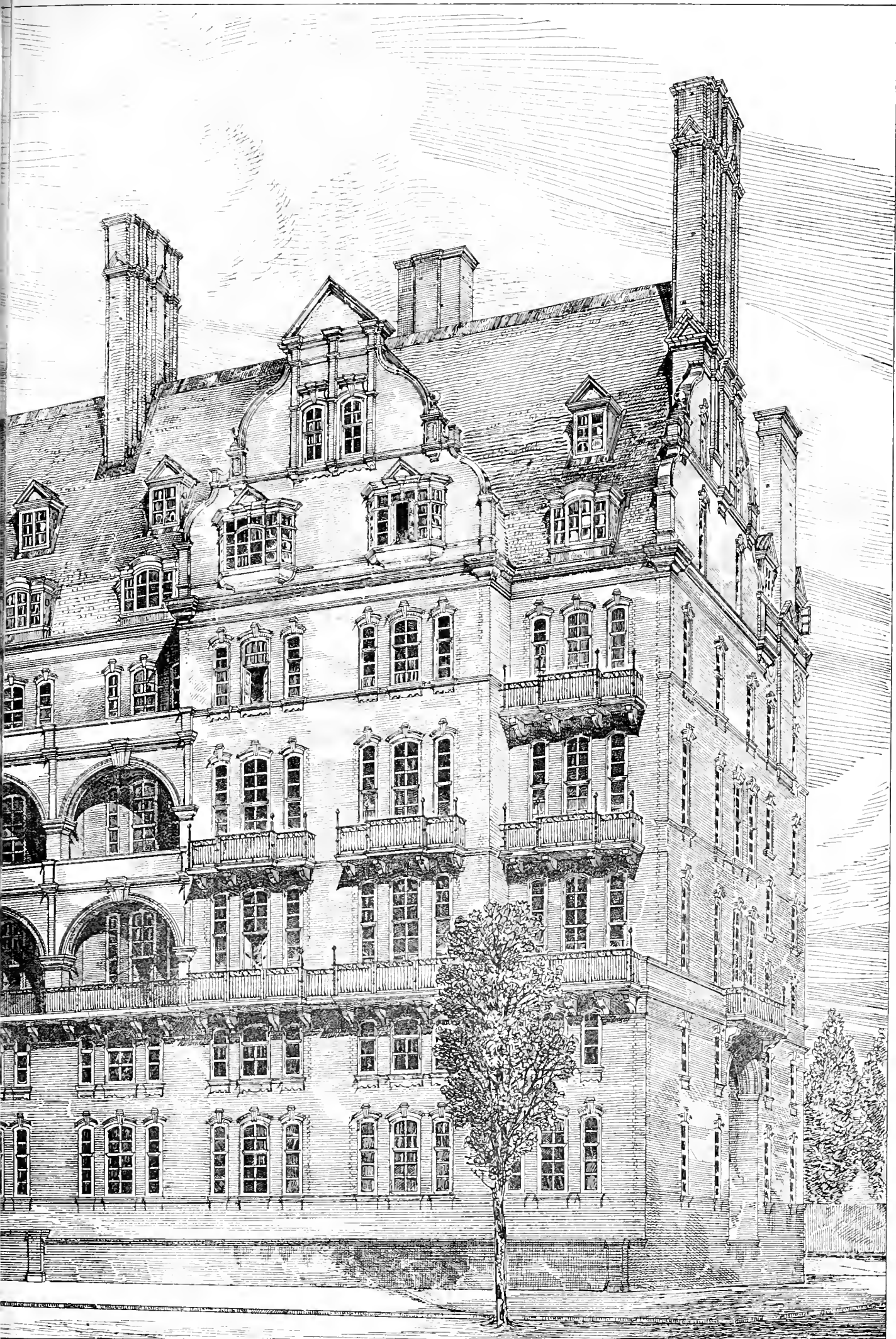
A public meeting, convened by the local builders, was held at the assembly-rooms, Richmond, Surrey, last week, to consider the building by-laws now under the consideration of the Richmond Vestry for adoption. Mr. A. C. Wylie occupied the chair; and after a report had been read by Mr. W. P. Goulding, F.S.I., a resolution was passed requesting the vestry to have the proposed regulations revised by some competent authority before being submitted to the Local Government Board. At a special meeting of the vestry, which has since been held, it has been decided to make several alterations in the by-laws, in order to meet the objections raised to them by builders.

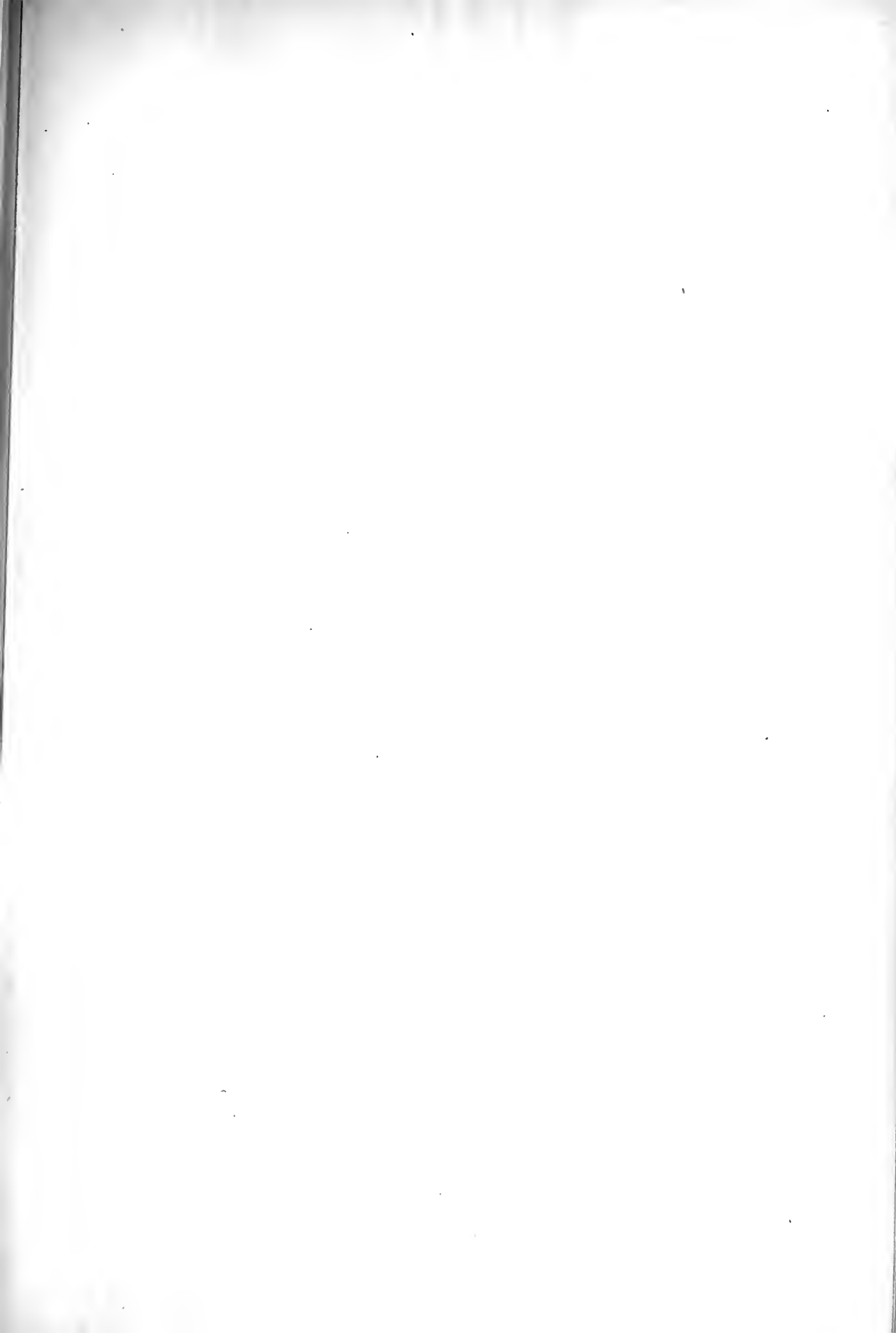


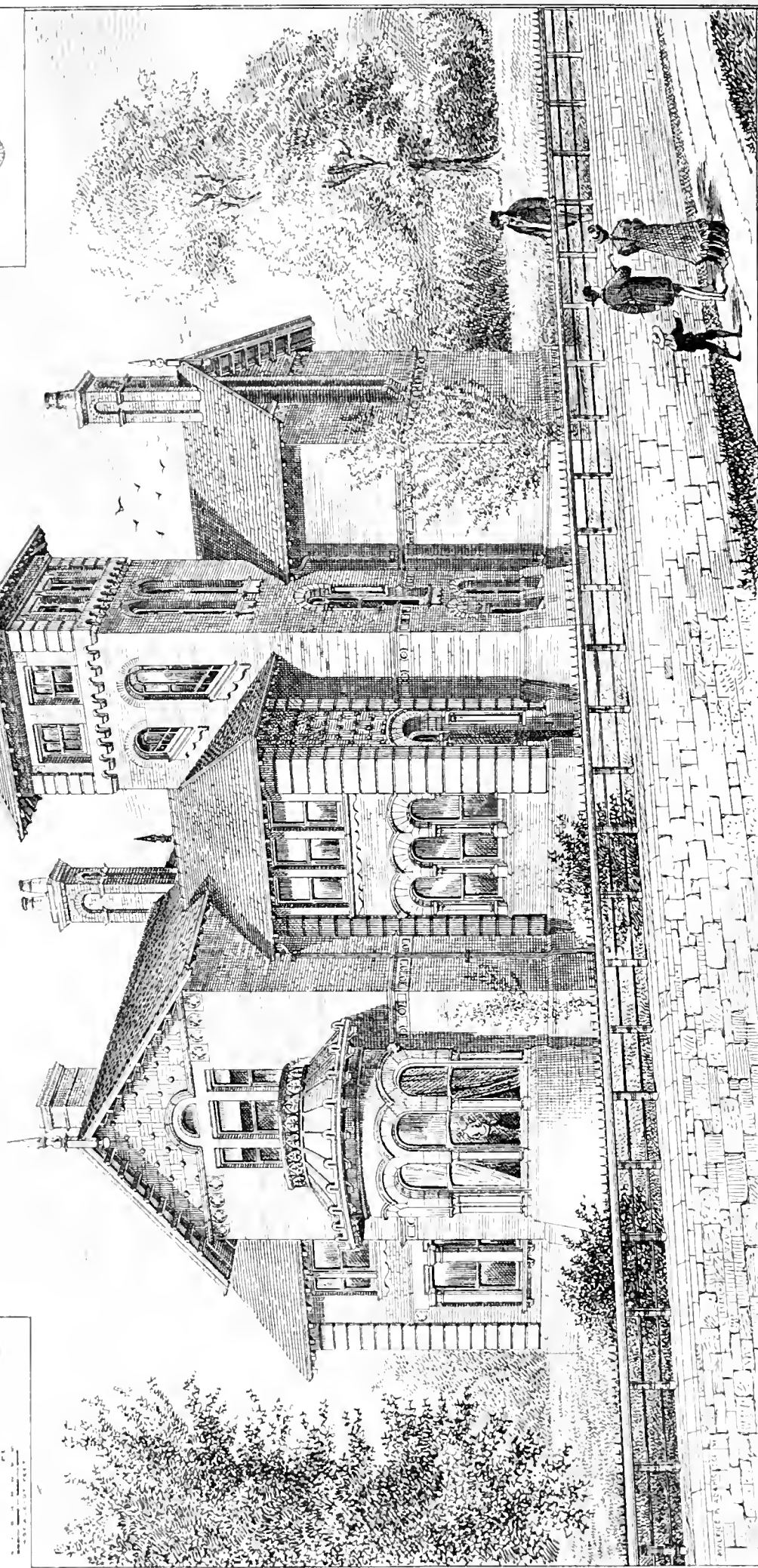
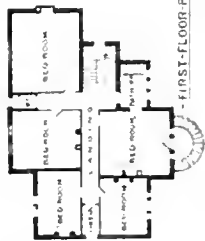
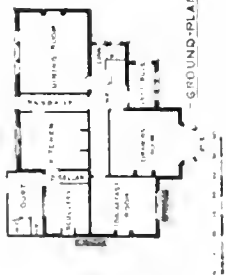
Albert Hall Mansions: South Kensington:

R. Norman Shaw R.A. Architect.









Residence, NILFORD MANOR ESTATE, SALISBURY, FOR C. NODDER ESQ^{RE} JOHN HARDING AND SON, ARCHITECTS, SALISBURY.

Photo Lithographed & Printed by James Akerman, 6, Queen Square, W.C.

THE BUILDING NEWS, OCT. 21. 1881.

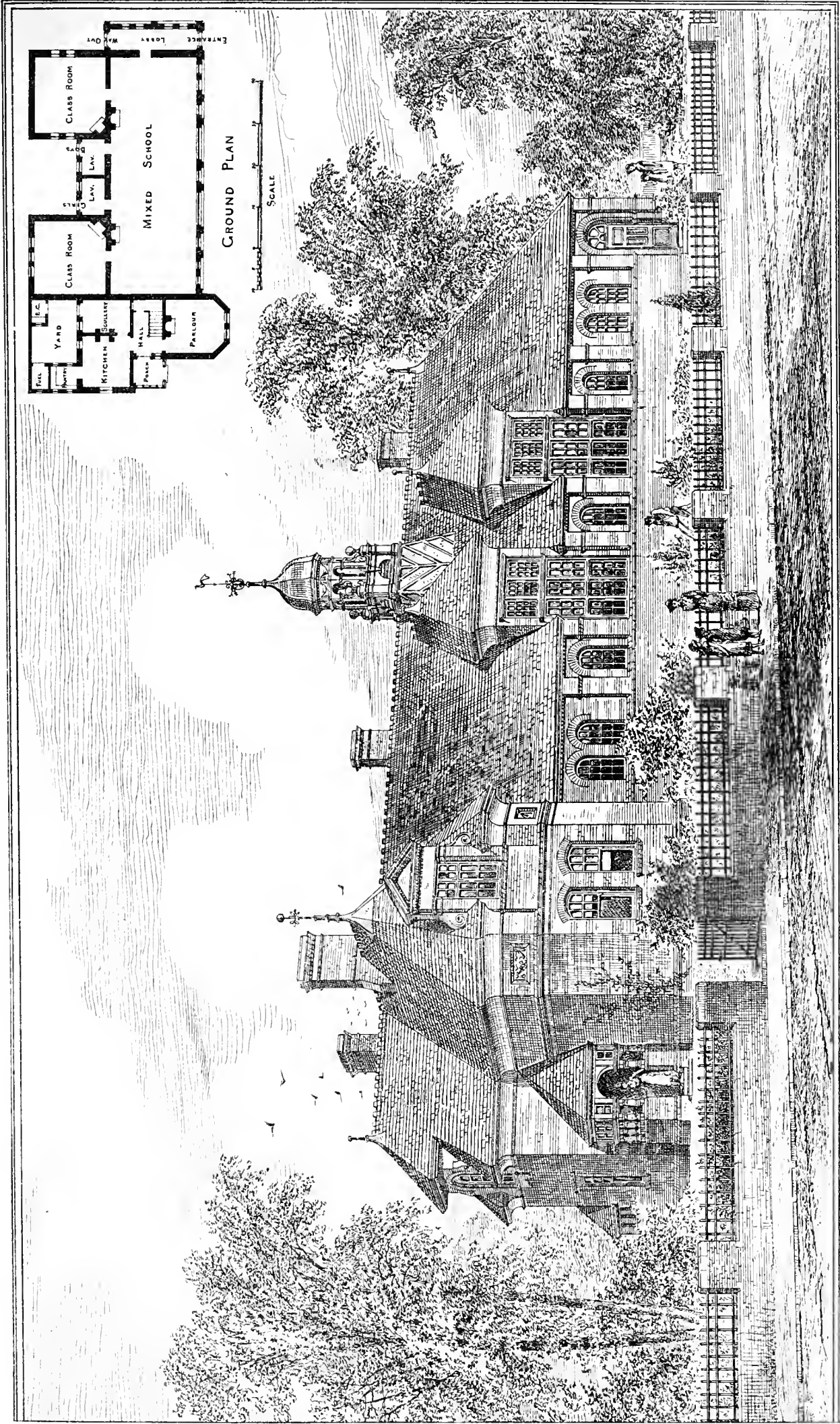
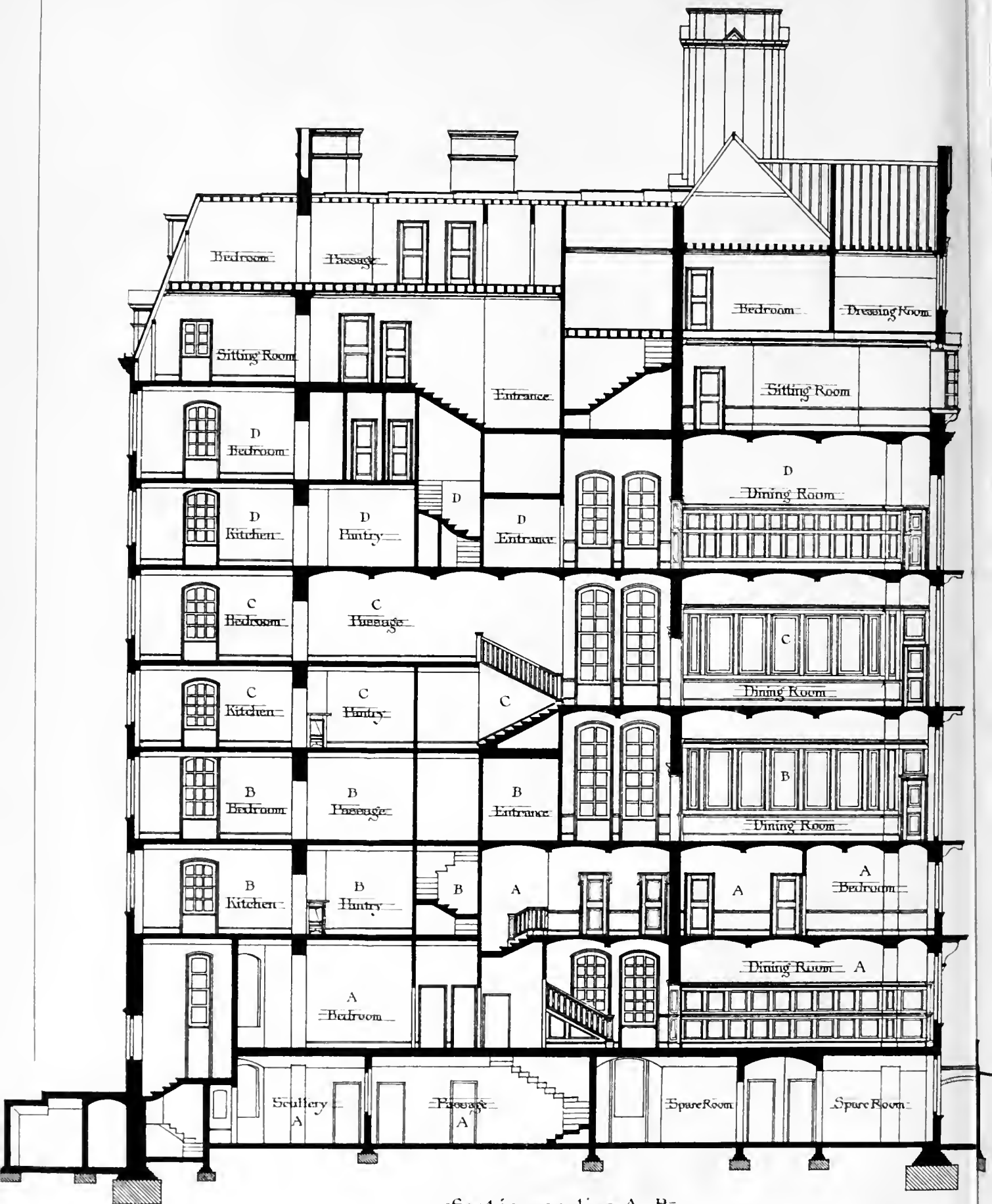


Photo Lithographed & Printed by James Alderson & Co. Queen Square W.C.

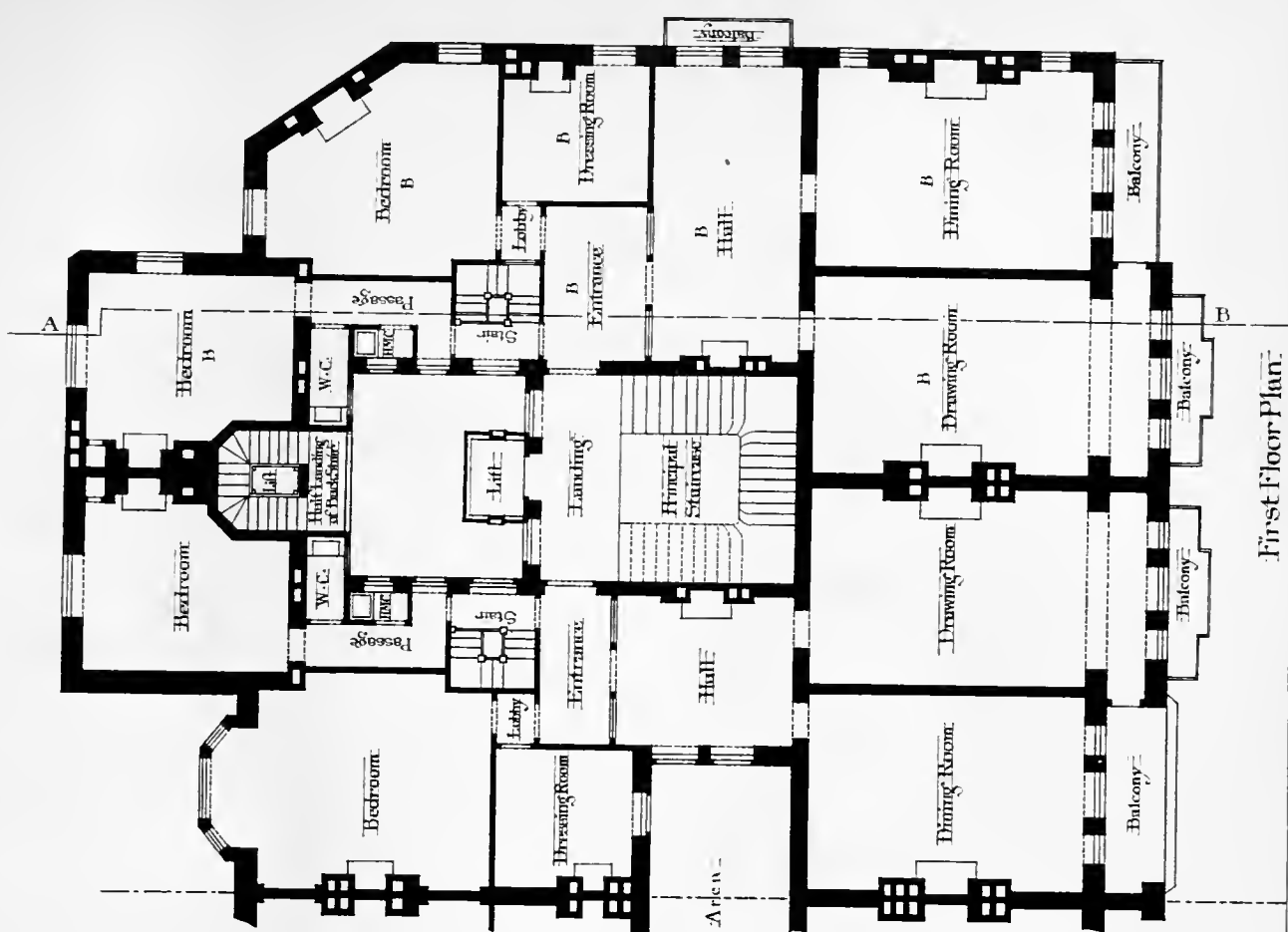
New Mixed School Pencoed, Wales, for the School Board. HENRY C. HARRIS, A.R.I.B.A. ARCHITECT

Albert Hall Mansions: South Kensington:

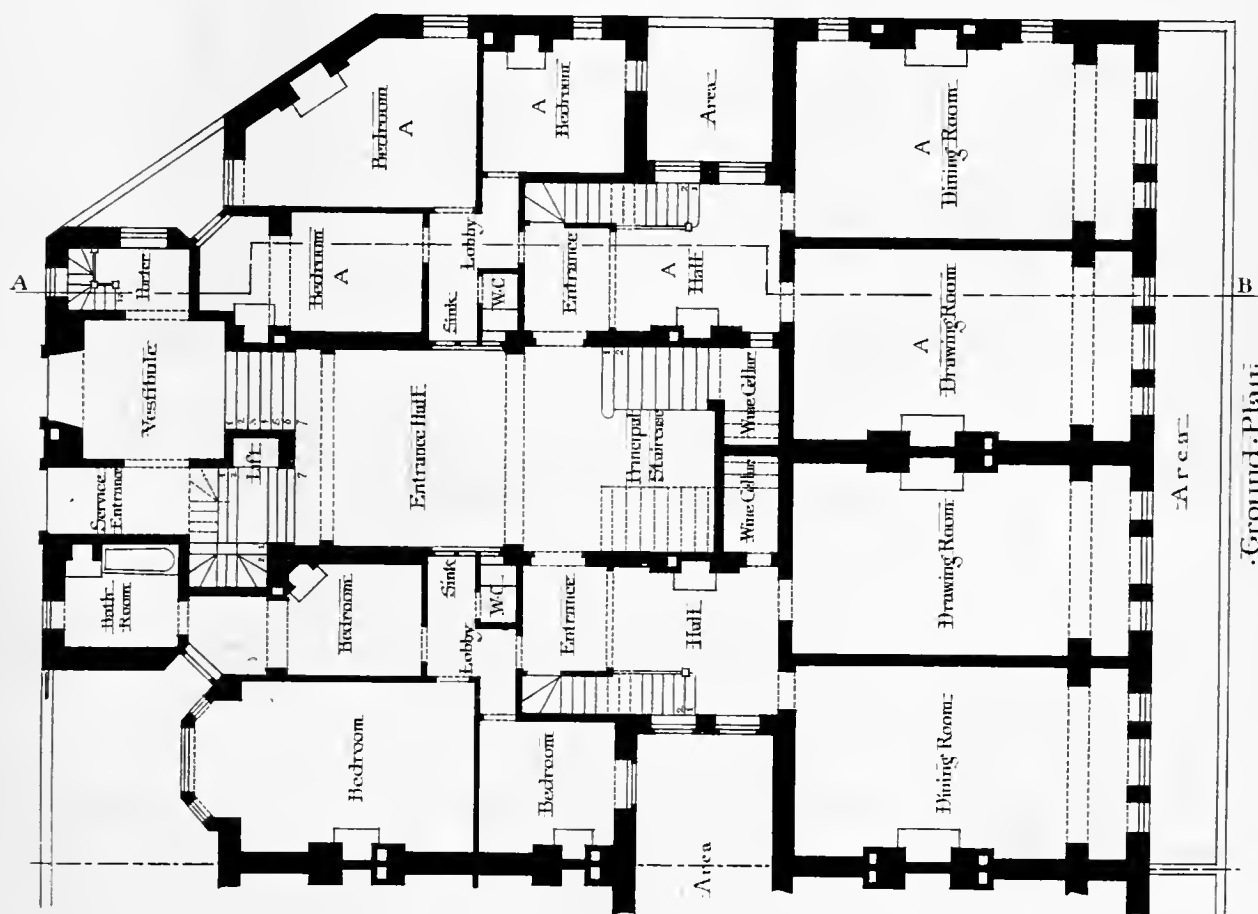
R. Norman Shaw R.A. Architect.



Section on line A-B:



First Floor Plan.



Ground Plan.

THE
 in the
 the pre
 Mr.
 read the
 Building
 report,
 the Co
 Comm
 guidan
 the o
 a rep
 term
 of A
 most
 your
 sug
 poli
 pra
 to c
 me
 re
 in
 pl
 fi
 Y
 t
 r

GLASGOW INSTITUTE OF ARCHITECTS.

THE fourteenth annual general meeting of the Glasgow Institute of Architects was held on Tuesday, Mr. John Honeyman, F.R.I.B.A., the president, in the chair.

Mr. William MacLean, writer, the secretary, read the annual report:—The New Municipal Buildings competition, referred to in last year's report, again occupied much of the attention of the Council. The Lord Provost requested the Council to formulate their suggestions for the guidance of the committee charged with framing the conditions for the new competition, and a reply was sent to his Lordship in the following terms:—"The Council of the Glasgow Institute of Architects having now given the subject most careful consideration, beg, in response to your Lordship's invitation, to offer the following suggestions: (1) The mode of conducting a competition most likely to induce architects in large practice to compete, and, therefore, most likely to obtain for the promoters a large number of meritorious designs, is this—To invite architects to submit sketch designs in the first instance, the drawings being limited to a plan of each floor, two sections, and two elevations, all drawn to the scale of $\frac{1}{16}$ in. to 10ft. No premiums to be offered, but the authors of the designs adjudged best, to the number of not less than six or more than ten, to be invited to prepare fully matured designs to a larger scale, illustrated by any kind and number of drawings they may please. Each competitor furnishing such designs to be paid a fee of, say, £200, and the author of the design ultimately selected as the best of these to be appointed architect of the new building. (2) In the event of the more usual course being adopted, we do not advise that the total amount of premiums offered should be greater than in the recent competition; but we recommend that the sum should be sub-divided to a greater extent, that the first premium should not exceed £400, and that there should be not fewer than five other premiums. (3) It is immaterial whether the wishes of the Corporation as to accommodation are communicated to the competitors by means of plans or by printed instructions, so long as the kind and extent of the accommodation desired is clearly defined; but it is of the greatest importance that competitors should be left absolutely free to arrange the accommodation in any way they may think best. 4. In the event of our first recommendation not being adopted, we are of opinion that competitors should be required to send in the following drawings—viz., a plan of each floor, two sections, four elevations, and as many additional drawings, not being perspectives, as competitors may think necessary to illustrate their designs; it being a condition that all these drawings must be to a scale of $\frac{1}{16}$ in. to 10ft. We consider it to be, on the whole, best that no perspectives be allowed. The way in which the drawings are to be finished should be distinctly stipulated, and any violation of the conditions in this respect, or in any other respect, should disqualify a competitor, who should have his drawings returned to him immediately on such violation being ascertained. So long as the instructions are perfectly explicit, it is of comparatively little consequence what style of drawing is prescribed; but we are disposed to recommend that the plans and sections should be tinted with sepia or China ink only, and that the elevations—including portions shown in elevation on section—should be drawn in line only with China ink, that they should be without shading of any kind, and that the windows and other openings should be darkened by a uniform wash of China ink, without shadows, but of such depth as each competitor may think best. 5. We think the Classic style of architecture most appropriate for the intended building. 6. We strongly recommend that the stipulation as to cost should be rigorously adhered to, and, therefore, earnestly advise—(1) That the Corporation should particularly specify everything which they intend the stipulated sum to cover; and (2) that before deciding upon what that sum should be, they should ascertain as nearly as possible what a building of the size contemplated must necessarily cost, and then allow in addition to that an ample margin for suitable architectural embellishment—nothing being more likely to lead to trouble and dissatisfaction than restricting the stipulated limit of expenditure unduly, while no greater mistake can be com-

mitted than to suppose that such undue restriction conduces to ultimate economy. 7. It is important that the conditions should be so framed as to leave no doubt as to the intention of the Corporation to appoint the successful competitor architect of the new buildings at the usual rate of remuneration. There may be good reasons why he should not be so employed, and, therefore, there must be some reservation to prevent the Corporation being actually bound to employ the author of the best design; but what is essential is that the profession should be satisfied that it is the *bona-fide* intention of the Corporation to employ any honourable and competent man who may be declared to be the successful competitor, as any doubt about this would prevent many men of good standing from competing. 8. We recommend that a professional adviser, or professional advisers, should be employed by the Corporation to assist them in the selection of designs. 9. With the view of preventing canvassing and the divulgence of mottoes, we think it advisable that the distribution among members of the Town Council and others of reduced drawings or photographs of competition designs, should be prohibited by express stipulation. In conclusion, it may be said that the success of your appeal to the profession, as indicated by the number and professional standing of the competitors, will be chiefly affected by the quantity of work required of them, the liberality of the terms offered, and especially the evidence of *bona-fide* interest in respect to the employment of the successful competitor and the provisions for securing fair-play; and the character of the result, satisfactory or otherwise, will depend (1) on the precision, definiteness, and practicability of the instructions and conditions; and (2) on the strict fidelity and impartiality with which, guided in all respects by these conditions, the judges act. On only two other points shall we now venture to offer an opinion:—(1) That it is exceedingly desirable and likely to be advantageous to the Corporation that abundance of time should be allowed for the preparation of the designs, and (2) that competitors should not be required to crowd too much upon the site. Assuring your Lordship of the willingness of the Institute to co-operate with your committee in any way you may consider practicable and expedient, in name and by authority of the Council of the Glasgow Institute of Architects (signed, JOHN HONEYMAN, President; WILLIAM MACLEAN, Secretary." It will be observed that those recommendations are in all important particulars identical with the recommendations which the Lord Provost obtained simultaneously from the Council of the Royal Institute of British Architects, and it is very gratifying to find that this expression of professional opinion has guided his Lordship's committee in framing the conditions of the present competition, which have given such general satisfaction. The proposed restoration of the west front of St. Alban's Abbey having been brought under the notice of the Institute by Mr. T. L. Watson, a remonstrance was sent to the Dean of St. Alban's in the following terms:—"That the Institute strongly disapprove of any unnecessary destruction of the Mediaeval portion of the west front of the Abbey, and protest against the proposed reconstruction according to the design illustrated in the BUILDING NEWS of 26th November last." It was resolved at the beginning of this year not in the mean time to invite competition for the Institute Gold Medal or President's Prize, as the competition has never been engaged in heartily by the assistants, whom it was intended to benefit and encourage. It is hoped that after the lapse of a year or two without competitions a greater number will avail themselves of the advantages thus offered. In the mean time, those who really desire to distinguish themselves in this way have an opportunity of competing for the prizes offered to members of the Glasgow Architectural Association, and for the prizes offered by the Royal Institute of British Architects, and they should receive every encouragement to engage in these competitions. The council having, on the invitation of the Leeds Architectural Association, considered the expediency of the obligatory examination of all candidates for admission to the Royal Institute of British Architects, recommend that members of the profession who have given proof of distinguished abilities, and who are otherwise eligible for admission to the Institute as Fellows, should

not be absolutely debarred from becoming members because at the outset of their career they neglected or failed to gain admission as Associates; and that therefore in the event of any rule being adopted making examination a necessary preliminary for admission in all grades, it would be expedient that full provision should be made for dealing with exceptional cases. The Master Masons' Association invited the advice of the Institute regarding proposed modifications of the existing rules and regulations for the measurement of mason-work in Glasgow and neighbourhood, which they propose adopting with the acquiescence of architects, measurers, and builders, and the secretary procured a copy of the proposed rules for each member of the Council. This important subject is at present engaging the attention of the Council, and their report will shortly be laid before a general meeting of the Institute. The Council desire to commend this subject to the earnest consideration of every member.

The President, in moving the adoption of the report, said that the proceedings of the Institute seemed to be becoming every year more interesting and important, and he thought he might venture to say that this year's report showed the usefulness of their association more clearly than any other which had preceded it, and amply justified their appeal to those architects—he was glad to say they were not numerous—who were eligible for admission and had not yet joined them. It was quite clear that as mere isolated individuals they could exert but little influence as architects when matters of public interest were under discussion; and they must all be sensible that friendly intercourse with other similar bodies—with their brethren in London, Edinburgh, Leeds, Paris, and Amsterdam—would be impossible without their union, and their recognition as one of the professional incorporations of the country. At the conclusion of the report, allusion was dimly made to matters which would occupy much of their attention during the session now commenced, and which could not be satisfactorily dealt with without a free interchange of ideas and co-operation. The municipal buildings competition need not, he hoped, take up more of their time—and in reference to it he would only pause in passing to allude to the courteous manner in which the Institute had been treated by Lord Provost Ure—and to express a hope that their next report would record the appointment of one of their number as architect of the new building—it could not be himself, he was very sorry to say. But year by year new topics required their consideration. That which seemed to be more immediately pressing was the question brought formally before them by the Master Masons' Association regarding the measurement of mason-work, and there were other questions connected with contracting demanding attention.

The reports were adopted.

Mr. John Baird moved that the Council of Management for the year consist of Messrs. Hugh Barclay, 136, Wellington-street; Campbell Douglas, 266, St. Vincent-street; John Gordon, 124, Bath-street; John Honeyman, 140, Bath-street; William Landless, 227, West George-street; D. McNaughton, 140, Bath-street; John Murdoch, 48, Newmarket street, Ayr; James Sellar, jun., 266, St. Vincent-street; James Thomson, 157, St. Vincent-street; Robert Turnbull, 123, Wellington-street; and J. L. Watson, 108, West Regent-street.

Mr. Alex. Skirving seconded, and the motion was agreed to.

A meeting of the newly-elected Council took place immediately after the general meeting. Mr. John Honeyman was re-elected president; Mr. James Sellar, jun., vice-president; Mr. John Burnet, 167, St. Vincent-street, auditor; Mr. William Landless, treasurer; Mr. William McLean (of William and C. J. McLean), writer, 196, St. Vincent-street, secretary.

THE NEW TOWN HALL AT HUDDERSFIELD.

THE new Town Hall at Huddersfield, which has been built at a cost of £40,000, was opened on Tuesday. The building has been erected from designs which were prepared by the late Mr. J. H. Abbey, during the time he was the borough surveyor. At the commencement of the work, Mr. Abbey secured the services of

Mr. Frederick Wild, architect, Bradford, to whom he entrusted the whole of the designing of the working details in connection with the building. After the death of Mr. Abbey, Mr. B. Stocks, architect, Huddersfield, was appointed by the Corporation to act in the capacity of consulting architect, along with Mr. Wild. The style is Classic, of the Corinthian order. The pile occupies a site bounded on one side by Corporation-street, on the other side by Peel-street, and at the south end by Princess-street, while at the north end are the Municipal Offices, with which there is direct communication. For a building of such importance the situation is most unfortunate, lacking prominence and surroundings in which its proportions could be displayed to proper advantage. The height from the ground line at the centre of the main entrance to the top of the balustrade is 77ft. The entrance itself is 17ft. in height by 9ft. in width. The portico has four Corinthian columns and pilasters, which support the entablature. The windows, of which there are two, one on each side of the entrance, have granite columns. On the main floor front are columns 27ft. in height, with carved Corinthian capitals and moulded bases. The windows are circular-headed, three in number, the principal one in the centre having an elaborately carved and sunk head; they have also moulded architraves, carved key-stones, granite columns with carved capitals and moulded bases. The whole is surmounted by a moulded architrave and frieze, and large moulded cornice with moulded medallions and dentils, with moulded and sunk balustrade. The centre of this front, to the whole height of the building, containing the principal window and entrance, projects some 5ft. from the rest of the front. The side elevations are in harmony with the front, though neither so elaborate nor richly ornamented. With regard to the interior, the basement will afford ample cellars, and be also available for the detention of prisoners. The court-room is 38ft. long, 37ft. broad, and 20ft. high from floor to ceiling, the public entrance being from Peel-street, and the magisterial and official entrance from Corporation-street. A suite of rooms for the use of the Huddersfield School Board is also provided on this floor. The entire first floor is devoted to the Assembly Hall and its adjuncts. It is approached by the public from Princess-street by a flight of steps which lead to a vestibule 37ft. wide by 23ft. deep, having cloakrooms right and left. A flight of a dozen wide stone steps leads to a landing, from which branch right and left two flights of handsome stone stairs which conduct to a second landing from which the main floor of the hall is reached. This floor is 78ft. 6in. long by 60ft. 6in. wide, with a height from floor to ceiling of 55ft.; the area is about 4,750ft.; the hall, exclusive of the orchestra and gallery, contains about 260,150 cubic feet of space. This area is calculated to provide sitting accommodation for 1,100 persons. A balcony extends around three sides of the hall, and at a still higher level, but thrown back from the hall itself, is a gallery capable of accommodating 500 people. The hall altogether will seat 2,250 persons. The space under the gallery is utilised as a refreshment-room. The orchestra is 37ft. wide and 25ft. in depth, with retiring-rooms for speakers and musicians on either hand. It contains the whole of the latest improvements in mechanical contrivances, one especial feature connected with it being a sliding platform, contrived so as to make the stage larger or smaller, whilst the seats are all removable in sections whereby the stage can be used for operatic performances on a plan designed by Mr. Wild. The ornamenting of the hall generally and the colouring has been done by Mr. B. Dixon, of Bradford, and the designer is Mr. Wild. The hall is lighted by means of three sunlights, together with two light brackets. The building is heated with hot water.

TRAPS.*

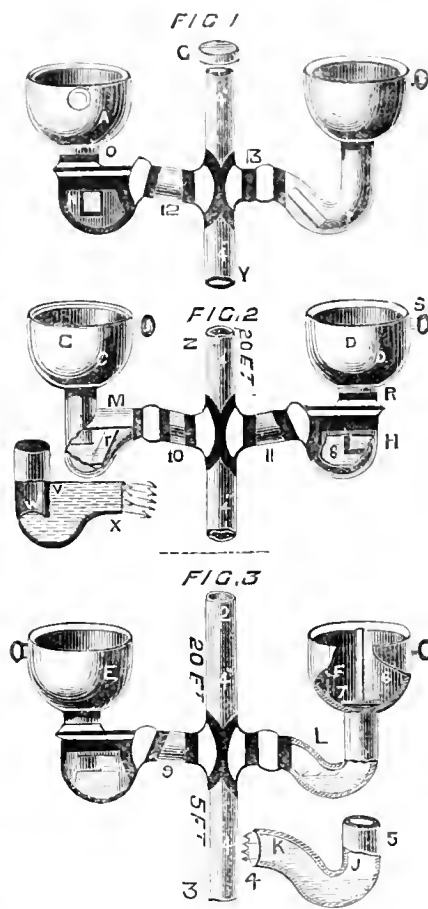
By P. J. DAVIES, H.M.A.S.P., &c.

PRACTICAL EXPERIMENTS WITH CLOSET-TRAPS.

THE large amount of attention lately devoted to closet-traps by men of all classes is no novelty, as I can trace nearly four hundred

writers on this subject, some of them signing themselves S.E. (Sanitary Engineers), while only a few are content with the more modest title of Practical Plumber. The opinions of these writers are so various that it is quite amusing to read their different ideas, more especially when some of their drawings are examined. The recent sanitary agitation has resulted in a series of experiments with a view of testing the actual value of closet-traps, and I purpose in this article to give a description of these experiments and their consequences, though nothing in them is new to me.

Within the last fortnight there has been erected a scaffold some 50ft. high, fitted with 45ft. of soil-pipes and closet-traps, for the especial purpose of experiments. It has been my good fortune, when attending to test the various traps, to have met with some of the best plumbers now in business, as also members of the National Health Society, and it affords me great pleasure to have the opportunity of informing my readers of the various effects of the experiments on the different traps. "Some of the self-yept" "Sanitary Engineers" and



"Practical Plumbers" will be astonished at the result of these soundly practical experiments.

A. Fig. 1, represents a full-sized Sharp's pattern basin, 14in. wide and 12in. deep, fixed over a full-sized Pullen's cast-lead O-trap: the height of the soil-pipe from the basin A to the foot of the pipe is 45ft. The bottom of the basin was plugged, the basin then filled with water, and in spite of all efforts, and however much water was applied, when the plug was suddenly removed, the trap could not be emptied of water nor the water-seal destroyed, even when the cap G was made airtight over the top of the soil-pipe. On the opposite side was fixed an S-trap, and although we endeavoured to unseat this trap by siphonage from the O-trap, it was found impossible, although the cap G was quite airtight (the reason was simply because the dip or water-seal in the S-trap was 2 1/2in. against 1in. in the O-trap), therefore the necessary air rather went through the O-trap without affecting its water-seal.

For the next experiment some 2 1/2in. sq. stones were placed inside the O-trap, three of which were washed away by one basin of water. Then one teaspoonful of ink was placed in the

trap, which required two basinsful of water to thoroughly cleanse it.

A house-flannel 2ft. 6in. by 2ft. was put into the dip of the O-trap, and was thoroughly washed away with half a basin of water, so that the action of the O-trap can be certified as follows:—

That it cannot be siphoned out; no momentum of water would destroy the water-seal; a full-sized house-flannel will pass through it with half a basin of water; three stones, 2 1/2in. sq., will pass out by the impetus given by one basin of water, and—it cannot ebb or wave out.

THE HELMET TRAP (H, Fig. 2).

This trap has a rounded bottom, and holds considerably less water than Pullen's large O-trap, or the above-mentioned.

It was filled with water, and on raising the plug in the bottom of the basin H, it was found impossible, by any means, to destroy the water-seal.

Four pieces of brick and stone, 2 1/2in. square, were all carried before the water down the soil-pipe.

The house-flannel, 2ft. 6in. by 2ft., as also an extra piece of rag, 3ft. by 13in., were completely cleared by quarter of a basin of water; the one teaspoonful of ink was washed completely away by half a basin of water, the inference necessarily being that the Helmet trap is self-cleansing; it cannot be unsealed by siphonage; it will not momentum out; it cannot ebb or wave out.

BEARD AND DENT'S S-TRAP.

B, Fig. 1, is a closet basin, exactly the shape and size of A, Fig. 1. The trap was first filled with water, the basin plugged, the cap G taken off the top of the soil-pipe, and the basin filled with water. Then the plug was raised, and in an instant the water rushing from the basin cleared nearly the whole of the water from the trap, leaving a gap of at least 1/2in. below the throat of the trap, thereby at once leaving the trap totally devoid of water-seal.

Now this action, as described above, is very easily explained, and is that, owing to the shape of the trap and its having so smooth a surface, it cannot resist the impetus of the water from the basin when the plug is raised. This is illustrated at J, Fig. 3, by which it may be seen that the momentum of the water is carried forward, and to a considerable depth below the throat of the trap, at times even as much as 3in.; but as soon as the water breaks or parts upon the top at K, the hinder part of the water falls back into the trap, but in not nearly sufficient quantity to refill the trap, and so re-establish the water-seal. It should be remembered that water, like a ball, will proceed unless checked by another equal quantity (in one shape or other), having equal weight and power; but this not existing in the S-trap, renders it useless for the purposes for which it is intended, proving at once that the S-trap is unsafe for valve-closets or any other closets where large quantities of water have to be thrown down at one time, and is especially unsafe for housemaids' sinks.

The trap was then tried with the cap G replaced on top of the soil-pipe, and the action was precisely the same, and we could not get any more out than before. The trap L siphoned out when B basin was discharged. B basin trap will siphon out when a basinful of water is discharged down the top of the soil-pipe and the basin A plugged.

This proves beyond question that the O-trap will not only supply air enough for its own proper working, but enough for other traps that have a greater water-seal. It can afford to help others without interfering with its own efficacy. The additional tests of the O-trap were, that on placing five stones 2 1/2in. square in the trap, they were washed right away by one basin of water. The house-flannel was washed out with water running full bore from a 1/2in. cock (rate 4 gals. per minute) and was also washed out with a quarter of a basin of water. The teaspoonful of ink was cleared quite away with one basinful of water.

THE ECLIPSE TRAP.

This trap is shown at N I, Fig. 2. The basin being filled with water, and, as in the other tests, the plug suddenly raised, the water rushed through and left the water-seal broken, 1/2in. below the dip, although plenty of air was given

* All rights reserved.

through the soil-pipe. This was an undeniable proof that the fault of the trap consisted in momentum of the water, and not in siphonage, showing that it has the same fault as Beard and Dent's ∞ -trap, and therefore should not be used for valve-closets.

When tested with the stones, one basin of water cleared away four stones 2½ in. square.

One teaspoonful of ink required two basins to clear it thoroughly away.

This trap will siphon out by discharging the top basin, and having the top of the soil-pipe made air-tight, and having the other traps also made air-tight, but not nearly so readily as a Beard and Dent's ∞ -trap.

When the flannel test was applied, a quarter of a basin of water was found to wash the flannel right away.

I trust these experiments will be sufficient to prove my assertions that the ∞ -trap is the only reliable trap for valve-closet work, or any closet or sink where large quantities of water have to be thrown down at once, and that the ∞ -trap is quite unreliable for these same purposes.

I have some other experiments in hand, which will be reported upon as my papers in this journal proceed.

For the satisfaction of sceptics, I may say that architects, sanitary engineers, practical plumbers, and builders of responsibility may, on presenting their cards to Messrs. Pullen and Son, 73, Penton-place, Kennington Park-road, S.E., view the apparatus and test it for themselves.

E. R. in last number, p. 492, third column, read "bell-trap" (instead of "bell") on top line; third line read "this trap, Fig. 106."

THE TECHNOLOGICAL EXAMINATIONS OF THE CITY AND GUILDS OF LONDON INSTITUTE.

WE have before us the programme of the examinations issued by the City and Guilds of London Institute, for the year 1881-82. It is a bulky quarto of over 60 pages of printed matter. The Institute, we may here mention, affords facilities for carrying out an examination in any of the subjects it has enumerated of a technical character wherever a class of instruction is formed. A local committee must be found to undertake the examination according to the rules laid down; any art or science school committee under the department, any school-board or local examination board connected with the Society of Arts, is eligible. The examinations are in two grades: 1st. Ordinary (or pass); 2nd. Honours, the former are chiefly for apprentices and journeymen, the second for firemen, managers, teachers of technology, though both grades are open to candidates. The other rules are of not sufficient general interest to quote here. We may, however, say there is no limit of age fixed and no fee required, and intending candidates are invited to apply to the secretary of nearest local committee or the special local secretary for all information. The examinations are to be conducted by printed papers. Among the 32 different subjects enumerated, we find besides the useful arts of bread-baking, brewing, sugar manufacture, &c., the following having more or less direct bearing on building, art, and engineering—viz: Iron and steel manufacture, oil colour and varnish manufacture, gas manufacture, paper, pottery and porcelain, glass, dyeing and bleaching, photography, electro-metallurgy and textile fabrics of several sorts, lace manufacture, weaving and pattern designing, electrical engineering, metal work, plumbers' work, wood working, mechanical engineering, &c. Certificates and prizes are to be given to successful candidates in each subject. In the honour grade a silver medal and £5, and a second prize of a bronze medal and £3, are offered, besides five prizes of varying value in the ordinary grade. The syllabus of subjects of examination gives some useful information. Machine construction and drawing, building construction, applied mechanics, light and heat, and inorganic chemistry are required for the full technological certificate in both grades, or at least two of the above subjects are necessary in most of the branches. Taking iron and steel manufacture, the following subjects are required. 1st, composition and characters of chief iron ores; preparation of raw ores for smelting; 2nd, construction and mode of working blast furnaces, &c.; 3rd, nature of fluxes requisite under

various conditions, utilisation of cinder; 4th, hot and cold blast, effects of variations in amount of fuel and flux and on the production of the iron made; 5th, characters of pig-iron from various ores; general effects of foreign elementary substances. Production of spiegeleisen and ferromanganese; general chemical and physical distinctions between pig-iron, wrought-iron, and steel; methods of casting iron and steel; foundry appliances, furnaces, crucibles, and moulds; malleable iron castings; chilled castings; conversion of pig-iron into malleable iron; refining; puddling, manufacture of bars, rods, rails, &c.; conversion of malleable iron into steel; conversion of pig-iron into steel; Bessemer, Siemens, and other processes; machinery and other appliances; hardening and tempering of steel; case-hardening; welding, &c.; preparation of tin and tern plates, galvanised iron sheets, &c. The pottery and porcelain manufactures include questions on the various kinds of pottery, earthenware, terra-cotta, majolica, vitreous stoneware, white and brown; English porcelain, &c.; the chemical properties of the materials; glazes and their properties; pottery colours; majolica colours; the degree of heat required by each material; also as regards glazes, colours, firing, and improvements in ovens.

In metal-plate work, the questions include the chemical properties of the several metals, alloys, solders, and soldering, cutting of metal plate in the construction of geometrical and compound forms, various tools used, making pipes, joining sheet-metal, seaming, riveting, zinc-laying, roofing. In plumber's work the examination has reference to the properties and qualities of lead, zinc, and tin, of iron, white and red lead, cements, &c., the action upon lead, zinc, and tin of air, of different qualities of water, acids, sewage gases, &c.; solders; plumber's tools; manufacture of metals into various forms; cast sheet-lead, milled sheet-lead, rolled zinc, galvanised iron, lead tubes, &c., gas-fittings, measurement of pressure of gas of a main or pipe; sanitary arrangements of dwellings, testing drains and soil-pipes, water-closets, screen boxes, waste-water preventers, closets, sinks, &c., water supply for houses, cisterns, filters, water meters, storing rainwater, &c.; roofing; varieties of traps, ∞ -traps, ∞ -traps, &c., ventilation of soil-pipes and drains, sizes of pipes, and fall required. Among the works of reference recommended are Buchan's "Plumbing," Eassie's "Healthy Houses," Dr. W. H. Corfield's "Laws of Health," Miller's "Chemistry," Vol. II. In each branch, the subjects required and works of reference are given.

The questions to be given are printed at the end of the programme, and will be found of service to intending candidates.

SLATE QUARRYING.

AT the usual meeting of the Liverpool Engineering Society on Wednesday week, a paper on "Slate Quarrying" was read by Mr. C. H. Darbishire, Assoc. M. Inst. C. E. The paper dealt chiefly with slate quarrying as carried on in the Nantlle Valley, and the several beds or veins of slate that are worked therein. The author commenced by alluding to the rock as having been formed of great deposits of mud in water, composed chiefly of silica and alumina, which have been subjected to immense pressure and volcanic convulsion. The split of the slate is attributed in a great measure to the effects of the great pressure. The paper further described the several means of opening quarries whether on the hill sides or on the flat, and alluded to the different lifting apparatuses in common use, advocating inclines instead of the old fashioned guide ropes and hauling chain. Attention was called to the system of bargains under which practically all roofing slates are made, as well as the duties undertaken by the rockmen and quarrymen respectively, and their tools. The ordinary sawing machinery was described, as well as the dressing machines in vogue, preference being given to the one invented by the late Mr. Greave. The explosives mentioned were powder, nitro-glycerine, dynamite and gun-cotton, all being more or less employed with the exception of nitro-glycerine, the use of which has now been almost entirely abandoned. In pure slate the common black powder only is burnt. The author concluded by pointing out that a quarry venture is not necessarily a success

because there happens to be some good splitting slate found therein, but he thought that if sufficient good rock is found few ventures are so safe, or so lasting.

OUR COMMONPLACE COLUMN.

PICT'S HOUSES.

PICT'S HOUSES are numerous in the north of Scotland. Sometimes they are excavations covered with boughs or turf, as found in Aberdeenshire, Caithness, &c. Many of these dwellings are found in groups, about 7 ft. or 8 ft. diameter, and are oval in plan. These subterranean dwellings are also called *weems* and earth-houses. A large number of them were found near Kildrummy Castle, 30 ft. long, and 8 ft. to 9 ft. wide, formed of stones 6 ft. long, and vaulted over in horizontal layers. A *weem* is described in Barry's "Old Statistical Accounts," xvii., 237; also in his "History of Orkney." See "Thomas's Account of the Celtic Antiquities of Orkney" in *Archæologia*, 1852; Maule's "History of the Picts"; Ferguson's "Rude Stone Monuments"; also BUILDING NEWS, 1870, p. 139.

PICTURE-GALLERY LIGHTING.

THE proper lighting of picture-galleries has long been a vexed question among architects, painters, and connoisseurs. Sir C. Eastlake, Papworth, Redgrave, Statham, and others have contributed reports, and written papers on the subject, and we refer the reader for information to the Report of the Commission on Lighting Picture Galleries by Gas, 1859, reported in this journal, Vol. V. 689, and the reports by the Select Committee on the New National Gallery, 1850, and to plans of the Sheepshank Gallery at South Kensington; the Dresden and Vienna galleries; those at the Louvre, Munich, Berlin, &c. Galleries are lighted either by side lights or by top lights, and for small pictures side lights placed tolerably high are sufficient. In larger galleries, top or skylights are more necessary, and are generally provided. There seems to be a consensus of opinion that side lights placed high and regulated by blinds from the bottom of the window are equal in all respects to top lights, and several of the best Continental picture galleries have side lights. We may mention as instances the galleries at Berlin by Schinkel, those at Vienna, the Louvre, &c. As artists adopt usually a side light, and paint under such a condition, it is thought, and reasonably so, that such lighting must be the best. Central skylights are, however, usual in all large galleries, and we may mention the galleries at Burlington House, the National Gallery, the Suffolk-street and Dudley Gallery, and especially the new Grosvenor Gallery, all in London, as affording types of this arrangement. The principal point to observe in designing a picture-gallery is to so arrange the top lights as to throw the light on the walls without causing glare. A rather novel method of accomplishing this was suggested some years ago in *Gazette des Architectes*, 1870, by a French architect (M. Jules Bourdais), which consisted in introducing light from the roof, so as to fall only on the wall surfaces to be covered by pictures. For this purpose a series of diaphragms or screens, more or less opaque, were used according to diminution of light required on the other parts. These screens are placed between the inner and outer roof-timbers, or between glass ceiling and roof-lights, and are made of gauze, calico, or paper on light frames. When circumstances permit, the angle of direction of rays and of the diaphragm should be between 50 and 70 degrees. In treating sections of galleries lighted on this principle, oblique lines are drawn at the most favourable angles for admission of light, and the glass panels in ceiling and roof are formed between these oblique lines. The Pinacothek, by Voit, is another ingenious way of admitting light. The cross section of the gallery of that building consists of a centre with a span roof of rather flat pitch, and on each side above the eaves rises a clerestory, with a lean-to from its top to an outer wall. By this arrangement the rays enter through the clerestory lights above the centre roof, and fall upon the outer wall where the pictures are hung. Reflection is the great object to be avoided in proper lighting, and the angle of admission and height of picture must be so arranged that the observer does not look at the

pictures in the direction of the reflected light. Buckingham Palace picture-gallery is well lighted, and the light is admitted through a raised lantern-light. Its dimensions are 180ft. by 36ft. Dulwich College has a good picture-gallery 144ft. long by 20ft. wide and 20ft. high. The Grosvenor Gallery, one of the largest and best in London, is 104ft. long by 35ft. wide, and the small gallery is 60ft. by 30ft. The longest new galleries in the National Gallery, by the late E. M. Barry, are 120ft. by 40ft., and 100ft. by 40ft. We refer to a list of the dimensions of other galleries given in "Arch. Dict.," and for particulars, to the BUILDING NEWS, where several recent examples are described and illustrated.

PIER, THICKNESS OF A

BRIDGE piers in the best examples vary in thickness from one-seventh to one-eighth of the span of arch. Neully-bridge piers are one-ninth the span. The mathematical principles of the subject will be found discussed in Mosely's "Mechanical Principles of Architecture and Engineering," Professor Rankine's "Applied Mechanics," Tarn's "Science of Building," and in Campin's "Treatise on Materials and Construction." The stability of a pier of masonry depends on its resistance to overthrow, measured by its weight multiplied into the distance from the outer edge at the base from the centre of gravity. But the stability of a pier to resist lateral pressure, as that of an arch, can be determined by graphical means, or the application of the parallelogram of forces. The resultant of thrust should for safety pass through the middle third of the base of pier or abutment to give a factor of safety 3. For cylindrical piers the rules are given in Campin's work; and the student will find articles on the subject in the BUILDING NEWS. The artistic treatment of piers is discussed in the BUILDING NEWS, 1869, p. 517.

PILE.

In pile-driving, the pile ought to be driven to such a depth as to insure resistance to the proportion of load it is likely to bear, allowing for stress caused by lateral pressure of wind and other causes. It has been stated on a good authority that if a pile 1ft. diameter does not advance more than 2-5ths of an inch under a series of ten blows from a monkey weighing 12 cwt., falling a clear height of 12ft., it will be able to bear with safety a permanent load of 25 tons. It must also be remembered, the energy of a heavy ram may be expended in crushing the pile instead of forcing it downwards. The size of pile, its material, and the nature of soil, are important elements which must determine the weight and fall of the ram. "A heavy ram and a moderate fall will do more effective work than the same aggregate force with a lighter ram and greater fall" (Matheson's Aid Book). The point of a pile should be exactly true with the centre line, or the pile is apt to go on one side.

PILLARS—STRENGTH OF IRON.

CAST iron is generally used, and the hollow pillar is lighter, stronger, and more easily cast than the solid form. The greatest care is necessary to keep the core concentric, so that the thickness may be the same all round. Calculations to ascertain the strength of iron pillars will be found in all works on construction, and Hodgkinson's experiments show the relative strengths of pillars of different sections. No rational theory of resistance to compression has been yet found, and the formulae we possess are deduced from experiment. The iron selected for pillars should have a high modulus of elasticity, for the greater it is the less is the deflection. In making calculations the thinnest part of the column must be taken. For cast iron cylindrical columns, solid or hollow, with flat ends, the formula is the following:—

$$W = \frac{36}{1 + \frac{r^2}{400}}$$

For rectangular columns with flat ends—

$$W = \frac{36}{1 + \frac{r^2}{500}}$$

In these formulae W = breaking load in tons per sectional square inch; r = length divided by least diameter. We also refer the reader to the paper in the "B. N.," 1869, p. 476, and to the columns of Intercommunication.

PIPES—IRON.

PIPES are generally of cast iron for water, gas, steam, &c. They are made with flanges or socket and faucet ends. The former are best for steam and high-pressure water, the latter for gas and ordinary water service. The core should be 'quite concentric, so as to have a uniform ring of metal. If the spigot end is slightly tapered and the socket end also bored to that shape, closeness of jointing is insured, and a smearing of white lead or Portland cement is all that is required to make a tight joint. Such jointing is, however, desirable only when the foundation is uniform and unyielding; in other soils the joints are liable to be fractured, and the caulking of wide socket-pipes is more safe. Turning for both spigot and flange pipes is preferable, as waste of water is saved. Among the modes of joining metal pipes is the flange joint, with a ring of vulcanised indiarubber screwed up between: it makes a good hot water or steam-tight joint. For faucet pipes, iron cement is the best material; the cement is forced between the joints with a caulking chisel and hammer. A very tight joint is made by turning the flanges of pipes quite flat and making a groove in each for a ring of wire, which is then screwed tightly between. Pipes of iron are generally tested by hydraulic pressure equal to a column of water 250ft. high. The thickness of a cylindrical pipe exposed to internal pressure, according to one formula, should be $x = \frac{p r}{c}$ p being

pressure persquare inch; r = radius of internal diameter; c = cohesive strength of the metal per square inch. Another rule, Hawkley's, makes the thickness of the cast-iron pipes equal to one fifth the square root of diameter (Burnell). Another authority states a pressure equal to a column of water 300ft. high (130lb. to the sq. in.) is generally adopted and sufficient for cast-iron pipes. A vertical position for casting is now recommended for pipes over 3in. in diameter. The socket is cast downwards to allow uniformity of metal. Cast-iron pipes are made 9ft. long when the diameter does not exceed 12in., beyond this and up to 48in. a length of 12ft. is usual. Socket-pipes cost, for all diameters above 3in., £3 to £4 per ton above the current price of pig-iron, the price of pig ranging from £2 10s. to £3 per ton. If the sockets and spigots are turned, 7s. to 15s. per ton extra is required. Rain-water pipes are as thin as can be cast; they have socket joints, and are sold by measure of length. Pipes for high temperature system (Perkins's) are usually 1in. in diameter, about 2in. inside and 1½ in. or nearly 2in. outside. They are proved to about 3,000lb. per square inch. See Fairbairn in the "Resist. of Iron Tubes," Hurst; BUILDING NEWS, 1871; Matheson's "Aid Book."

The following is a clause that has been introduced for testing pipes in specifications for waterworks:—"The pipes, after being jointed and for a while uncovered, shall be from time to time tested in such lengths not exceeding 180yds., and at such pressures not exceeding the actual working pressure due to the head of water by more than 50 per cent., as the engineer may consider advisable." One mode of testing is to apply the pressure until it reaches the limit specified, then to carefully inspect each pipe in the trench at the sockets and joints. If a joint sweats, the caulking tool should be used while the pressure is on. When the defect occurs in the pipe itself, the pressure is withdrawn, the water run off, the joint cut out, and a new one inserted with a collar joint.

At a meeting of the lands committee of the Yarmouth town council, on Tuesday, it was resolved to recommend that body to subscribe £30,000 towards the proposed dock, near the entrance to the harbour. The area will be about 10½ acres, and the cost, exclusive of land compensation, sidings, and warehouses, £70,000. The docks will be 1,100ft. long and 400ft. wide, with a depth at high-water of 21ft., and 18ft. at low-water. The length of quays will be about 4,000ft.

Mr. G. E. Chapman, surveyor and inspector of nuisances to the Newhaven local board, last week sent in his resignation of the latter office, on the ground that his duties as a surveyor were sufficiently onerous to occupy his time and attention. The board resolved not to accept the resignation of one office without that of the other, as they considered one man could discharge both.

Building Intelligence.

HANLEY.—On Monday the foundation-stone was laid of the New Tabernacle Church Buildings, Hanley. These buildings are being carried out from the designs and under the superintendence of Messrs. William Sugden and Son, architects, of Leek, whose plans were selected unanimously by the committee at the close of last year in a competition limited to Messrs. Sugden, Mr. J. O. Sulman, F.R.I.B.A., London, and Mr. Ellison, of Liverpool. Messrs. Sugden submitted a Classic design, with tower and dome, and two designs in English Perpendicular Gothic, one of the latter being the one which is being followed in execution. All the intricate stonework of the front is to be executed in red Hollington stone, except some of the more exposed parts, where the adamantine Roche stone from the Leek district is being used. The walls of this front are faced externally with specially made local thin red bricks, and the roofs are covered with brown Broseley tiling. The tracery of the side windows will be chiefly of red terra-cotta, of similar character to the stone tracery of the front. The following is a summary of the accommodation provided: Chapel, with north and south transepts and galleries on three sides, containing 1,000 sittings; extreme length, including rostrum apse, 81ft., width 48ft. width across transepts 69ft., height in centre 42ft. Lecture-room, containing 200 sittings, length 43ft., width 29ft., height 23ft.; organ-chambers both to chapel and to lecture-room; tower and entrance porches, and two main staircases, one descending to the school-floor; and narthex 24ft. long and 8ft. wide, with double swing glass doors; entrance-porch to lecture-room and for girls' approach to school; a boys' porch and two porches to classrooms; minor staircase, behind rostrum apse, for the minister and choir; minister's vestry 16ft. by 12ft., with lavatory, &c.; deacons' vestry, 20ft. by 12ft.; large schoolroom, 55ft. long, 41ft. wide, 28ft. high, with clerestory; library, 21ft. long by 17ft.; infants' schoolroom, equal to about 33ft. by 16ft.; mothers' meeting-room, 20ft. by 17ft.; eight boys' classrooms, each 12ft. by 10½ft.; five girls' classroom, each about 13ft. by 9½ft.; one young women's classroom, 25ft. by 13ft., and two smaller ones; young men's classrooms, tea-room, scullery, heating apparatus vault, lavatories, separate for boys and girls, ample corridors, &c. The contractor for the erection of the buildings is Mr. Samuel Warburton, of Harpurhey, Manchester.

HUDDERSFIELD.—On Thursday week a new chapel, which has been erected at Partown, Huddersfield, for the Wesleyan Methodists, was opened. The building, which is dedicated to the Holy Trinity, was designed by and has been erected under the superintendence of Mr. Arthur Smith, architect, Queen-street, Huddersfield, his plans and designs having been selected from a number of others in open competition. The style is Early English, and the edifice is built of pitch-faced wall stones, from Elland Edge, with Crosland Hill ashlar dressings. At the rear there is the minister's and stewards' vestries, each 14ft. long and 12ft. wide; and a classroom 19ft. long and 14ft. wide. The chapel will accommodate 750 persons. The following are the contractors:—Masons, Messrs. S. and G. Brook, Bradley; joiner, Mr. David Light, Leeds-road; plumber, Mr. George Slater, King-street; plasterer and slater, Mr. W. E. Jowett, Huddersfield; painter, Mr. Thomas Robinson, Ramsden-street; ironwork, Mr. James Brook, New-street; and heating apparatus, Messrs. W. and S. Thornton. The total estimated cost, including extras, is £5,000.

LAWRYOLYN.—Christ Church, Lawrytyglyn, S. Wales, was opened on Thursday week. The church consists of nave 43ft. by 20ft., chancel 17ft. by 20ft., with vestry at S.E. corner 10ft. by 9ft.; and porch 7ft. 6in. by 7ft. 6in., with tower over N.E. corner. It is built of local grey stone, with Cefn freestone dressings to the angles, windows, and coping. The roof is open-timbered, and covered with Machynlleth slates; the seats are of pitch-pine varnished. The aisle and chancel are laid with ornamental encaustic tiles. The tower is of three stages—porch, ringing-chamber, and belfry: the last being surmounted with open oak tracery framing, with ornamental weather louvres, capped with gilded vane. The

style is Late Decorated Gothic. The architects are Messrs. Jones and Parke, of Newtown; the builder is Mr. E. Williams, of Newtown.

LONDON.—The City Press office, and printing establishment of Messrs. W. H. and L. Collingridge, has recently been rebuilt upon the site of the premises destroyed by fire last year. The style is Jacobean, the ground-floor portion being executed in red and grey polished granite; the upper stories are in red Corsehill stone, having circular bays over each entrance, the whole being finished with a Mansard roof, and ornamental cresting, with dormers springing from the top cornice, also in Corsehill stone. The whole of the casement-lights are in wainscot, fitted with Smith and Stevens' "Janus" sill bars and watertight fastenings. The late Mr. John Collier was the architect, but owing to his decease during the progress of the works, they were completed under the supervision of Mr. Chas. W. Merrin, his chief assistant, by whom the front was designed and the details of the building worked out. Mr. Crabb was the contractor. The parquet floor was laid by Mr. J. F. Ebner.

SALISBURY DIOCESAN CHURCH BUILDING ASSOCIATION.—A meeting of the general committee of this association was held in the Board-room, in the Close, on Tuesday week. An application was received and considered from the Rev. A. C. Burnard, Rector of Beer Hackett, in the archdeaconry of Dorset, asking whether his inability to complete the tower of the church in that parish would affect the grant of £50 made by the society towards the works which are being carried out. The committee resolved to deduct £5 from the grant, and to pay this sum when the tower is actually completed. In the case of Chicksgrove Tisbury, in the archdeaconry of Sarum, a certificate was handed in that the school-chapel there had been finished, and an order was made for the payment of the grant promised. An application was next considered for a grant towards the restoration of the parish church of Manningford Bruce, in the archdeaconry of Wilts, at an estimated cost of £1,500, the church, when completed, to seat 100 persons, all free, and a grant of £40 was voted. The remaining case was North Tidworth, in the archdeaconry of Sarum, the application being for a grant to take down and rebuild the present dilapidated church at an outlay of £1,350, only £784 of which has at present been raised. The church, when built, is to afford free accommodation for 130 persons, and a grant of £50 was promised.

SPALDING.—In March 1879, over 60 sets of competitive designs were received by the trustees of the Johnson Hospital, Spalding, when the one selected was that of Mr. G. G. Hoskins, F.R.I.B.A., of Darlington, (who has been so successful in other hospital works, already mentioned in our columns), shortly after which, the work was placed in the hands of Mr. James Bulling, of Ollerton, near Newark, and has been carried out under the supervision of Mr. Wallis, clerk of the works. On the 12th inst., the Hospital was formally opened by the Bishop of Lincoln. The aim of the architect was evidently, so far as externals were concerned, to present a building which, whilst in material construction corresponding with St. Peter's Church, to which it is adjacent, should at the same time bear upon the face of it evidence of its own all-important purpose; and, as to the interior, airiness, thorough ventilation, convenient ingress and egress, good lighting, and a favourable arrangement of aspects have all been carefully studied, and effected with the greatest possible success. The bricks used are of the same character and quality as those employed in St. Peter's Church; the eaves, cornice, and other work of a like description, are formed of purpose-made bricks; the sills, copings, and other dressings are of Ancaster stone, and the entrance steps of Park Spring stone. All the external walls are hollow. The front of the building faces to the eastward, and on passing into the main entrance the first room that presents itself to our right on the ground-floor is the operating-room. Next in order in the front of the building is the surgeons' sitting-room, from which only the main corridor has to be crossed in order to reach the consulting-room, and adjoining which is the surgery. Next in order comes the dispensary. The dispensary waiting-room is at the extreme north of the building, whilst to reach the dispensing-room and pass out, the

patients need but to pass along the main corridor, delay a moment at a hatchway provided for the purpose, and then make their exit by a door in the east wall. Along the main corridor to the south, we have porter's room, conveniently situated near to the main entrance. Next to this is the matron's sitting-room. To the west of these rooms, crossing the main corridor, is the convalescent and dining-room. Then comes the waiting-room for prospective in-patients, and at the extreme south the board-room. To the west of the main entrance there is also a complete set of kitchen offices. Ascending the main staircase, we find that all the wards are arranged on the first floor, occupying the extremenorth and south respectively. Provision is made for twenty patients—ten males and ten females. Adjoining all the wards are the nurses' rooms. In addition to these wards for general patients, a small room at either end of the building has been provided for isolated cases, or for the accommodation of patients who may require either exceptional quiet or unusual attention. Detached from the main building and approached by a covered way from the kitchen offices, are the laundry (with drying closet attached), wash-house, coal-house, tool-house, ash-pit, &c., underneath which is provided cellage, and within convenient distance of which are also placed a soft-water tank, the mortuary, and other minor offices.

STOKE NEWINGTON.—On Friday last the corner stone was laid of the enlargement of St. Faith's Church, Stoke Newington. This church, designed by the late Mr. Burges, is built in the Early English, 13th-century style, and was consecrated by the Bishop of London in 1873. At that time, however, only the tribune, choir, and part of the nave were erected, and the death of its chief promoter, Mr. Robert Brett, of Stoke Newington, in 1874, prevented any practical effort for its completion until the present time. The tribune and choir form a chancel of noble proportions, capable of accommodating 300 persons, and the south clerestory contains an excellent organ by Hill and Sons, completed in 1880. On the death of Mr. Burges, in the present year, Mr. James Brooks, of Stoke Newington, was appointed to carry out the original design and finish the church by adding the un-built portion of the nave, Mr. Brooks having offered his professional services gratuitously.

TRANMERE.—On Tuesday the new church of St. Luke, Lower Tranmere, was consecrated. The cost of the building will be £6,000 in all. The church consists of nave, chancel, and side aisles, with clerestory. It is designed in the Late Gothic or Perpendicular period, simply treated. Advantage has been taken of the great fall of the land by placing the vestries underneath the east end, the choir vestry being large enough to seat over 100 persons. The church will accommodate 720 persons. There are four entrances, that at the south-west corner having a porch. At the west end of the nave is erected a substantial half-timber bell-cote. The whole of the exterior is local stone, and a portion of the interior is faced with Runcorn stone. The benches are of pitch-pine, also the altar-rail and table, the pulpit and font being of stone. The builders' work has been carried out by Mr. Alexander Bleakley, of Birkenhead. The whole has been designed and carried out under the superintendence of Mr. G. E. Grayson, 31, James-street, Liverpool.

WICKWAR.—The restoration of the church of St. Thomas, Wickwar, which has been in progress during the last sixteen months, is now nearly completed. The church is a stone building in the Early English style. In 1829 it was new roofed, new pewed, and fresh paved at an expense of £700. The chancel was restored in 1856, and an organ was erected. The task of preparing plans for the restoration was entrusted to Mr. W. L. Bernard, architect, of Bristol, and there were two contractors to carry out the undertaking—Mr. Lovell, of Wickwar, who did the masonry, and Mr. Roach, of Charfield, the carpentry. It was found necessary to have a new north wall, and the other walls have been repaired and neatly pointed outside. The embattled tower at the west end, in which are hung six bells, has been also repaired. The wall on the south side of the chancel was taken down and rebuilt.

WIGGINTON.—On the 7th inst. the reopening of St. Bartholomew's Church took place after

restoration. The church will now accommodate 200 persons. The date of the church is about 1370. In restoration two old windows were opened out, one in the south side of the chancel and another in the south side of the western chapel, the latter having been filled with stained glass by Mr. Bell, of London, the subject being St. Bartholomew. The chancel arch has been enlarged, and is acoustically and otherwise a great gain. The organ also has been enlarged, and removed to the chancel, an arch having been opened out into the vestry, so as to form an organ chamber. The roofs of the chancel, nave, and vestry are all new, the timbers being too decayed to admit of restoration, and raised to the original pitch; that, however, of the western chapel has been simply restored. The total cost was £900. The architect is Mr. Withers, Adam-street, Adelphi, London, who is also architect for the Northchurch parish-church restoration, and the builder is Mr. Fincher, of Tring; Mr. Lingard, of Berkhamstead, being the mason engaged.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

LEEDS ARCHITECTURAL SOCIETY.—The following is the syllabus of papers for the session 1881-1882:—Nov. 10, president's address and annual report; Nov. 24, "Terra-cotta and Faience as Materials for Constructive and Decorative Application," by Mr. James Holroyd; Dec. —, distribution of prizes (date to be announced hereafter); Jan. 12, "Lighting by Electricity," by Mr. H. P. Holt, A.I.C.E.; Jan. 26, "The Bedford Park Estate, Turnham Green," by Mr. W. H. Thorp, Grad. R.I.B.A.; Feb. 9, "Church Restoration: What to Do and What to Avoid," by Mr. C. Hodgson Fowler, F.S.A., F.R.I.B.A., of Durham; Feb. 23, "A Real and Ideal Architect," by Mr. J. W. Connon, F.R.I.B.A.; March 9, "Polychromatic Decoration of Gothic Buildings," by Mr. G. A. Audsley, F.R.I.B.A., of Liverpool. Nomination of Officers: March 20, "Dutch Architecture," by Mr. R. Phené Spiers, F.R.I.B.A., lecturer on architecture at the Royal Academy, London. Election of officers: April 6, members' soirée.

COMPETITIONS.

BATTERSEA BATHS AND WASHHOUSES.—Competitive designs were received in the month of May last from six architects who had been selected by the Commissioners, and we are now informed that the latter have availed themselves of the services of Mr. Ebenezer Saunders, member of the Metropolitan Board of Works, who will report as to the merits of the respective designs.

BOLTON.—At a meeting of the Bolton sanitary committee, on Monday, the report of the Hospital sub-committee was read as follows: The sub-committee stated that in response to the advertisements for designs for the borough hospital eleven sets were received, bearing respectively the following mottoes or devices: "As you like it," "Bolton," Borough Arms (device), "Desideratum," "Health," "Octagon," "Progress," Red Cross (device), "Sanitas," "Viola," and "Well considered." Prior to the sub-committee's decision the designs of "Viola" were withdrawn, and after careful consideration of the respective merits of the other designs, the sub-committee came to the conclusion to recommend that, subject to the conditions of the competition, the first prize be awarded to "Desideratum," and the second prize to Borough Arms (device). The envelopes containing the names of the authors of the designs marked respectively "Desideratum" and Borough Arms, were opened, and it appeared therefrom that Mr. Marshall Robinson, 19, Acresfield, was the author of "Desideratum," and Mr. T. Haselden the author of the Borough Arms design. It was resolved that the author of "Desideratum" be requested to furnish the committee with proof that his design can be carried out for £4,000. The author of the first design wins the premium of £25, and that of the second the premium of £15 offered by the Corporation.

"OWEN JONES" PRIZES, 1881.—This competition was instituted in 1878 by the Council of the Society of Arts, as trustees of the sum of £400, presented to them by the Owen Jones

Memorial Committee, being the balance of the subscriptions to that fund, upon trust to expend the interest thereof in prizes to "Students of the school of art who, in annual competition, produce the best designs for household furniture, carpets, wall-papers, and hangings, damask, chintzes, &c., regulated by the principles laid down by Owen Jones." The prizes are awarded on the results of the annual competition of the Science and Art Department. Six prizes were offered for competition in the present year, each prize consisting of a bound copy of Owen Jones's "Principles of Design" and a bronze medal. The following is a list of the successful candidates:—(1) Gideon Fidler, School of Art, Salisbury, design for carpet; (2) John Lamb, School of Art, Kidderminster, design for carpet; (3) Thomas Dutton, School of Art, Nottingham, design for lace; (4) Rose Phillips, School of Art, Northampton, design for wall-paper; (5) Robert Harris, School of Art, Salisbury, design for chintz; (6) W. J. Cluow, School of Art, Macclesfield.

CHIPS.

Indian-ink drawings that are to be coloured or washed over with tints should have a little bicarbonate of potash added to the ink. After the drawing has been exposed to light for an hour or so, the lines can be gone over without washing them up.

The parish-church of Holsworthy, Cornwall, is to be rebuilt. The church has been in process of reconstruction for some time, and an anonymous donor having offered £200 towards the restoration of the nave, the vicar and wardens have determined to appeal for additional funds, so as to complete the whole building. The cost is estimated at £2,000, and Mr. Wiffen is the architect.

The memorial-stone of new board schools for the Warley Union District was laid by the chairman on Oct. 3rd. The schools consist of boys, girls, and infant department with the necessary classrooms, lavatories, residence, outbuildings, playgrounds, &c. Mr. R. F. Mathews, of Paradise-street, Birmingham, is the architect, and Messrs. Stockton and Son, of Oldbury, have the contract, £1,831, for the whole of the works.

New schools are about to be erected in the Bearwood-road, Smethwick, from the designs of Messrs. J. P. Sharp and Co., Birmingham, architects to the Harborne School Board.

A meeting was held at Haverfordwest last week to consider the desirability of restoring St. Mary's, the chief and finest church in Pembrokeshire, when it was decided to take steps to procure subscriptions with that object.

Serious and repeated complaints having been made as to the quality of the water supplied to the city of Ely, the Local Government Board have instructed their inspector, Mr. S. J. Smith, to hold a local inquiry into the matter on Friday, the 28th inst.

New corn-stores have been erected at Oldbury for Mr. H. T. Nock. The contract for the works, £1,450, has been executed by Messrs. Stockton and Son, contractors, of Oldbury. Mr. W. Withers, of New-street, Birmingham, was the architect.

The local board of Brentford, at their meeting on Tuesday week, adopted the plans of Messrs. Gotto and Beasley, civil engineers, of Westminster, for the drainage of the district, subject to certain modifications suggested by Captain Gilton and the approval of the Local Government Board. The estimated cost of the scheme is £18,000, but this will be considerably increased by the proposed alterations.

Messrs. Robert Boyle and Son have recently applied their complete system of ventilation and sanitation to the Brompton Oratory, South Kensington, which has proved highly successful, the Rev. Fathers having presented Messrs. Boyle with a valuable testimonial to that effect. The new extensions to the Devonshire Hospital, Buxton, opened last week by His Grace the Duke of Devonshire, are also fitted throughout with Messrs. Boyle's air-pump ventilators, which are at present being applied for the ventilation of Lambeth Infirmary.

Messrs. Chambers, Munery, and Co., of 41, Bishopsgate-street Without, are introducing some remarkably cheap and well-designed office-fenders (made also as curb for tiled hearths) worth the attention of our readers.

A new vicarage has just been completed for St. Michael's Church, Trivale. The architects were Messrs. Davis and Middleton, of Birmingham and Dudley, and the contract for the works, amounting to £1,337, has been carried out by Messrs. Stockton and Son, Oldbury.

"To a practical man with a taste for mechanics, and the bumps of conscientiousness fairly well developed, we can give no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *Engineering*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mousetrap, to the latest method of calculating the phases of Orion!—The *Brighton*. Price Two-pence of all newsmen, or post free 2½d.—St. Tavisstock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31 TAVISTOCK-STREET, COVENT-GARDEN, W.C.
Cheques and Post-office Orders to be made payable to J. FASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All *Situation advertisements must be prepaid.*

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33f. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.
Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete Vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—C. E. J.—M. and Co.—J. D. M.—G. and Co.—J. P. M.—F. C. Co.—B. A. B.—C. D. and Co.—E. G. O.—J. L. A.—H. F. H.—W. H. S. and S. D.—J. A. and Son.—T. H. Co.—C. D. and Co.—B. P. H. Co.—T. S.—J. C. B.—W. F.—H. L. S.

J. A. SAUNDERS, Folkestone. (The only mode of obtaining Prof. Roger Smith's lectures at University College is by attending the courses, as the College authorities do not allow class lectures to be published.)

MEDICAL SEALS.—ERRATA.—In our issue of last week the numbering of figures on the plate was transposed. For "1" read "5," for "2" read "1," for "3" read "6," for "5" read "3," for "6" read "8," for "8" read "2." In the letter press on p. 486, col. 3, line 13, for "Renulf" read "Kenulf"; p. 486, col. 3, line 14, for "is the finest" read "is of the finest"; p. 487, col. 1, line 24, for "Wariogay" read "Worm-gay"; p. 487, col. 2, lines 6 and 7, for "Figs. 2 and 3" read "Figs. 5 and 6."

Correspondence.

"FREE PROFESSIONAL SERVICES."

To the Editor of the BUILDING NEWS.

SIR,—The letter of Mr. J. L. Robinson, in your issue of this week, with your editorial note,* that we should be allowed to correct the paragraph referred to, has rather taken me by surprise.

As senior of our firm, I beg to state that the reason we have offered our services gratuitously is that it is a national movement, which has met not only with universal approval, but has drawn forth large subscriptions from all classes of the community.

We are not alone in thus helping a good cause. An eminent firm of solicitors in this city have done the same, and I do not for a moment believe the rules of the Institute would forbid any architect making such an offer.—I am, &c.,
H. P. N. DEANE, F.R.I.B.A.

* The postscript referred to was not an "Editorial note."—Ed. "B.N."

SIR,—We have a saying, at this side of St. George's Channel, "that if you put an Irishman on a spit, you could get another to roast him." I hope you won't think that I am turning the spit, in referring to what seems to be a case of "kettle and pot," appearing under the above heading in your last issue, and "Our Office Table" in the number for the 16th ult., as I suppose it is the same Mr. John L. Robinson who figures in both.

In one, it is stated that "he had prepared plans for a new Town-hall in Cork, but the mayor said the designs would cost nothing, as he sent them unsolicited and free of charge," but you charitably add that he received an official vote of thanks for his very admirable sketch. In the other case he incloses a statement that Messrs. Deane and Sons wrote to the Committee of the National Exhibition of 1882, intimating their willingness to give their gratuitous professional services to the Committee, which were accepted with thanks.

The difference between the two cases appears pretty much like, "twee-dle-dum," and "twee-dle-dee," unless it lies in *submitting plans and offering services*, or that they were rejected in one case and accepted in the other, in both "with thanks"; or perhaps being a Fellow of the R.I.B.A. makes the custom of architects offering their gratuitous services more honoured in the breach than in the observance.

As Mr. Robinson thinks it fair to give the firm he refers to an opportunity of correcting errors, and is ready with his pen, as to others, perhaps he would set himself right in the matter, or in the words of the once-popular song, "Correct those failings in himself that he condemns so in another."

Limerick, Oct. 15, 1881.

M. M.

SIR,—Your correspondent, Mr. Robinson, should not fret about the doings of the firm whose name he gives. Offering "gratuitous services" is merely a bid for popularity, and a means of keeping before the public, for the services of Messrs. Deane and Sons will not be required by the Committee of the Irish Exhibition. Mr. Edward Guinness has given the use of the existing building free for twelve months—a fact of which Deane and Sons were aware. If any alterations are required, doubtless Mr. Guinness will have them made under the supervision of his own architect. A piece of practice on the part of the same firm, which seems to have escaped Mr. Robinson's notice, was the sending in (without being asked by the authorities to do so) a set of plans some time ago, for the new art buildings to be erected here, and for which a competition is now open. There is nothing like having a good eye to business.—I am, &c.,
Dublin, Oct. 17, 1881. SIMPLE SIMON.

SIR,—Mr. Robinson writes with real Irish emphasis. Boycotting will be, I expect, his next suggestion! Why should not the gentlemen he refers to give their services? They have as much right to do so as others to charge five per cent. I expect there are very few gentlemen in the profession who have not at some time or in some way given their services. Friend R. surely disquieteth himself in vain. No great harm will ever be done in this way; the practice will assuredly be very circumscribed.—I am, &c.,
M.

THE "SATURDAY REVIEW" AND FREEMASONRY.

SIR,—I have read both the article on page 439, and the letter of "Knight Templar," on page 503; but although the latter proves the writer has a warm heart to the "Order," the historical knowledge he shows is scarcely so creditable to him. If he had read much about the history of Freemasonry he would have known that many students of history have asserted that what has been known for the last century and a half as Freemasonry, "was invented and established in, or about, 1717." The fact that Freemasons adopted old masonic signs, tools, and emblems is no proof that Freemasonry itself is old, and I hardly think Woodford and Whytehead are the most reliable Freemasonic writers. W. J. Hughan in England, Findel in Germany, and D. Murray Lyon in Scotland, are all authors of higher repute; the latter is the Grand Secretary for Scotland, and both he and Hughan—an Officer in the Grand Lodge of England—coincide in

asserting that there was no Freemasonic system of three degrees in existence until about 1717, nor any Grand Master until the same year. Then a good while after that—viz., towards the end of last century, Masonic Knights Templars, and other high-sounding degrees sprang up. The adoption of a similarity in nomenclature does not involve historical or hereditary relationship. VERITAS.

FOREIGN TRAVELLING STUDENTS.

SIR,—Although foreign travel is so universally recognised as an essential part in the education of an architect, there does not appear to be any regular route laid down, and every one contemplating an architectural tour is left pretty much to his own devices to find out in which towns the various buildings best suited to his purpose are to be found.

I think it would not be a very difficult matter for some competent persons to make out such a route, and if a little extra trouble were taken, a list might be made of places and buildings that would be of the utmost value not only to those who (1) intend to travel, but also to those who, (2) being unable to go abroad, study at home, in that it would give a definite idea at a glance of the history of architecture. The list that we need is one something like the following, arranged under such headings as:

Country	Town.	Building.	Date of Comm.	Date of Compl.	Style.
					Earliest example in Greece.
Greece.	Corinth.	Temple.	655, B.C.	581, B.C.	of Doric in Greece.

And commencing thus, going on through Italy, France and England, down to the time of the Revolution. The list to contain only those buildings in which each successive step (as nearly as it can be done) in the history of architecture can be traced. With regard to the secondary object proposed, it might be well to go back a great deal further in dates, but it would not be necessary as far as travellers are concerned.

The BUILDING NEWS, being a journal which most students of architecture take in, would be a fitting place for the publication of such a list, if anyone could be prevailed upon to compile one for us, and if you could afford the space for it in your columns.—I am, &c.,

R. W. B.

HOUSE DRAINAGE AND SEWER AND GULLY VENTILATION.

SIR,—From the letter of Mr. Buchan on this subject, page 508, he has evidently misunderstood some of my remarks upon sewer ventilation. I did not suggest the use of the rain-water pipes as a means of ventilation. I think if Mr. B. will read my letter again, he will see it was quite the reverse: "The sewage drains would be the only ones having a direct communication with the street sewer." I should not advocate the use of rain-water pipes as a means of ventilation for the same reasons as stated by Mr. Buchan.

As a rule, however, rain-water pipes on the front side are generally connected direct with the street sewer, without being intercepted by a gully-trap, or any regard being shown as to the inlet from the caves gutter being adjacent to bedroom windows.

In reference to the escape of sewer-gas from the street gullies after a continuance of hot dry weather; although the surface area of the gully exposed to the atmosphere might be reduced, and the depth of the water-seal increased, evaporation would still go on, and the contents which remain would be mere sludge.

I think a system which would dispense with the necessity of a trap in the street gully is the best method to adopt. I am, &c.,

Juta, Oct. 18, 1881.

W. B.

MR. P. J. DAVIES ON WATER-TRAPS AND SIPHONS.

SIR,—In reference to the traps, Figs. 93 and 94, on p. 421, I should like to ask Mr. Davies if he can point to any published drawing prior to A.D. 1875, showing these in the same way as he has drawn them, especially at the turn-down point B in each? Or is this the improvement that he refers to on page 421? I have imagined that I was the first to definitely point out, in 1875, the improved effect produced in the well of a trap by causing the water to fall over a sharp edge in place of over a rounded edge; but if any other party published that before me, then *Palmarum qui meruit ferat*—but upon satisfactory evidence.

In regard to the quotation from Pliny, given by Mr. Davies on p. 421, it, of itself, hardly shows reference to the use of water siphon-traps to keep back the air on the outer side of the trap from getting into the pipe on the inner side of the trap. It simply shows that Pliny knew that water would rise to its level even through a pipe with ups and downs in it. I would infer, however, that he must also have known that to enable it to do so in a close or air-tight pipe, the air requires to be let off at the higher part of the bend before the water can flow onwards, unless where the pressure is so great as to force the air before it.

Coming, next, to p. 456, may I ask why Fig. 100 is shown "upside down"? Does that mean that the way it is drawn is not really the way in which it has been applied, and that it is "shown upside down" to make it more like Fig. 101? Fig. 100, as drawn, and Fig. 101 have this advantage over Fig. 99, that if the water runs out of the trap from any cause the ball still acts, or tends to act, as a barrier to the passage inwards of the air beyond the trap; whereas, in Fig. 99, should there get a hole, by frost or otherwise, in the trap to let out the water, then the foul air blows directly into the house, the ball B, in Fig. 99, being quite useless in such a case, and the same may be said of the Bower trap, Fig. 102.

Further on, p. 492—Jenning's ball-trap, Fig. 103, which Mr. Davies says "is simply perfection," and "requires no criticism as to merits or demerits," is, in my opinion, quite open to criticism, and, although a very ingenious and clever trap, is open to the imperfection of being apparently all right, when in reality it may be useless. It has the same fault as pointed out above with Figs. 99 and 102, viz., that the ball is only a mere supplementary addition to the water, and not independent of it. Should a hole get into the metal of the part where the water lies, as during frost, then the water may run off and the foul air blow freely in; B then being only a dummy, or sham sentinel. Then, again, should a sand-hole exist in the inside metal above the ball, and the sand by-and-by get washed out or corrosion occur, then the trap becomes useless, so that altogether for safety Fig. 103 is much inferior to Fig. 101, although so much neater-looking than the latter.

W. P. BUCHAN.

Intercommunication.

QUESTIONS.

[6729.]—**Dairy and Poultry Farm Buildings.**—Can any reader recommend a good book with designs for, or a description of, such structures? Also for pigeries.—P. PLAYFAIR.

[6730.]—**Asbestos.**—I wish to warm a room by means of asbestos fuel. Will any of your readers kindly inform me if I must use an atmospheric burner, or will an ordinary burner be suitable? Also, what is the probable cost per hour?—A. SUESCABBA.

[6731.]—**Old Crosses in West of Cornwall.**—Is there any authentic list of existing granite crosses in this interesting part of England? I met with many curious examples during a hasty visit to the neighbourhood this summer.—H. DUNSFIELD.

[6732.]—**Down-Draught in Chimneys.**—I have lately entered a new house, and find every chimney acts as a conductor of air into the rooms, strong down-draughts. Can any of your readers give me advice as to the best way of remedying this great evil?—W. B.

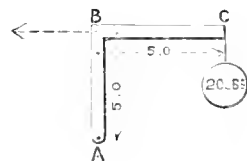
[6733.]—**South Africa.**—I am a joiner, and am anxious to emigrate to South Africa. Are there not some labour agencies who send out mechanics? Some reader will, perhaps, give information in "Intercommunication."—JACK PLASE.

[6734.]—**Rain-Water.**—I have somewhere seen an invention described by which the rain-water, as it runs off the roof after a shower, is discharged into a waste pipe, but by an automatic balancing arrangement the water, as soon as clear, is diverted to another pipe, so that it may be conducted to a rain water tank. Can any contributor give me particulars of the foregoing, and where it may be obtained?—B. S.

[6735.]—**Rain-Water.**—The following circumstance has come under my notice, viz., a rain-water tank has been recently constructed in some premises in the South of England of 9in. brickwork in cement, finished with 3in. cement plastering, coated with Russian tallow. It is about 15ft. deep, and 6ft. diameter, covered with dome and ordinary manhole (originally intended for cesspool). Has an overflow pipe. Rain-water is conveyed from slated roofs by means of ordinary cast-iron eaves, gutters, and down pipes, and stoneware drainpipes jointed with clay and cement. Very little if any surface water is admitted. The water is drawn from tank by means of ordinary iron lift-pump and iron pipe. The water used for culinary purposes is supplied by a company, and is obtained from the chalk, and is very hard. The rain-water, instead of being soft as usual, is as hard as the water supplied by the company. What can be the reason?—J. E.

[6736.]—**Calculating Deals.**—Will some reader of the BUILDING NEWS kindly inform me the most practical and correct way of reducing deals, battens, &c., into standards by fully illustrating the same, so that I may thoroughly understand the rule? What is the meaning of the following:—210.21 × 7 white battens at containing 3:1.2646. 1+1 the 1 of a standard? What is the meaning of 26 2/3?—SAM THOMAS.

[6737.]—**Pull on Casting.**—A casting, A B C, as shown in the diagram, working on a cone at A, and



loaded with 20lb. at C. What would be the horizontal pull at B, the weight of the casting not being taken into consideration?—SEVENAX.

REPLIES.

[6653.]—**Variation of Compass.**—"L. L. U.," on p. 511, took rather a rough way of determining the variation. You cannot do it accurately unless sufficiently acquainted with astronomy to determine in what part of its orbit the Polar star is at the time of observation, because, although practically stationary for general purposes, it really has a 2° or 3° orbit, which of course affects any angle of variation that may be obtained. I took the variation by theodolite some years ago in Bengal when on survey duty, and made it, if I remember rightly, 3° 8' when the correct amount was about 2° 47'. In Morayshire, in 1863, it was 23° 30' West, which may help "L. L. U." in obtaining the present amount there.—P. PLAYFAIR.

[6657.]—**Chimney Shaft.**—Hugh McLachlan is, of course, correct in saying, on p. 511, that drawings would have to be submitted to the district surveyor. One knows that. What is inquired for is the data upon or by which the surveyor is supposed to check designs.—P. PLAYFAIR.

[6694.]—**Deductions in Brickwork.**—What does "Young Surveyor" mean by "quoins having copings"? Does he intend copings of gables, &c., when of stones cut with horizontal beds and vertical sides for bedding on to the brickwork, to be so understood, if not, would he please explain? The following extract from the system recommended by the Manchester Society of Architects may help him, published in BUILDING NEWS, April 10, 1874. "To obviate any misunderstanding as to so-called trade usages, with regard to other materials, as stone, &c., built in, it is proposed to measure the nett quantity of brickwork to be executed; deducting entirely all labour and materials in openings having more than 100 square feet 'face' measure, and deducting materials only (leaving 'hollows' for labour) on the following:—All other openings than the above, the shape they are actually executed, provided they are openings in the walls and built above with the same materials. All cills, strings, cornices, &c., and other masonry or dressings built in, and being more than six inches high. The 'hollows' thereon being assumed to pay for the labour in providing proper bed therefore, filling up thereto, and pointing up." The above is from the trade of "Brick setter," the last clause appears to be what is required. I do not understand the term "hollows," perhaps it is of local use only.—H. McLACHLAN.

[6692.]—**Statics and Dynamics.**—The work recommended by the Royal Institute of British Architects to students for their examinations is Todhunter's "Mechanics for Beginners." I have no acquaintance with it, but the name of the author is a sure guarantee of the quality of the work, and it is to be hoped for those who are not versed in mathematics that it does not prove many of the theories thereby. I have studied what I know of the subject from Cassell's "Popular Educator" and Tomlinson's "Elementary Mechanics" (Weale's Series), the latter is a little antiquated, but its truths are still the same; in both these the subject is treated in a simple manner, arithmetic only being used in the theory of mathematics. If "W. S." knows hardly anything of physics he would do well to read Balfour Stewart's Shilling Primer on "Physics" published by Macmillan and Co. For a more advanced work I would recommend buying some work published by the last-named publishers, and the intending student would do well to glance through it before purchasing to see whether it is above his level or not. The best works often use algebra and trigonometry in their explanations, as with Rankine's and Parkinson's.—H. McLACHLAN.

[6692.]—**Statics and Dynamics.**—A very good treatise, and one I can recommend to a beginner, is Baker's "Elementary Statics and Dynamics," published in Lockwood's series, about 18. 6d. A more advanced treatise is Twiss's "Practical Mechanics."—G. H. G.

[6693.]—**House Surveying.**—My experience in surveying has led me to think the surveyor who is instructed to examine house property and old buildings, cannot go too well equipped with such things as spirit-levels and plumb lines. Such tests are not usual unless a very elaborate survey has to be made upon the condition of a building, but they are very necessary. No practical surveyor should be without the two former of these instruments mentioned, and a gimlet is almost as necessary to test the condition of timbers. A mere superficial examination of joists, rafters, and plate is often very misleading, as the interior may be perfectly rotten, and a few thrusts with a pointed pen-knife will not give so good an idea of the soundness of a large scantling as a gimlet-hole. There is nothing *infra dig.* for an architect or surveyor to carry with him the necessary instruments for his professional avocations, no more than for a surgeon or physician to carry a case of probes or lancets or a stetho-

scope in his pocket. In surveys for sanitary purposes, as in the examination of drainage and ventilation, a set of tools and instruments for measuring the velocity of flow and the currents of air in shafts become necessary. I know of no books on the subject.—G. H. G.

[6993].—**House Surveying.**—I expect surveying for dilapidations is referred to, I know of no work as required. A spirit-level is useful to test the levels of floors, &c., and a plumb line to test the upright of walls and chimney-stacks. The eye is generally sufficient for the purpose, but the named instruments show exactly the degree of settlement. I expect the "gimlet at the end of a walking stick" was used to find whether there was any dry rot, but if that existed strongly the stick alone would have been quite sufficient. When within reach a penknife is sufficient if the blade be pushed into the wood; dry rot is often hidden by an outer shell about one-eighth of an inch thick or less.—H. McLACHLAN.

[6995].—**Plastering.**—Cracks arise sometimes from settlement and sometimes from shrinkage in the laths. The lime is also at fault if not properly slaked, and the stuff is best kept.—G. H. G.

[6995].—**Plastering.**—Probably from the "rendering" coat not being sufficiently keyed to the laths, or not beaten well between them to form a key on the upper side. Theoretically I should say the "rent laths" are much better, for their inequalities and knot holes are first-rate for the purpose of keying, which is of more importance than an equal thickness of stuff, even though the latter will cause some cracking from unequal shrinkage. It is really impossible to have plaster-work without cracks; these will always be caused by shrinkage on the drying out of the water, and though these may be filled up, the elasticity of a wooden floor is sure again to cause others. The different causes mentioned in question will all occasion cracks to a greater or lesser degree.—HUGH McLACHLAN.

[6996].—**Cement Work.**—I should think that the rendering coat had become too dry before the finishing one was laid over it. To remedy some knock off all unsound work, back and notch well into rendering coat, and well wet same by sprinkling with a plasterer's brush before laying on the finish. Cracks will be likely to appear at junction of old and new work after drying, if so these can be stopped afterwards.—HUGH McLACHLAN.

[6998].—**Factor of Safety.**—It would be well if querists would study the elements of building before entering into the "intercommunication" column of the BUILDING NEWS, it would save themselves and others much trouble; for if they mean to study the subject, the elements must be learnt, and the sooner it is done from observation and books the better; it will also at times save them from unpleasant remarks. I intend to give over answering questions when the information desired can be learnt from nearly every person acquainted with the subject, therefore in future answers on such questions are not to be expected from me. All materials break under pressures or strains if these are increased or produced to a sufficient extent. These pressures and strains are chiefly:—compression, tension, cross breaking which subjects the piece submitted thereto to both compression and tension at the same time in its separate parts, torsion and shearing. Compression is simply crushing and tension is pulling asunder; the other three will be found I believe in all cases to be these two united in different manners. Torsion is the strain caused by twisting, and shearing is a breaking asunder caused by one part of the material being forced in one direction and another part being forced in an opposite direction, making, as it were, the one part to slide over the other. Experiments have been tried on various materials to see what pressures and strains would destroy them, the pieces being made of similar sections and the pressure or strain measured in lbs. or tons, generally reduced to a mean on sections of one inch square; the mean results for similar materials of similar and same sized sections are called constants, and it is from these that the breaking weights and desired dimensions are calculated. Before the breaking point is reached, fracture is generally noticed to commence, and this is called the point of fracture. It is also found that in bodies submitted to cross strains and torsion that a small part in each is under no strain, this part in each is called the neutral line. Further from the experiments it has been found that the breaking weights vary considerably, this of course arises from defects in the materials operated upon, for instance, knots and shakes in timber, air bubbles and sand holes in iron and veins and cracks in stone and brick, also other inequalities. Now it being well known that no piece of any material can be perfect and also that a large number of the defects in the materials can not be discovered, it is necessary to allow a large margin for safety; and as the point of rupture is only a fraction by measure of the breaking weight, say one-half or one third, and still more that the limit of elasticity is even less, for if a body is subjected to a strain beyond its limit of elasticity it will not recover the same perfectly and therefore for future use is not so strong, for these reasons it is necessary to use only a small fraction of the breaking weight as the extreme load or strain to which the piece should be submitted, and this fraction is called the *factor of safety*. It varies with the material and also with the kind of strain and by different authors is variously given the same being the case regarding *compression*. The factor of safety under a tensile strain for wrought iron is taken as one-fourth, for a cross strain as one-sixth and for a compressive strain as one-tenth; for other materials which are not so well understood and more uneven in texture, one-tenth is generally taken. I might have added that the *limit of elasticity* is that point reached when any body is bent and cannot recover exactly its former position. "M." and others equally ignorant should read B. Stewart's Primer on "Physics" referred to in my answer No. 6992.—H. McLACHLAN.

[6999].—**Oil in Boards.**—What I believe to be the best remedy is very simple. Lay brown paper over the parts injured and then apply a hot iron, this will draw out the oil, which will then be absorbed by the paper. I expect that these parts will always appear darker than those uninjured.—H. McLACHLAN.

[6999].—**Books.**—Send to R. T. Batsford, Holborn, London, W.C., for catalogue of architectural books.—H. McLACHLAN.

[6991].—**Books.**—"Subscriber" may consult Scott Burn's works on "Farm Architecture. For specifications, the best work is Donaldson's "Handbook of Specifications," and a smaller treatise, containing a good model specification, is Wrightwick's "Hints to Young Architects," edited by G. H. Guillaume. A good provincial pricebook was noticed last week in the BUILDING NEWS, compiled by R. Beckett. For surveying and levelling I recommend Simm's and Baker's treatises. All these books may be obtained of Messrs. Lockwood and Co., Stationers' Hall-court.—G. H. G.

[6992].—**Lunatic Asylums.**—I believe no work has been published on this subject. "Esquire" would however learn much by studying a paper read at the Architectural Association on "Hospitals for the Insane" and reported in full. Dr. Oppert also refers to them in his work on hospitals.—H. McLACHLAN.

[6995].—**Brick Architecture.**—The introduction of Dobson's "Bricks and Tiles" (Weale's Series), gives a short list of old buildings. Mr. Tavenor Perry's paper "on the Mediaeval Brickwork of Pomerania" read at the Royal Institute of British Architects, Nov. 17, 1873, and James Brown's "Brick Ornament and its Application" advertised on the front page of the BUILDING NEWS. "S. F. C." will see many of the best examples in London, in the Temple, Lincoln's Inn, and pretty generally through the West Central District and Chelsea. Nearly all the seventeenth and eighteenth century buildings within twenty miles of London when not of stone may be inspected. Rotterdam, Amsterdam, Bruges, and other towns of the Netherlands are rich in this respect. The best new work is also to be found as a rule in the neighbourhood of the best old work.—HUGH McLACHLAN.

[6997].—**Softening Putty.**—In answer to "A Subscriber," I find in Mr. Fawke's book on "Horticultural Buildings," published by Batsford, p. 103, the following:—"When ordinary putty becomes very hard it may be softened for the purpose of easy removal by keeping it moist for a short time with caustic potash or soda, or if the putty be painted, with nitric or muriatic acid, it will be softened in about an hour." Instructions are also given in the same book on page 102 for making putty, which will not be liable to get hard, crack, and allow water and frost to get in.—N. G. T.

[6998].—**Plumbers' Solder and Smudge.**—"A Young Plumber" may get some hints as to these upon pages 19 and 20 of Buchanan's "Plumbing," No. 191 of Weale's Series.—AS OLD PLUMBER.

[6999].—**Rainfall, Sewage, &c.**—Latham's work on "Sanitary Engineering and the Statistics," published by Mr. Simons, will give all that is needed. These subjects will also be found fully treated in the back volumes of the BUILDING NEWS.—G. H. G.

[6993].—**Shoring.**—I know of no work treating of underpinning and shoring, except in a very casual manner. The dangers likely to occur from want of shoring are generally apparent enough to those who have charge of a building. With respect to the principles of shoring, they are simple, and an acquaintance with the elements of mechanics is all that is required. The forms of shores are well known, and will be found in Hurst's edition of "Tredgold's Carpentry" (Spoe and Co.). It would be useless to lay down any principles without knowing the exact case "W. G. M." has in view. One general principle of some importance is to relieve by upright posts and crosspieces or needles any weight which is acting injuriously in any direction, and then to give the lateral support. Thus, if a house wall leans it is desirable to relieve the loads on the upper floors by propping between the floors, removing the load as far as possible, and after this has been done to place the raking struts. The chief danger of underpinning arises from defective bond and bad mortar. If the wall is at all shaky or "rotten," it is not safe to underpin more than 2 or 3 feet at a time, and this should not be done without relieving the wall of any weight that it may have to sustain at this part, and every care ought to be used to find out if the wall carries the weight of any other structure than its own load.—G. H. G.

[6994].—**Gas-Tar and Shingle Paths.**—Remove all soft soil and fill in 6 or 8 in. deep with stones, broken bricks, &c., which would pass through a 2½ to 3 in. ring. After levelling and consolidating, put a layer of smaller stones about 3 in. thick, which would pass through a 1 in. or 1½ in. ring level, and then cover with layer of levelled gravel. Heat the gas tar, and to boiling condition ladle it out on the gravel. Old waterpots without the rose will be handy. Dust over upon the distributed tar fine gravel. When sufficiently set, and as soon as possible, roll with heavy garden roller. In hot weather some work done in this manner was rolled a day or two after being laid, but the whole did not set firmly for two or three weeks; then it was satisfactory. I should think fine granite chips, Derbyshire spar or crushed shells would form a better appearance if sprinkled on the hot tar instead of gravel.—F. T.

[6997].—**Mounting Drawings.**—One method I have frequently adopted has answered well. It is as follows:—The stretcher being naked, i.e., no calico strained on it, apply the selvage edge of the calico to the edge (not front nor back), and nail it on with tacks about 2 in. apart, then the opposite side, stretching the calico very tightly, with tacks about 6 in. apart, then one of the other sides, not stretching so tightly as for the last, with tacks about 6 in. apart, and then the opposite side, stretching very tightly. Fill in the tacking on the three sides, making the tacks about 2 in. apart, stretching the calico very tightly before driving each tack. Cut off the superfluous calico when it is ready for mounting the drawing. Paste on strips of coloured paper, covering the tacks. Cut the drawing to leave a margin on stretcher of the width desired. Lay the drawing face downwards, and cover the back with paste rubbed on with the hands, carefully covering every part, avoiding lumps and an uneven thickness of paste. Pay special attention to the edges. Damp the calico with a moist sponge. Place two corners of one side of drawing on the stretcher, another person holding the opposite corners well up. Place a large sheet of clean paper over the side just attached, and gently and quickly press down the sheet, the assistant yielding to the pressure. Each person rub down on the piece of clean paper with a scale or set square, and work out the superfluous

paste at the edges. Clean off with damp sponge. Starch some prefer to paste.—F. T.

[6993].—**Separate Cistern to W.C.**—It seems to me that "O." has not sufficiently stated his case. To keep the service pipe "charged" he must have a stool cock at the bottom. If within the district served by the New River Company, the w.c. will have to be fitted with a waste preventer. For a stool cock to be regulated by waste preventer fixed at the top of the "charged pipe," it would necessitate a complication liable to get out of order in a short time. If waste preventer was fixed in connection with the stool cock at the bottom of the pipe, judging from those that I have seen from their beautiful and delicate construction, it would cease to act with the least particle of grit, and I don't believe this would pass the company. The water in the cistern feeding w.c. with a "charged pipe" is subject to the minimum of contamination, but "O." must bear in mind that an open sink and a w.c. pan are not on a par for comparison, as he imagines.—N. D. F.

[6993].—**Separate Cistern to W.C.**—The objection to a w.c. being flushed direct from a storage tank arises from the fact that, even with a valve under w.c. seat, the flush pipe is liable at any time to become a vent pipe, but when a service box or valve in cistern is used, the danger is greatly increased, because there is at all times a direct communication between the w.c. pan and the tank, up which the foul gases are constantly passing and being absorbed in the drinking water. If any one doubt this he may easily convince himself by holding his nose over such a pipe while the w.c. below is being used.—DANIEL EMBAGE.

[6995].—**Girder.**—If "H. D." refers to any of the one thousand and one books on strains, he will find correct diagrams showing tension and compression.—P. PLAYFAIR.

LEGAL INTELLIGENCE.

IN RE JOSEPH WOODHOUSE.—Before Mr. Registrar Ilazlitt.—The debtor, carrying on the business of a builder at Tottenham and Kingsland, presented his petition for liquidation a few weeks since, estimating his debts at about £15,000, and assets £12,000. The meeting of creditors having been recently held and adjourned, Mr. Doria applied on Monday for a further injunction restraining several actions. His honour granted the application.

STAINED GLASS.

WARMINSTER.—A stained-glass window, the work of Mr. Charles Evans, of Fleet-street, London, has lately been erected in the Chapel of St. Boniface Mission, Warminster. The subject represented is the "Crucifixion"; the figures of St. John and the B. V. Mary are introduced at either side, the whole being surmounted with an ornamental canopy and base.

NORWICH.—In connection with the restoration of St. Peter Mancroft Church, a window in the south-east portion of chancel has been filled with stained glass by Messrs. Clayton and Bell. The cost was £400, and the work is a memorial of the late Mr. Robert Seaman. It contains full length representations of SS. Peter, John, Paul, and Barnabas, and there are also the following scenes:—In the centre "The Call of Peter," "The Charge to Peter," "The Stoning of Stephen," "The Martyr of Antioch," and "Paul Preaching at Athens." On the right-hand side is Barnabas introducing Saul to the Apostles, and the "Healing of the Cripple at Lystra." On the left-hand side are the Apostle John leading the Virgin Mary home from Calvary, and the same apostle at Patmos. Beneath the window is an inscription.

CHIPS.

The church of St. Emanuel, Lockwood, Huddersfield, has just undergone considerable improvements, including the erection of a very handsomely-carved memorial oak pulpit, in the Decorated style, with the top of open tracery work, filled in with brass grilles. An ornamental reredos is also among the work, which has been executed by the firm of Messrs. Jones and Willis, of Birmingham and London.

Hereford Cathedral school was founded by Bishop Gilbert, in the year 1331. This, the 500th anniversary, has been appropriately celebrated by commencing the erection of a school library in memory of the founder. In addition to the library, two new classrooms are being added; and arrangements are being made for isolating boys in case of illness. The works are being carried out from the designs of Mr. Kempson, F.R.I.B.A., and the contractor engaged is Mr. Callis, of Hereford. The works will all be completed before speech-day comes round again.

The Chiswick improvement commissioners inspected on Thursday se'night the additional tanks and precipitating works at the pumping station, which have just been carried out under the superintendence and from the plans of Mr. H. O. Smith, C.E., their surveyor. The tanks are four in number, measure 94ft. by 40ft., and are constructed in concrete, with brick facings. The contractor was Mr. Harry Smith, and his foreman, Mr. Standen.

Our Office Table.

THE report of the select committee appointed to consider the working of the Artisans' and Labourers' Dwellings Improvement Act, 1875, and the amending Act of 1879, has been issued. It states that, owing to the lateness of the session, all the witnesses were not examined, and the report therefore recommends that the Committee should be reappointed early next session. It is, however, suggested that, with the view of lessening the expense of carrying out the Act of 1875, the confirming authority might well consent to the basement and ground-floor of any building being let as shops or workshops, and that in considering the amount of accommodation to be provided for the working classes displaced by any scheme, the confirming authority would be justified in giving a liberal interpretation to the relaxing power in the 4th section of the amending Act, and might take into account, as in part fulfilment of the obligation to provide equally-convenient accommodation, any suitable existing facilities of transport, to a reasonable distance and at reasonable prices, by water, tramways, or workmen's trains.

RAPHAEL MONTI died in London on Sunday, aged 63. A native of Milan, he studied sculpture under his father, Gaetano Monti, and at an early age won the Gold Medal of the Imperial Academy in that city by a group of "Alexander taming Bucephalus." His next considerable work, "Ajax defending the body of Patroclus," was exhibited before he was grown up. Between 1838 and 1842 he resided at Vienna, and between 1842 and 1847 was occupied with several groups designed to add to the attractions of Milan. In the last-mentioned year he came to England, where his "veiled statue," executed at the instance of the Duke of Devonshire, elicited high praise. Returning soon afterwards to Milan, he gave in his adherence to the popular party, and in 1848, as one of the chiefs of the National Guard, was sent on a mission to the camp of Charles Albert. The war over, he again came to England, and from that time devoted himself to his art.

AN Educational and General Art Exhibition is to be opened at Stirling early in the ensuing year. It is proposed to obtain and exhibit works from Art Students and Art Schools both in England and Scotland; and from promises which have already been received, it is expected that the present exhibition will afford an interesting and instructive illustration of the progress of Art-Education throughout the country. It is intended to add a general exhibition of original works of art by professional and amateur artists. The exhibits will include (1) Paintings in oil and water-colour, (2) paintings on china, terra-cotta, or other pottery ware, and (3) studies in black and white—including original architectural designs. The exhibition will be opened in the galleries of the Smith Institute as soon after the 1st January, 1882, as arrangements will permit. Intending contributors are requested to communicate with the manager before Thursday, the 22nd December, 1881. All works sent, through the agents, for the exhibition must be delivered to them as follows:—London agent, Mr. James Bourlet, 17, Nassau-street, Middlesex Hospital, London, till about the 15th December; Messrs. Doig, McKechnie, and Davies, Edinburgh, till about the 19th December; Mr. Geo. Davidson, Glasgow, till about the 19th December.

BOROUGH surveyors and sanitary officials serve too many masters to grow bumptious, or many might feel taken down an inch or two after reading the following anecdote of the late Mr. A. W. Morant, engineer to the borough of Leeds, contributed by Mr. J. T. Bottle to a memoir just printed for private circulation by Mr. Wyatt Papworth, while Mr. Morant lived at Great Yarmouth. An aggressive-looking female, with a plethoric umbrella, came one day stumping into the surveyor's office at the Town Hall, and fixing on Morant her glittering eye, she asked, in the most uncompromising tones, "Are you the man what belongs to the gutters?" A bright smile arose on his face, and the patient way in which he entered into the small sanitary grievance, addressed to him in a tone which might have been considered insulting to a scavenger, was never forgotten by the listener. When the visitor had departed Mr. Bottle and his friend

had a hearty laugh, and Morant exclaimed, "If ever I feel bumptious with respect to my official position (which he certainly never did), I shall try and recollect that, after all, I am, in the view of the public, only 'the man that belongs to the gutters.'"

THE new session of the Royal Institute of British Architects will be opened on Monday fortnight, the 7th of November, by an address from the president, Mr. G. E. Street, R.A., and the meetings will be held fortnightly after that date, the first for the reading of papers being arranged to take place on the 21st prox. It is announced that no applications (under the old rules) for the associateship of the R.I.B.A. will be received after the 31st December next.

THE opening conversazione of the Architectural Association will be held on Friday in next week, the 28th inst., at the Conduit-street Galleries, when an address will be delivered by the new president, Mr. Aston Webb. The following is a list of the gentlemen who have consented to read papers, with the titles and dates of delivery, so far as they have been definitely fixed:—Nov. 23, "The new Examination, and what it involves," Professor T. Roger Smith; Dec. 9, "Barnacles," Mr. Cele A. Adams; "Physical Science in relation to Architecture," Mr. J. Slater; "Specifications," Mr. Ewan Christian; "Some Thoughts on Principles of Design in Church Architecture," Mr. B. E. Ferrey (who has recently reversed his initials); "Sundry Working Drawings," Mr. J. P. Seddon; "Ideal Dwelling Houses," Mr. E. Ingress Bell; "The Influence of Ritual on Church Architecture," Mr. E. Eldon Deane; papers by Messrs. G. Aitchison, A.R.A., and John Hebb; "Architectural Inconsistencies," Mr. P. E. Masey.

THE Prince and Princess of Wales on Tuesday opened the new East Dock at Swansea, which has been constructed at a cost of about £300,000. The new dock nearly doubles the dock accommodation of the port, and was commenced in 1879. The harbour now consists of a South Dock, 13 acres, with a half-tide basin of five acres, communicating with each other by a lock 300ft. long, furnished with three pairs of gates 60ft. wide, and having entrance-gates 70ft. in width. The North Dock covers 14 acres, with a half-tide basin of 2½ acres, connected with the dock by a lock 100ft. long and 65ft. wide, having at its seaward-end entrance-gates 60ft. wide, and at its northern end smaller locks communicating with the Swansea Canal and the upper part of the river Tawe. The North and South Docks have 23ft. of water over the sill at ordinary spring tides, but the new East Dock have a far greater depth, besides being in various ways better adapted for large vessels. The area of water that will be enclosed in the new dock is 23 acres, which will give a length of 2,320ft., a breadth varying from 500ft. to 340ft., and a depth of 36ft. The outer sill of the dock will have on it 32ft. of water at ordinary spring tides. The work has been designed and carried out from plans by Mr. James Abernethy, President of the Institution of Civil Engineers, and the contractor was Mr. Walker, of London.

CANDIDATES FOR THE GODWIN

BURSARY (value £40), open to all members of the profession of British Architects, are required to send in their applications and testimonials on or before 30th JANUARY, 1882, not later than 4 p.m., to the undersigned, in accordance with the Schedule of Regulations (copies of which may be obtained at the office of the Institute). Carriage and all expenses must be paid by the Candidate.

J. MACVICAR ANDERSON, Hon. Sec.
WILLIAM B. WHITE, Secretary.
Royal Institute of British Architects, 9, Conduit-street,
Banover-square, London, W.

MEETINGS FOR THE ENSUING WEEK.

TUESDAY.—St. Paul's Ecclesiological Society. "Roman Antiquities Discovered in Warwick-lane, E.C." By W. J. Adams. 7.30 p.m.
FRIDAY.—Architectural Association. Opening conversazione. 8 p.m.

A new church is about to be built close to the Brentford abutment of Kew-bridge, from the plans and designs of Mr. A. W. Blomfield M.A., of London.

The prizes were presented to the successful students in the Merthyr science and art schools on Thursday week, by Mr. C. H. James, M.P., who congratulated the meeting on the favourable character of the report, and the good work carried on in the school.

Epps's Cocoa.—Grateful and Comforting.—"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected Cocoa, Mr. Epps has provided our breakfast tables with a delicately flavoured beverage which may save us many heavy doctors' bills. It is by the judicious use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. Hundreds of subtle maladies are floating around us ready to attack wherever there is a weak point. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame."—*Civil Service Gazette*.—Made simply with boiling water or milk. Only in Packets labelled—JAMES EPPS & CO., Homoeopathic Chemists, London."—*Mak* 'rs of Epps's Chocolate Essence for afternoon use.

Lamplough's Pyretic Saline is refreshing, most agreeable, and the preventive and curative of FEVERS, BILIOUSNESS, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by chemists throughout the world, and the M-sker, 113, Holborn Hill. Use no substitute. See Medical Testimony.

Holloway's Ointment and Pills.—All ulcerations, sores, abscesses, bad legs, and skin diseases are best treated by these medicaments. The ointment eradicates all noxious taints, and makes every symptom assume a milder form, and this desirable result is made doubly certain by the purifying, regulating, and alterative powers of the Pills.

Douling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to **CHARLES TRASK**, Norton-sub-Hamdon, Ilminster, Somerset. —[Advrt.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates. General Repairs and Alterations Executed. Experienced Workmen always in readiness, and sent to any part of the country. —[Advrt.]

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE
CORSHAM DOWN
CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.
PICTOR & SONS, BOX, WILTS.
(See trade advt. on p. XXV.) Advrt.

TENDERS.

*Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ALLOA, N.B.—For construction of the Alloa and Forth Bridge Railway:—
Watt and Wilson, Glasgow (accepted).

ARBRATH—For the erection of a manse at Arbroath, for the Abbey Church Congregation. Messrs. J. MacLaren and Son, Dundee, architects:—

Mason's work:—			
Alexander, Arbroath ...	...	£579	9 6
Mitchell, Arbroath ...	...	553	0 0
Caldor Bros., Arbroath ...	...	548	10 0
M'Laren and Nairn, Arbroath ...	...	548	0 0
Fife, Arbroath ...	...	526	0 0
Ram-ay and Gordon ...	...	499	0 0
Anderson, Arbroath (accepted) ...	...	496	10 0
Joiner's work:—			
Dathie, Arbroath ...	...	331	0 0
Scott, Arbroath ...	...	306	0 0
Watt, Carnoustie ...	...	304	4 9
Farquhar, Arbroath (accepted) ...	...	298	10 0
Gasfitter's and plumber's work:—			
Dyer, Arbroath ...	...	91	10 0
Tyne, Arbroath ...	...	88	12 9
Rayne, Arbroath ...	...	88	0 0
Burnett and Fletcher, Arbroath ...	...	84	10 0
Brown, Dundee ...	...	83	10 0
Burness, Arbroath ...	...	82	19 5
Farquharson, Dundee (accepted) ...	...	78	0 0
Plasterer's work:—			
Campbell, Arbroath (accepted) ...	...	50	0 0
Gibson, Broughty Ferry ...	...	46	0 0
Slater's work:—			
Mit-hell, Arbroath ...	...	34	15 0
Burnet, Arbroath (accepted) ...	...	33	13 0
Gauld and Laburn, Dundee ..	...	30	19 0
Blinds:—			
Westwood, Sons and Miller, Dundee*	...	11	7 6
Bells:—			
Westwood, Sons and Miller, Dundee*	...	8	11 6
*Accepted.			

ASHOVER.—For the erection of a new school at Ashover Upper-end, for the Ashover Charity Trustees. Mr. W. Bramham, Clay Cross, Derbyshire, architect. Quantities by the architect:—

Askew, W. B. Matlock ...	...	£586	13 0
Adams, R. Middleton ...	...	544	0 0
Mellor and Askew, Littlemoor ...	...	540	17 0
Hopkinson, Reed, Milltown ...	...	509	16 9
Walker, J. and Sons, Wirksworth ...	...	499	18 0
Beardlow, T. J., Ashover (accepted) ...	...	492	17 9
Redwood & Wass, Sutton-in-Ashfield ...	...	397	0 0

BAMBER BANGOR.—For erection of a police-station, court-house, and out-buildings, for the Walton-le-Dale District at Bamber Bridge, near Preston. Mr. T. Nevett, Winckley-street, Preston, architect:—
Walmesley, J., Preston (accepted).

BATH.—For erection of a boys' school in rear of Dove-
place, Walcot, Bath, for the School Board. Mr. C. B.
Olive, 39, Great James-street, Bedford-row, W.C.,
architect:—

Hatherly, W. and T., Bristol	£1,857	0	0
Bladwell, Bath	1,795	0	0
Birch, Bath	1,710	0	0
Cross, Bath	1,680	0	0
Hayward and Wooster, Bath	1,627	0	0
Hewlett, Bathurst	1,490	0	0
Morris and Son, Bath	1,488	0	0
Mould, C. and W., Bath	1,470	0	0
Mann, R.	1,467	0	0
Emery, Bath	1,460	0	0
Morgan and Lovell, Bath	1,460	0	0
Chancellor, Tiverton	1,450	15	0
Long, T., Bath	1,389	0	0
Gay, E., Bath (accepted)	1,321	0	0

BRIGHTON.—For alterations and additions at No. 39,
Middle-street, Brighton, for Mr. C. C. T. Mr. S. Den-
man, architect:—

Cheesman	£80	0	0
Parsons	82	10	0
Newham	802	0	0
Patching	790	0	0
Dean	770	0	0
Garrett	755	0	0
Wright (accepted)	594	0	0

BRIGHTON.—For construction, &c., of the new roof
(containing 3,500 tons of iron), for the Brighton
station:—

Patent Shaft and Axletree Co., Wednesbury (accepted).
BROMLEY, KENT.—For erection of Plaistow Vicarage,
Bromley, for the Rev. W. Hodgson. Mr. W. R. Millett,
architect:—

Arnold	£3,139	0	0
Grubb	2,908	0	0
Mitchell	2,800	0	0
Crossley	2,845	0	0
Scrivener	2,763	0	0
Payne	2,667	0	0
Balding (accepted)	2,575	0	0

BROMLEY, KENT.—For house connections with main
sewer:—

Lansbury, T., Bromley (accepted).
[Other tenders received from Peill and Sons, Bromley;
Hill, Brothers, Beckenham; Woodham Brothers,
Penge; J. W. Neave, Lewisham; G. Stephenson, Dart-
ford.]

BUCKINGHAM.—For repairing the workhouse boundary-
walls:—

Smith, G., Buckingham (accepted) ... £8 17 0

CHELTENHAM.—For building a villa residence in the
Queen's-road, Cheltenham. Mr. Place, Regent-street
Chambers, Cheltenham, architect:—

Clarke, T., builder, &c., Grosvenor-street, Cheltenham
(accepted).

CLAPHAM, S.W.—For alterations, &c., to 113, 120, and
122, High-street, Clapham. Mr. Johnson, architect.
Quantities by Messrs. Northcroft, Son, and Neigh-
bour:—

Tafman and Potheringham	£2,650	0	0
Lawrie Brothers	1,990	0	0
Hall	1,928	0	0
Earl and Son	1,893	0	0
Hobson	1,873	0	0
McLachlan and Sons	1,813	0	0
Maxwell	1,745	0	0
Mills	1,700	0	0
Sawyer	1,677	0	0
Lane and Son	1,634	0	0
Thorne	1,549	0	0

COCKERMOUTH, CUMBERLAND.—For alterations and ad-
ditions to premises in Main-street, Cockermouth:—

Joiners:—			
Crone, T., Cockermouth	£83	10	0
Moore and Swain, Cockermouth	55	0	0
Dent, H., Cockermouth (two late)	55	0	0
Robinson, P., Cockermouth	51	10	0

Joiner and carpenter:—
Reay, T., Cockermouth (accepted) ... 53 13 6

Builders:—			
Bolton, J., Cockermouth	56	0	0
Althouson, J., Cockermouth	25	0	0

Mason's work:—
Gidson, J. and W., Cockermouth* ... 35 10 0
*Accepted.

CROYDON.—For making-up and repair of various
roads, for the local board of health:—

Cornwall-road, Theobald's-road, Westfield-road, Vic-
tory-place, Back-road, and Child's lane:—
Lake (accepted).

Lawrence-road and Canby-road:—
Etheridge (accepted).

Hastings-road:—
Streeter (accepted).

Nicholson-road:—
Lundridge (accepted).

DUBLIN.—For heating the infirmary portion of the
workhouse at Abbeygrove, also the dining-hall and chapel,
with hot-water, for the Dublin Board of Guardians:—

Boss and Murray, Dublin	£169	0	0
McGuire and Co., Dublin	156	11	0
Gibbs, R. R., Liverpool	150	0	0
Power and Son, Kilkenny (accepted)	148	0	0
Dobbs, R., Abbeygrove	145	0	0
Brooks, Thomas and Co., Dublin	102	13	6

ELV.—For scavenging the city, for the local board of
health:—

Lupton ... £300 year.
Rickwood ... 200
[Neither tender accepted, the board having decided to
have work carried out under their surveyor.]

GREATWORTH.—For repairing and other works at St.
Peter's Church, Greatworth, near Banbury. Mr. H. H.
Gough, F.R.I.B.A., architect:—
Cottrill, Culworth (accepted) ... £312 9 0

GLASGOW.—For pile-driving and other work required
to strengthen a portion of the General Terminus Quay
wall in Glasgow Harbour, about 855ft. long, for the
Clyde Navigation Trustees. Mr. G. Keith, general
manager:—

Morrison and Mason, Glasgow (accepted).

[Other tenders received from D. Maxwell, Glasgow;
J. and T. Maxwell, Pollokshields; J. Bain, Boness;
Glen and Dobbs, Kilsyth; Muir and Girdwood, Mother-
well; J. Buchanan, Glasgow; A. Coghill and Co., Glas-
gow; A. Edie, Glasgow.]

GREAT MARLOW.—For erecting a new school and class-
room at Sir Wm. Borlase's school. Mr. C. Carter,
architect:—

Corby, A.	£450	0	0
Carter, R. G.	420	0	0
Carter, J. S. (accepted)	416	0	0

(The two rooms will afford accommodation for from 90
to 100 boys.)

HALIFAX.—For erection of two dwelling-houses in
Lindwell, near Greetland, Halifax:—

Accepted tenders.
Mason:—Taylor, G., Lindwell, Greetland.
Joiner:—Taylor, J., Lindwell, Greetland.
Plasterer:—Wadsworth, T., Lindwell, Greetland.

HOLDEN.—For the construction of new sewers in John-
street, Little James-street, and St. John-street, within
the Holborn district. Mr. Lewis H. Isaacs, Assoc. Inst.
C.E., surveyor:—

Wilkes and Co.	£1,794	0	0
Crockett	1,586	0	0
Marshall	1,577	0	0
Mowlem, J. and Co.	1,450	0	0
Pord and Everett	1,422	0	0
Neave and Son	1,394	0	0
Killingback (accepted)	1,350	0	0

HOMERTON, E.—For painting, &c., at Homerton Works
house, for the Hackney Union. Messrs. Lee and Smith,
architects:—

Jolley and Callen	£2,839	0	0
Pope	2,510	0	0
Goldman	2,522	0	0
Martin and Goddard	1,906	0	0
Shurmer	1,853	0	0
Everhard	1,829	0	0
Barber, Son, and Co.	1,820	0	0
Gentry	1,765	0	0
Roberts	1,634	0	0
Flaxman	1,490	0	0
Wells and Co.	1,297	0	0
How	1,296	0	0
Burman	1,242	0	0
Barker and Co.	1,239	0	0
Williams	1,195	0	0
Stevenson, S.	1,137	0	0
Macarty	815	0	0

HONTOX.—For alterations and additions at No. 148,
Hoxton-street, for Mr. R. Hillier. Mr. Edward Brown,
18, Finsbury-street, Spitalfields, architect:—

Marr, R.	£119	0	0
Skipper, G.	369	0	0
Salt, S.	360	0	0

HUDDESFIELD.—For proposed new chancel, vestries,
&c., to St. Mark's Church, Longwood, Huddersfield.
Quantities supplied by the architect, Mr. J. W. Cockings,
New-street, Huddersfield:—

Mason:—			
Hill, J.	£640	0	0
Grubham, B. and N.	620	0	0
Schoff-11 Bros.*	614	0	0
Bates, S.	580	0	0
Ephraim, D.	579	0	0
Royston and Sons	572	10	0

Joiner:—			
Christie, J.	132	10	0
Garmory, S.	132	0	0
Batey, J.	125	0	0
Balmforth, I.	122	10	0
Wool Bros.	118	10	0
Shaw, W. H.	112	0	0
Walker, J.	99	10	0

Plumber:—			
Brook and North	48	12	0
Mellor and Crowther	47	0	0
Garton, G.	45	15	0

Plasterer:—			
Tunncliffe and Sons	47	10	0
Jowett, W. E.	43	3	0
Morton and Sons	40	10	0
Bottomley, E.	35	0	0

Painter:—			
Stuttard, J. H.	16	0	0
Bottomley, E.	15	0	0
Earnshaw Bros.**	15	0	0
Holroyd, W. and P.	13	10	0
Preston, J.	13	0	0

Stainer:—			
Jowett, W. E.	50	8	0
Pycock and Son	50	0	0
Goodwin and Sons	46	0	0
Alison, T.	38	17	6

* Accepted at £594; + at £110 10s; + £15 15s;
+ plastering, £22; + concrete, £13; ** £15; +, £38
17s. 6d.

HUDDESFIELD.—For erection of a washhouse and
laundry and alterations to present kitchen, at the Deans-
house Workhouse, for the Huddersfield Guardians.
Messrs. J. Kirk and Sons, Huddersfield, architects:—

Masons:—			
Moorhouse and Pogson, Meltham.			
Joiners:—			
Kaye, J., and Son, Holey More.			
Plasterer:—			
Quarmby, J., Holmthorpe.			
Slaters:—			
Pycock, W., and Sons, Leeds.			

ISLINGTON, W.—For building a masonry at Dockwell
Hospital, for the Heston and Isleworth local board:—
Daneels, of Hounslow (accepted) ... £31 10 0

KENSINGTON.—For two houses, South Kensington.
Messrs. George and Peo, architects. Quantities by
Messrs. Stonor and Sons:—

Simpson	£15,540	0	0
Williams and Son	15,125	0	0
Colls and Sons	14,558	0	0
Brass	14,371	0	0
Ashby Brothers	14,147	0	0
McLachlan and Sons	13,940	0	0
Manley	13,050	0	0
Stevens	12,768	0	0

LANDPORT (HANTS).—For extension of Conway-street
Board School, Landport, for the Portsmouth School
Board. Mr. G. Rake, Ordnance-row, Portsea, archi-
tect:—

Bevis, Portsmouth	£2,357	4	6
Burbridge, G., Southampton	2,139	0	0
Light, Landport	2,117	0	0
Lewis, W. D., Southampton	2,096	11	6
Earwaker, R., Southampton	2,066	0	0
Cooper, T. C., Portsmouth	2,010	0	0
Quick, T. W., Southampton	1,975	0	0
Evans, Southampton	1,953	0	0
Crook, J., Southampton	1,897	0	0
Beech, G., Southampton	1,777	0	0
White, F., Landport (accepted)	1,754	0	0

LEIGH (NEAR WORCESTER).—For execution of drainage
works within the Leigh Special Drainage District. Mr.
E. Pritchard, C.E., engineer:—

G. Law, Kidderminster, (accepted), according to sche-
dule of prices.

LIMPHOE, NORFOLK.—For building tower to St. Bar-
tholomew's Church, Limphoe. Mr. Arthur S. Hewitt,
A.R.I.B.A., 8, Regent-street, Yarmouth, architect:—
Hawes, G. C., Norwich (accepted).

LLANRO.—For proposed new shop at Llanrug, Carna-
von, North Wales, for Mr. G. Roberts. Mr. J. P. Mun-
ford, architect:—

Williams, J.	£2,180	0	0
Price, P.	2,160	0	0
Williams, G.	2,158	0	0
Edwards, H.	2,140	0	0
Williams, G. H. (accepted)	2,100	0	0
Roberts, J.	1,903	0	0
Owen, W.	1,745	0	0

LONDON.—For two houses, Harrington-road, for Mr.
W. Cassell, Esq. Messrs. Ernest, George, and Peto, ar-
chitects. Quantities supplied by Messrs. Stonor and
Sons:—

Simpson and Son	£15,540	0	0
Williams and Son	15,125	0	0
Colls and Son	14,558	0	0
Brass	14,371	0	0
Ashby Bros.	14,147	0	0
McLachlan	13,940	0	0
Manley	13,050	0	0
Stevens and Bastow, Bristol	12,768	0	0

LOXLEY.—For three shops adjoining the Greyhound,
Lea Bridge-road. Mr. Cotton, architect:—

Handley	£2,483	0	0
Hewlett	2,378	0	0
Tomms	2,285	0	0
Shurmer	2,187	0	0
Hayworth	2,039	0	0
Jackson and Todd	1,819	0	0
Edwards	1,480	0	0
Young, W.	1,198	0	0

LOXLEY.—For extension of premises, West Ferry-road.
Mr. Eve, architect:—

Borke	£1,873	0	0
Nightingale	1,772	0	0
Crabb	1,764	0	0
Morter	1,759	0	0
Niblett	1,750	0	0
Hall, Biddall, and Co.	1,719	0	0
Abraham	1,697	0	0
Macey and Son	1,616	0	0
Lawrence	1,579	0	0
Harris and Warlop	1,574	0	0
Crisp and Toulton	1,517	0	0
Shurmer	1,485	0	0
Salt	1,472	0	0

LOXLEY, W.—For sundry works at No. 7, Great Port-
land-street. Mr. R. Reid, architect:—

Ebbs and Sons	£288	10	0
Hatfield and Son	258	0	0
Foxley	218	0	0

LOXLEY (NOTTS).—For erection of lecture hall,
classrooms, &c., at Long Eaton. Mr. A. H. Goddall,
Market-street, Nottingham, architect:—

Cooper, Nottingham	£1,271	0	0
Wheatley & Mauls, Nottingham	1,165	0	0
Fullalove, Long Eaton	1,147	0	0
Starr, Beeston	1,147	0	0
Youngman, Long Eaton	1,097	0	0
Morrison, Nottingham	1,067	0	0
Budd, Beeston	1,021	0	0
Clepham, Norwell (accepted)	1,018	0	0

NEW CHILWELL, NOTTS.—For 1,248 yards of 9in. pipe
sewers at New Chilwell, near Nottingham for the
Shardlow Sanitary Authority. Mr. Joseph Bullock, sur-
veyor:—

Cope, J., Nidley	£216	0	0
Thombs, W., Steinon	197	0	0
Tomlinson, J. and G., Derby	177	0	0
Knight, J., Loughton	177	0	0
Hughes, H., Lower Gormal	157	10	0
Beardsley and Pounder, Ilkerton	145	15	7
Todd, G. F., Derby (accepted)	137	18	4
Parsons, G., M. nfield	130	0	0
Hawley, T., Ilkerton	125	0	0

THE BUILDING NEWS.

LONDON, FRIDAY, OCTOBER 28, 1881.

FORMS OF CONTRACT.

WE have, on a former occasion, spoken of some of the legal requirements of contracts, and we now mean to refer to a few of the clauses which generally appear in the conditions prefixed to specifications. These are usually of a rather vague kind, and not much relied upon; though if contractors fully understood and realised the full meaning of some of the clauses to which they put their signatures, they would be more circumspect and cautious before undertaking work. There is generally a clause at the commencement of these conditions which states that the drawings and specification must be taken together according to their true intent and meaning, and it has been decided in several instances that the omission of certain necessities from the specification was not sufficient to entitle the builder to charge them as extras, they being implied in the general terms. If, for instance, the flooring of a room be omitted, or not particularly described in the specification, yet the same may be reasonably and obviously inferred from that document and the drawings. How far, however, a Court will hold a contractor to provide certain things which are not so obviously inferred from either one or the other of these documents, it is hard to say, and it is therefore necessary to add the sentence "that in case of any discrepancy between the drawings and the specification, the architect is to decide which is to be followed." It is very common for a contractor to turn round and say that a thing is not specified, and that he must be allowed an "extra" for performing it, but few who do so can realise fully the meaning of the clause we have cited. Another clause usually found in conditions relates to the supply of copies of the drawings and specification. It runs usually in this form: "Complete copies of the drawings and specifications, signed by the architect, are to be furnished by him, or by the measuring surveyor, to the contractors for their own use, and the same, or copies thereof, are to be kept on the buildings in charge of a competent foreman, who is to be constantly kept on the ground by the contractor, and to whom instructions can be given by the architect." In important works this clause is fully carried into effect; the architect supplies tracings of all drawings and details, or they are supplied by the surveyor who takes out the quantities, who goes over and examines the figured dimensions, carefully checking them with those he has used for the measurement of the work. In smaller contracts the labour generally falls on the architect, and it is very necessary to make this set of tracings correct copies of the contract drawings. We have occasionally seen very rough tracings in the hands of contractors, in which sectional parts, mouldings, and other details were slurred over in a very ship-shod fashion, as if anything would suffice; in some cases it is evident these rough tracings have been prepared by the contractor himself or the clerk of works in great haste. In some contracts it is customary to insert a clause to the effect that figured dimensions are to be taken in preference to those shown by scale, and it is very common to find discrepancies, which have escaped the notice of architect, builder, and quantity surveyor, becoming serious causes of disagreement and unpleasantness. In many otherwise good forms of contracts, no reference is made

to errors in figuring or scale, and the result is that the builder claims for additional brickwork, flooring, and other items; hence these discrepancies are discovered in setting out the building on the ground, and entail often extras for excavation and concrete, besides walling. Increased depth of footings as they occur should be booked by the clerk of works, and the additional depth marked on the plans. A great deal of after-trouble might be saved by anticipating these contingencies and providing a clause to meet them in the contract, thus a set form of clauses, useful as they must always be, seem to call for modification in nearly every case.

One of the most important provisions is that referring to alterations and variations in the work, and the clauses which are generally inserted to meet these are worded in various ways. As the form that has been settled between the Council of the R.I.B.A. and the Committee of the London Builders' Society may be taken as a well-discussed clause, we quote it here. It runs: "No extra work is to be executed except upon the express order of the architect, to be shown by any instruction or subsequent approval in writing, or by any drawing, plan, or account signed or initialed by him. Provided always that if the architect shall require the contractors to execute any works as a variation which he may decline to order as an extra, the contractors may reserve the question of their right to be paid for the same until the final settlement of accounts. No charge for day-work is to be allowed as such, unless the authority for the work shall expressly direct it to be done as day-work, or unless the work cannot from its character be reasonably valued by measurement. All vouchers for day-work are to be delivered to the architect within 14 days following the week in which the work may have been executed. Any variation made in carrying out the works is not to vitiate the contract, but unless a price or schedule of prices be previously agreed on, the value of all variations is to be ascertained by measurement or otherwise. All omitted works are to be deducted at prices not exceeding those contained in the estimate on which the contract was based, and all additional works are to be valued at fair measure and value prices, the value so ascertained to be added to or deducted from the amount of the contract." These terms fairly meet all the general requirements of architects and contractors. They give the contractor power to reserve any question touching a variation without causing interruption of the work, and the subject of day-work is clearly laid down. In cases where a schedule of prices is not accepted or a price is not agreed on, any addition is to be arrived at by measurement and valuation. Omitted work is to be valued at the prices of the contractors' estimate. Occasionally modifications may be introduced to meet exceptional cases, but the above terms include most of those kinds of deviations which occur in practice. It is only reasonable that an architect or his employer may be able to vary within certain limits without necessarily incurring expense, yet in the larger part of contract agreements the terms are so equivocally expressed, that a variation is looked upon as an extra.

It is unnecessary to quote in full other clauses, such as that giving the architect power to remove from the premises all materials not in accordance with the specification, and alternative power to employ other persons to remove the same; also to pull down or substitute work or materials that he may condemn. In such a clause, however, the contractor should be allowed a right of reference, and the terms adopted in the form of conditions we have quoted provides for it. The words "notwithstanding any certificate for payment which may have been given," ought to be affixed

to the provision we have mentioned, as where this has not been done we have known a contractor uselessly plead the certificate which he has lately received as a justification of defective workmanship or material which the architect has discovered some time afterwards. The value of work inefficiently done, or not according to the conditions, can be deducted from the contract price, and the employer can set up this defence to any action brought for the whole sum; in fact, the law does not entitle the builder to any remuneration for badly-executed work. A very necessary and safe clause in the interest of the employer is that which states "that all work or material forming or intended to form part of the building are to be considered to be the property of the employer," though, on the other hand, he is not to be made responsible for any loss or damage in respect of such work or material, the contractors having complete charge of the works, and being responsible for watching the same. The clause defining the time of completion should be explicit, and yet not unnecessarily severe on the contractors, and we think it right and just that alterations made, and "strikes and lock-outs" in any of the trades should qualify the time of completion. The terms of this clause are not strictly, or indeed often, enforced, yet the wording should be such as to leave no doubt on the mind of the contractor, and to make him feel that justice will be done him should stress of weather or any unforeseen accident occur. Another very necessary provision ought to refer to defective workmanship or materials being discovered within a reasonable time after the completion of the building, making the contractor answerable for amendment, the amount in case of dispute being settled by arbitration. The amounts of certificates, reserving sums for papering, painting, &c., to be paid on completion, depend so much on circumstances, that it would be of little use to adopt any particular form. A certificate of the architect, as we have said before, is conclusive evidence of the completion of the works, and entitles the contractors to immediate payment, though it may be necessary to add to the clause introduced into the contract the words, "without prejudice to the liability of the contractors to amend and make good defects within a reasonable time." Another condition generally relates to contingencies such as the bankruptcy of the contractor, reserving power for the employer or the architect to enter and take possession of the works and to employ other persons to complete them at the cost of contractors. It is only fair to add a clause in case of the bankruptcy of the employer, to enable the contractors to suspend the works and to require payment for all materials wrought and works executed, &c. Insurance of building in an approved office, and a clause at the end providing for questions in dispute or difference, as to additions or other matters, ought always to be introduced, and the forms adopted in the conditions we have mentioned appear reasonable and fair. Such arbitration clause should apply to every matter arising under or out of the contract except under those clauses in which the architect is mentioned as being the sole arbiter. A frequent cause of difference arises from an architect withholding or otherwise altering the certificates, and it appears to be only just and proper that such difference may be referred, without any suit at law, to an arbitrator agreed on by both parties, or to two arbitrators, one to be named on each side, with power to employ an umpire, the costs of which reference to be in the hands of the latter. A good form of contract will vary its terms to meet the circumstances of each case, and builders will be found more ready to contract under conditions which have been prepared to suit the wants of the work than they would to

bind themselves to a number of arbitrary rules which seldom meet the case, and are on this account unheeded. Architects would also be more satisfied if they thoroughly understood the conditions under which they were acting, which in many cases they do not, having probably never practically tested the forms they daily use, not from intelligent conviction, but from habit.

BUILDING IN SOUTHWARK.

SOUTHWARK, one of the most densely-populated portions of the Metropolis, has lately shown a few signs of progress. Not long ago we had to chronicle the demolition of one of the old and noted hostels, and more recently of that grim, walled-in area, known as the Queen's Bench prison, both sites which have since been covered by new buildings. The Queen's Bench prison was a solidly-built brick group of buildings, inclosed by a high brick wall with massive buttresses, familiar to all who have travelled through the Borough from the Elephant and Castle over London Bridge. The appearance of the old prison was extremely dismal, and the sight of the huge dark walls exercised a depressing influence on those who lived under their shadow. These buildings have been swept away, and the old boundary-wall, 3ft. thick at the base, and battering to about 18in. at the top, has been pulled down, except a small part. The prison was massively built of brick, and one or two of the smaller buildings still standing for temporary use retain traces of some excellent workmanship. The most important erection which has been made in Southwark of late consists of two extensive rows of blocks of industrial dwellings on this site, commenced about two years ago by Mr. J. W. Hobbs, as a private speculation, but which has lately been acquired by the Directors of the National Model Dwellings Company. These dwellings, called "Queen's Buildings," are, without exception, the largest group of buildings that have been recently erected in London for the purpose, and consist of several immense blocks, comprising accommodation for 150 families, each dwelling containing a suite of two or three rooms, self-contained, and separated from the others in the same group. To be more precise, each floor comprises a two-room and a three-room dwelling, access to which is by a stone staircase, common to each block of five stories. Each dwelling is provided with a sink, copper, range, dust-shoot, and w.c.; the rooms are of good size, and furnished as completely as houses of a superior rent. The lower stories are finished as shops, which face the Scovell-road, opposite the rows or blocks. The rents range from 6s. 6d. to 10s. 6d. per week.

In the planning and construction of these comparatively immense ranges of dwellings we find convenience, economy of space, and substantiality have been the chief objects of the builder. The situation is undoubtedly one of the best which could have been selected. These buildings are within an easy distance from the large warehouses and wharves on the Surrey side of the Thames, and within a mile of the City, not far from the Elephant and Castle, Blackfriars, and close to the Borough-road-stations of the London, Chatham and Dover Railway; the tenants who occupy them are in a very central position in regard to the chief centres of work. The two parallel rows of blocks already built abut at the west-end on Southwark-bridge-road, and on the east on the main route to London-bridge, to which latter they are at right angles. A new road called Scovell-road is thus formed between. On the south side the buildings are bounded by Borough-road. Another series of blocks, forming a third parallel row, are about to be erected

on the north side facing Collinson-street, and these have a series of cross or lateral blocks behind abutting on the back of the present rows, so that the greatest advantage is taken of the area. From what we have said, there are ten sets of dwellings in a block between each pair of party-walls, comprising in all twenty-five rooms, without including the shops and basements. These blocks are over 30ft. frontage each, and one row contains nine of them. The depth from front to back is 35ft., the entrances and staircases to the dwellings just completed are in the rear, and are placed centrally. On each side we find, on entering, a kitchen or living-room, fitted with one of Doulton's stoneware sinks, a copper (Smeaton's patent), a dresser, coal-bunker, a dust-shoot, forming a projection on the outside, and a w.c., also projecting and entered from a small balcony. Fronting the roadway are the bedrooms. Cupboards are provided in each room, and the woodwork is grained and varnished. The closets are fitted with Tylor's apparatus. We also find the ventilation of the dwellings has been attended to; the soil-pipes are carried up, and each is open at the top; the closets, forms a projection on each side of the open stairs from top to bottom, and have external windows; the windows of the rooms have sashes, but no special mode of ventilation other than the fireplace flue and the windows has been introduced. The roofs form flats, and are constructed of joists, 9in. by 3in., with concrete filling in, and covered by Seyssel asphalt. No special provision to render the dwellings fireproof has been attempted. The floors are of wooden joists, but substantial, and the staircases and landings have been constructed of stone, and rest upon solid walls, so that one great risk is minimised.

In the architectural treatment of these dwellings there is little to call for remark. White perforated bricks have been used in the fronts, with malm gauged arches neatly executed, in some cases springing from stone skewbacks, or relieved by lintels and labels of stone. The windows are varied in their dressings; the centre windows of each block slightly break forward, and have stone jamb-shafts, skewbacks and labels; the others have stone lintels and arches of brick. There is a stone corbel-table with a series of arches below the cornice, with trusses at the piers; and the elevations finish with a panelled brick parapet, the straightness of which is broken at intervals by ball terminals over the piers. Between the blocks, marking their division, are narrow brick pilasters springing from carved corbels, and horizontal members or stringcourses break the otherwise vast brick fronts. It is difficult, indeed, to treat in an architectural manner immense rows of dwellings where economical considerations have the first regard. Given a front and back wall, with a repetition of internal arrangements of precisely the same kind, it is impossible to do more than to vary the windows or employ slight brick or stone relief. More might, we think, have been done with the staircases; but these occupy the rear of each row, and the designer was left to make the best of a long lofty façade of brick with nothing but windows of bedrooms and shops below. In these circumstances the architect is restricted; to give light and shadow, calls for breaks and recesses, and to vary the roof line, gables and expensive roofing are entailed—both out of the question. Lightness, without conforming to any style, appears to have been aimed at, and the fresh new fronts, with their neatly-finished windows and black tuck-pointed joints, are at least unpretending. The backs, with the closet and dust-shoot projections, are perfectly plain, only relieved by red-brick arches, and by the small balconies on each

floor which give access from the living-rooms to the closets and dust-hoppers. The acute angle at which the ends of the rows are cut off by the Borough-road, made it difficult to obtain a pleasing front to the road. At the other end a coffee-tavern has been built, called the Queen's Bench Tavern, at which tenants and others may get good refreshments of a non-alcoholic kind at reasonable prices. The interior is fitted up in a thorough manner. We see a large coffee-room or dining-room, lined by stained and varnished boarding, with painted-glass windows in which are introduced in the centres representations of the Queen's Bench prison, with some of the sports in which the inmates delighted. Below is a second-class dining-room, while on the first-floor are capital reading, billiard, and bagatelle-rooms. These extensive ranges of dwellings and tavern have passed lately into the hands of the National Model Dwellings Company, which was established for the purpose of providing model dwellings for the working classes, of approved sanitary construction, in the metropolis and other large centres of population. The third row of dwellings, just commenced, will also be acquired by the company on favourable terms. The profits are to be appropriated in paying a half-yearly dividend of 5 per cent., the balance of profits being devoted to a triennial bonus and a contingency-fund. We may add, the buildings have been carried out under the supervision of Mr. W. E. Sinclair, clerk of works for Mr. Hobbs, and the same gentleman, we hear, has prepared the plans and has carried to a successful completion the details of the blocks we have described.

Nearer the Elephant and Castle some extensive buildings have been lately erected in the Borough; one of these is worth notice for its lofty front of red brick, terra-cotta, and stone. It has been erected by the proprietors of the Atlas Paper-works. The entrance, with approach to warehouse in the rear, is constructed of polished red granite piers, carrying sculptured stone heads of Atlas with the globe, which form capitals; above the cornice the front is of red brick, in which terra-cotta panels have been introduced. The stone balconette and the side bay window over the entrance give rather a pleasing relief to a façade, which is the only attempt recently made to infuse a little architectural spirit into this long neglected but important City approach. At the corner of Southwark Bridge-road and Southwark-street, Messrs. Macey and Sons, the builders, have erected a block of warehouses in red brick. This building claims notice, inasmuch as the architect has boldly availed himself of cast iron as a filling-in to give greater light as well as strength. In this instance three wide red brick piers, relieved on the face by slight pilasters, are the only brickwork in the front. A little set back from the face of these are cast-iron bays embracing two wide openings or lights; each has a cast-iron pilaster in the centre; the horizontal portions resting on these, masking the girders, form panelled dados in cast iron, which are made to agree with moulded work in the brick piers; thus a continuity and connection is maintained. The ironwork will probably be painted chocolate or bronze colour. This iron window-framing conceals the line of floors and insures rigidity and lightness. Another instance we observe in the same road, near Cannon-street end. Here a warehouse of five stories has its front entirely constructed of iron, the girders supporting the floors are carried on brick piers at each end only, and the front space is divided into three unequal divisions, the centre being the widest, by cast-iron fluted pilasters resting on dados, in a line with which the wooden framing of the windows follow. The girder-fronts are left to show

both flanges; stiffening-plates occur at short intervals, and produce a series of pannels, which are enriched by iron pateras. The effect of the dark bronze ironwork, and the light wood frames between, give a thoroughly characteristic appearance to the elevation, and the principle is worth the attention of architects who have limited frontages, and in situations where every inch of space is required for light. In Southwark-street, several large blocks of warehouses have been built, to which we may refer another time; the great aim in most of these has been to utilise every inch of the front for light and air to the several floors, in many instances crowded with goods or workmen.

We pass on to notice a very extensive and ornamental block of warehouses in Southwark Bridge-road, occupied by Messrs. Petty, Wood, and Co., designed in a very costly and showy Elizabethan style. The front is broken up by a lofty tower, finished at the top with a steep slate roof and ridge, and a gabled entrance into a yard. The materials of the front are red brick and stone dressings. The windows are numerous and have stone mullions and transoms, and the doorways have stone arches. These are rusticated by keystone-shaped voussoirs at intervals, and the whole rests on elaborate columns of rusticated character. Complex and acrobatic bits of masonry are introduced in other parts; we see an oriel window carried by a buttress with a small isolated shaft of stone springing from the outer edge of the buttress, more for the sake of ornament than use, and the corner-round turrets at the upper part of the tower have similar devices supporting them. Between the windows are buttresses with semi-Classical details. Very seldom have we seen buildings of this class carried out in such a florid and expensive style. The warehouse does not seem the fittest building for the exercise of capricious or whimsical ornamentation, and the caprice is rendered more apparent from the severely commonplace character of the adjoining buildings. Opposite, a valuable freehold frontage is to be let on building leases, and in a few years this neglected thoroughfare will, it is probable, receive renewed attention for business purposes.

THE WATER QUESTION.—XIX.

A REGULATING DAM.

THE basis of calculation of the size and cost of a dam to arrest the flow off the ground of excessive rainfalls—in contradistinction to a reservoir for the supply of water the year round, such as that last described—is a depth of $\frac{1}{2}$ in. of rain-water, over an area not exceeding 2,000 acres, considered as one rainstorm, and falling in a day, or two days, or in whatever time such a fall of rain takes place, the absolute quantity of water produced by the whole rainstorm being that for which provision is to be made. In a former article we said that in the regulation of the flow of water off the ground in excessive rainstorms it would be necessary to consider the ground acre by acre downwards from the top of every hill, and that floods might be arrested by numerous dams in the minor watershed areas and discharged gradually. For this purpose let an example be taken of a dam to be constructed for a watershed area of 1,000 acres or thereabouts. Four inches in depth over 1,000 acres of ground is equivalent to 14,520,000 cubic feet. This quantity would not all reach the dam as a flood; part of it would be absorbed by the ground and yielded as minor springs issuing from the superficial strata after the cessation of the heavy rain, and some part would be evaporated. If 3 in. in depth over the whole area be taken as the quantity

which would actually reach the dam in a short time, it would be a reasonable quantity to provide for, and would probably meet the requirements of the case. This quantity would be 10,890,000 cubic feet; but let the quantity to be provided for be taken at 12,000,000 cubic feet, as has, indeed, before been stated. The height of bank for this quantity would be—following the same proportions as before—about 40 ft., and the area of land required might be about 20 acres, if a separate dam be made, and that may be considered in the first instance to be so, and afterwards the same provision may be considered as being added to the capacity of a reservoir of supply, suitable for the same situation; for, according to the circumstances of any position in respect of demand for water-supply, it may be proper to make either a regulating dam solely, or a reservoir for the supply of water the year round with the addition of space equal to that required for a regulating dam suitable for the same situation. If, then, a regulating dam be made with an earthen embankment 40 ft. high and 400 ft. long, on a site having the proportions already referred to, with a puddle trench of such depth that a line drawn straight from a point 40 ft. below the surface at the middle of the bank, to a point 10 ft. below the surface at each end of the bank, representing the average bottom of the trench, the following amount of work would have to be performed, approximately:—The seat of the bank to be cleared of objectionable material would be about 6,000 sq. yd. The excavation of the puddle trench about 4,000 c. yd. The quantity of puddle about 6,400 c. yd.

Deducting the quantity of puddle in the wall, the embankment would be 24,000 cubic yards, of which about 2,500 would be rough stone at the foot of each slope, and 7,500 cubic yards of selected material to be placed on each side of the puddle wall, and the remainder of the earth would be 14,000 cubic yards. The pitching of the inner slope with stone would cover about 3,000 sq. yd. The soiling of the outer slope would be about 2,400 sq. yd.; the roadway over the embankment 600 sq. yd.

The culvert would be laid at about two-thirds of the depth of that of an embankment 60 ft. high, as in the former example. Its length would also be about two-thirds, and the quantity of excavation for this culvert would be about 4-9ths of that of the former one. The cubic quantity of brickwork in the culvert, per lineal yard, would be about 9-10ths of that of the former culvert, and, its length being two-thirds, the cubic quantity of brickwork in this culvert would be about 3-5ths of that in the former one. There would be nearly the same quantity of concrete per lineal yard of culvert, but only two-thirds in the whole length.

The way in which the water would be discharged in this case would be different from that in the other, where a pipe would be laid through the culvert up to a valve-tower, and the water drawn off from near the surface. In this case it would be discharged from near the bottom only. The sluice would be always open; but inasmuch as it would be desirable that the same quantity of water should be discharged in the same time, as per minute or per second, at whatever height the water may stand in the dam, and inasmuch as the quantity discharged through the same area of opening would increase with the rise of water in the dam, it would be desirable to diminish the area of the opening as the water rises, so that at all times the same quantity may be discharged per second. The sluice would be constructed so as to open or close automatically with the rise or fall of the water in the dam. This is not a reservoir the object of which is to retain water as the primary necessity, but is a receptacle to

hold temporarily a glut of water and let it out gradually, becoming empty before the recurrence of another flood. The rate at which the water may run out can be determined beforehand in every case. In this example let it be 20 cubic feet per second.

The velocity of the water passing through the sluice will be proportionate to the square root of the height above the centre of the opening, very nearly,—and near enough for all practical purposes. If the centre of area of the opening be maintained always in the same vertical position, by reducing the height of the opening equally above and below the centre by two doors approaching each other, then the rate of motion of the reduction of the height of the opening would be as the square root of the height of the rising water, in order that the same quantity per second may pass through the sluice continually, and the intervening gear between the sluice-door and the force which moves it would have its parts so proportioned as to effect this rate of motion. The full velocity of the water through the sluice due to the force of gravity is $8\sqrt{H}$, H being the height in feet of the surface of the water in the dam above the centre of area of the opening; but the actual velocity would be somewhat less, and the effective area of the stream of water would be considerably less than that of the sluice opening; combining these effects the practical quantity of water passing through the sluice would be proportionate to five times the square root of the head in feet.

If A = the area of the sluice opening in feet,
 H = the head of water above the centre of the opening, in feet.
 Q = the quantity discharged per second, in cubic feet.

$$\text{Then } Q = 5\sqrt{H} \times A, \text{ and } A = \frac{Q}{5\sqrt{H}}.$$

The bottom of the dam would contain but little water for some feet in height, and the sill of the sluice may be laid at a level 8 ft. above the lowest point of the dam. It would still contain but little water in the next 4 or 5 ft. in height, and the zero from which to reckon the heights of the rising water in the dam may be established at 4 ft. above the centre of the opening when the sluice is fully open. The area of the sluice opening would be, for that lowest level of the water,

$$\frac{20}{5\sqrt{4}} = 2 \text{ sq. ft.}$$

And it might conveniently be made 1 ft. wide and 2 ft. high; the width remaining fixed, and the height varying with the head of water in the dam. The corresponding heights of the water in the dam and the openings of the sluice would be as follows:—

Height of Water.		\sqrt{H} .	Velocity.	Area.
Above Zero.	Above centre of opening.			
Feet.	Feet.	Feet.	Ft. per second.	Sq. Ft.
0	4	2	10	2'00
5	9	3	15	1'33
12	16	4	20	1'00
21	25	5	25	0'80
32	36	6	30	'66
45	49	7	35	'57
60	64	8	40	'50

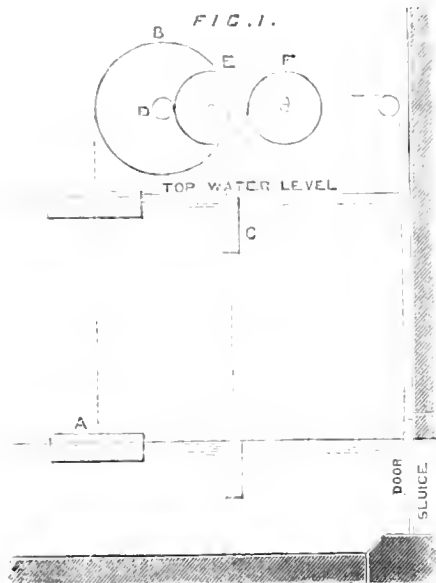
The area of the opening, and, where the width is fixed, therefore the height of the opening also, is thus inversely as the square root of the height of water in the dam above the centre of the opening, the constant quantity discharged being 20 c. ft. per second.

A float is the essential instrument with which to make use of the force of gravity to move the sluice-door by means of intervening gear of the proper form, to reduce the

height of the opening as the water rises in the dam, by carrying up a weight (its own weight) to the top water level or to any intermediate height to which the water may rise. If the centre of the opening be maintained always at the same level, two motions of the door are necessary, which would be given by reverse gear; but if the opening of the sluice be closed from the upper side only, the centre of its area will be continually lowered, and the head of water correspondingly increased by the quantity due to half the extent of motion of the sluice-door. The diminution of the height of the opening must, therefore, be as the square root of the rise of water plus half the range of motion of the sluice-door.

There are various forms in which the gear may be made to regulate the opening of the

cistern D and into the descending pipe E, in which are two valves, F and G, connected by a spindle, so that when one opens the other closes. The spindle is continued downwards to a float H. From the descending pipe E the pipe I conveys water into the tank K, in which is another float L, connected by a chain passing over a pulley to the head of the lever M, the end of which regulates the movement of the

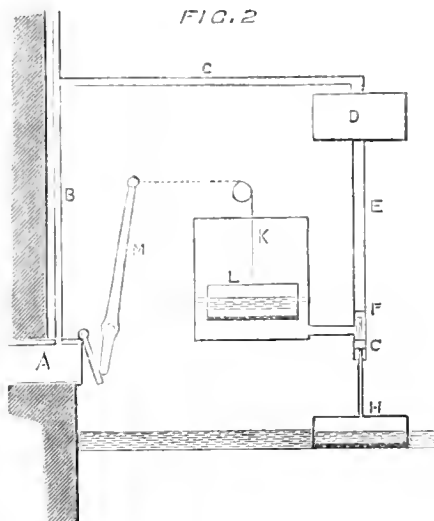


sluice in this way; that shown in Fig. 1 is direct in its action, simple in its parts, strong, and convenient.

A is a float, a chain attached to which passes round the wheel B with one turn, and supports at its other end a solid weight C. On the axle of the wheel B is a pinion D, toothed into an intermediate wheel E, which reverses the motion of the wheel F, which carries upon its axle a curved lever or cam, the range of which in a quarter of a revolution is equal to the range of motion of the sluice-door. To the back of this curved lever is attached the chain which draws up and lets down the sluice-door, and the form of the curve of the lever is such that the horizontal rate of motion of the chain, and therefore the vertical motion of the sluice-door, increases as the square root of the rise of water in the dam. As the float A rises from the zero level, 5ft. above the sill of the sluice, the weight C on the other side of the wheel draws up the slack chain, turns the pinion D and the intermediate wheel E, together with the wheel F and the curved lever, and lets down the sluice-door with a rate of motion such that the area of the opening is always inversely proportionate to the square root of the head of water.

The same result—that of discharging an even quantity of water—would be obtained by first discharging the water into a pond or tank below the embankment, and maintaining the water in it always at the same level.

One form of apparatus for this purpose is shown by the sketch Fig. 2. Here the discharge-pipe under the embankment is always fully charged with water. A is its outer end. B is a pipe rising from it, and the pipe C conveys water from it into the



hinged door at the end of the discharge-pipe A. When a sufficient quantity of water flows through the discharge-pipe to keep the water in the pond or tank at its proper level, the valve F is kept nearly shut by the upward pressure of the float H (and the valves being ring-valves are moved with but little pressure). If a sufficient quantity of water to keep the pond up to its proper level is not being discharged from the pipe A, the float H sinks and opens the valve F, supplying more water to the tank K and raising the float L, thus relieving the pressure of the lever upon the door and allowing more water to flow out. If too much flows out the float H rises and completely closes the valve F and at the same time opens the valve G, allowing the excess of water in the tank K to run out and the float L to lower and reduce the opening of the outlet of the pipe A. The small pipe B is carried up to the top of the bank, the water in it being under the pressure of the head in the reservoir, and the cistern D is closed for the same reason. This apparatus is described more at length in Dr. Downing's "Practical Hydraulics," but for the purpose now under consideration it is not of so suitable a form as that first described.

With the provision of a space of 12,000,000 cubic feet to receive a flood from 1,000 acres of ground, and a bank 6ft. above the level to which that quantity of water would rise, there would be no real need, probably, of a waste-weir and byewash; indeed it would be a contrariety of purposes to provide one, inasmuch as the object of the dam is to arrest the whole of a great flood, even the greatest; and if the basis here stated, upon which the capacity of a dam is calculated, is not sufficient, let it be increased; but in all probability it is sufficient. However, as no hazard must be ventured in such a case, it may be well to provide means of taking off water at the top water level fixed upon; but not a great flood, such as must be provided for in the case of an ordinary reservoir. A channel of less depth and width than would be necessary in the other case may be provided in this, and such a channel is included in the estimate following—viz.:

	Quantity.	Price.	
		s. d. £	
Clearing the seat of the bank	6,000 sq. yd.	9 2	50
Excavation of the puddle trench	4,000 c. yd.	5 0	1,000
Clay puddle	6,400 "	2 6	800
Embankment	24,000 "	1 6	1,800
Road over embankment	600 sq. yd.	2 0	80
Pitching inner slope	3,000 "	2 0	300
Soiling outer slope	2,400 "	6 2	20
Excavation for culvert	2,600 c. yd.	4 0	400
Ditto for byewash	1,800 "	1 0	90
Concrete in foundations	200 "	6 0	60
Ditto in byewash	1,000 "	7 0	350
Brickwork in culvert and sluice walls	500 "	24 0	600
Gravel puddle	300 "	4 0	60
Stone sills, coping, &c.	1,000 c. ft.	2 0	130
Footbridge			120
Girders, sluice, and other ironwork			250
			6,000
Contingencies			940
			£7,000
Land and fencing			2,000
			£9,000

There may be added to this, £1,000 for other expenses, making £10,000. This is at the rate of £10 per acre, and should free this land from liability to contribute to expenses of a river-conservancy board.

SHOP-WINDOWS.—II.

ON a recent occasion we drew attention to the aspect of our shop-windows as regards decorative materials and furniture, and pointed out a few of the circumstances that have been most concerned, during the last thirty or forty years, in bringing about their present condition. We now propose to offer a few remarks on some of the subsidiary art manufactures; and, following on the heels of the decorator, we come, first of all, to metal-work, which we shall notice under the respective heads of Iron, Brass, and Silver.

At the time of the Gothic revival, nothing, perhaps, was in a more lamentable condition than iron-work. For twenty years, or more, however, this handicraft has been in a more healthy condition; and the work turned out by firms like Hart, Son, Peard and Co., Jones and Willis, Hardman and Co., Potter and Son, and others, has been as noticeable for its truth of treatment as its beauty of design. In the early days, when the best architecture alone demanded its employment, the wrought work naturally took exclusively to Mediæval forms; but the windows of the best iron-workers of the present day—and still more our domestic buildings in all directions—give plentiful evidence that Classic work is quite as practicable as Gothic, and, better still, that work now leaves the forges good in design, and suitable for its purpose, yet exhibiting less servile copyism of any particular date or style.

In the course of the reaction from the period of castellated door-scrappers and embattled fenders, a terrible hue-and-cry arose against the use of cast iron for any purpose whatever; but more sensible views now prevail. There are many uses, well known to architects and engineers, for which cast iron is more suitable than wrought in construction: stanchions are usually cast, and girders often combine both forms of the metal. And so in ornamental work. When used in simple appropriate forms, the employment of cast iron is perfectly legitimate. But the attempt to produce, in brittle casting, those delicate features which the malleability of the metal renders it susceptible of at the forge, is a misapplication of material, and an æsthetic sham. Two very good instances of the respective uses of cast and wrought work are afforded by the large gates and railings of the British Museum and of Burlington House. Both these specimens of iron-work, each so fine in design, and yet so different in style, are an unanswerable protest against the attempts at restriction in the treatment of the metal according to its place and purpose, which the purists would inflict upon us.

The improved working of brass naturally followed quickly on that of iron, but its progress was far less satisfactory. Although the two metals differ considerably in their qualities and capabilities, yet for many long years the treatment of brass was almost identical with that of iron, and until recently it was to be seen only in the Mediaeval forms which characterised the early iron-work of the revival. It was but the other day that we were in one of the City churches, where we observed, in juxtaposition with pulpit and stalls of Elizabethan wood-carving, the altar-rails, gas-standards, and lectern, all in brasswork of the Gothic period, and elbowing an old wrought-iron Renaissance standard bearing the emblazoned shields of various civic dignitaries. Those whose tastes had outrun the Birmingham gaseliers or standards, cast in bronze or ormolu, whether Classic, Cinque-cento, or Rococo in design, could find nothing wherewith to light their drawing-rooms or dinner-tables but coronets, angular pendants, and other articles of ecclesiastical form; and the use of brass was almost entirely restricted to this purpose. But during the last few years a marked and rapid development in the working of the metal has taken place, and it now seems likely to assume for the future a very prominent place in domestic fittings. Possessing as it does, not only considerable toughness, and a ready fusibility, but high ductility, great malleability when cold, and the property of being easily turned with the lathe, it lends itself to the most varied treatment and divers uses. Latterly gas-pendants, brackets, and standards have been produced, of excellent design, combining richly curved stems with handsomely turned bosses. Fenders are now made, artificially moulded and pierced, that fully rival the old in everything but colour; and the "repoussé" work which now figures so largely in sconces and similar articles, is a most welcome contribution towards the embellishment of our rooms. The richness of colour and the brilliant polish of good brasswork have a great effect in relieving and brightening our too-often sombre apartments, particularly in the neighbourhood of the fire, where it most agreeably replaces the fenders, fire-irons, and dogs of polished steel and ormolu that are still in many houses the terror alike of mistress, housemaid, and guest. One objection is sometimes urged against the use of brasswork for domestic purposes in the amount of cleaning it requires. But this is at once obviated by the employment of a thin lacquer. Whether the old brass was different in composition from the modern, or whether time has effected some change in it, we are not able to say; but it is beyond dispute that the colour of the old is superior. The lacquer, however, like the glazing down of decorative gilding, materially enhances the beauty of the new metal, while it entirely protects it from the action of the atmosphere.

If the brazier's handicraft has lagged behind the blacksmith's, far more still has that of the gold and silversmith lagged behind the brazier's. Even when making allowance for a considerable advancement within the last year or two in this branch of manufacture, it is still, probably, the most backward of any; and the greater part of the real plate, as made at present, is "a thing to shudder at, not to see." Let anyone go to the great Bond-street houses, and inspect the racing-cups, épergnes, or presentation plate that they produce, and surely his heart will sink within him. The lessons of Cellini and the great masters of high-class metal-work, as well as the many exquisite specimens of old domestic plate, seem all in vain; and, with few exceptions, vulgarity of design and clumsy modelling are rampant everywhere.

This is the more to be wondered at, considering the great taste and demand that exist at present for good plate. The windows of the second-hand silversmiths are filled with the most beautiful specimens. During the last century the manufacture of domestic plate was at its best; and its artificers thoroughly understood and acted on the principle that, gold and silver being precious metals, no more of them should be used in the production of any given article than was necessary, and that they should receive the thoughtful design and careful workmanship which their intrinsic value demands. Hence the teapots, sugar-basins, salt-cellars, and other objects of daily use made during the Queen Anne and early Georgian periods were models of beauty and excellence of every kind, and are justly in demand by connoisseurs. But during the whole of the present century these beautiful forms, with their exquisite modelling and delicate chasing, have given place to vulgar shapes of double or treble the necessary weight, loaded with what a facetious critic once called "the knuckle-bone business," and every other variety of bad Rococo ornament. There are certainly indications of improvement. The excellence both of the old silver, and of much of the electro-plate, seems gradually to be opening the eyes of the silversmiths, and we have latterly seen several thoroughly artistic tea and coffee services of modern make.

The invention of electro-plating has effected an entire revolution in the secondary branch of this manufacture. Up to the latter part of the 18th century the only process of plating known was the clumsy method of soldering silver upon a baser metal, which had been practised from the time of the ancient Romans, and has been technically called "French plating." This allowed little scope for skill, and there is not much of such work now to be met with. But about the year 1800 was introduced the more modern system of fusing a plate of silver direct upon an ingot of fine copper or other metal, and then drawing the product into wires, or beating it into plates that could be cut, or hammered, or chased, into the desired forms. This process afforded a much greater facility for skilled workmanship, and continued in vogue during the first half of the century, till it was eventually superseded by electro-plating. This "true," or "English" plating, as it is termed, was remarkable for its strength and durability, and excellent specimens may sometimes be seen at the second-hand silversmith's, which were produced in the first years of its introduction, before taste in such matters had become utterly debased, and which thoroughly commend themselves for artistic treatment.

To Mr. Elkington, the head of the well-known Birmingham house, belongs the principal credit of having brought the process of electro-plating to its present state of perfection. As early as 1803, Brugnatelli, a pupil of Volta, contrived to gild the baser metals by means of the galvanic current, and, later on, De la Rive improved upon the process; but it was not till Rudz and some others, and notably Elkington, took the matter in hand from a practical point of view, about 1840, that electro-plate, as we now know it, had any existence. The different processes employed in its manufacture lend themselves with singular facility to varied artistic treatment. In the more elaborate articles, which are usually cast, the modelling is done in the original wax pattern; then the soft brass cast, which follows, allows of easy chasing; and the article itself, in a hard white alloy of copper, nickel, and zinc, receives the finishing touches before it enters the gold or silver bath. The manufacturers of electro-plate have not been slow to avail themselves of the capabilities afforded by the invention; and this ware has, from the first, been

marked by a general excellence of design, that sorely puts to shame its nobler prototypes in the precious metals. Of course, in a branch of manufacture that appeals for purchase to the great bulk of society, and not to a few wealthy connoisseurs only, it would be absurd to expect nothing but "high-art" treatment; and we accordingly find dogs officiating upon their hind legs as pen-holders, owls, with a pericranium like a sieve, doing duty as pepper-casters, and boating-hats, concealing a butter-dish within their inmost recesses. But the great majority of épergnes, salvers, cruet-stands, tea-services, and hosts of other articles are excellent in design. Many of these have been reproduced, or artistically adapted, from Classic or Cinque-Cento specimens, and are admirable alike for form, modelling, and chasing, tasteful in intention, and commendable in workmanship. In fine, there are few branches of manufacture in a more thoroughly healthy condition than that of electro-plate.

In passing from metal-work to pottery, we enter upon a vast field, which we can only glance at. Volumes have already been written upon this subject, and volumes may be written yet; for although everything connected with European pottery is pretty well known to experts, there is still a great deal to be learnt concerning Oriental wares. There is one thing, however, in connection with the subject, that strikes one very strongly in strolling through the streets: and that is the great increase, within the last few years, of shops for the sale of ornamental china—old or new—and articles of virtu generally: and this at a time of general depression, when people have been supposed to have little enough to spend on luxuries and curiosities! However, the shops exist, and many of the windows present a perfect feast to the eyes.

With old china we are not at present concerned. Exquisite specimens of Sèvres, Wedgwood, Faience, Crown Derby, and other choice porcelains are constantly to be met with at the best dealers in antiques. But these are things rather for the frequenters of Christie's than the general public: we are now dealing with the state of contemporary manufactures, as displayed in shop-windows. It must be evident to the most superficial observer that there has been a wonderful improvement in ceramic art during the last thirty years. It was in 1850 that Minton first commenced the manufacture of Majolica, though his encaustic tiles date back to 1828. Majolica is one of the most effective kinds of English pottery for the purposes of decoration; and, as it is now produced, the bold character, both of its design and colouring, renders it a worthy reproduction of the old ware. Its most important feature is its application to constructional decoration; and as such, it covers the floors and walls of public buildings in every direction. In 1862 the Worcester manufacture was revived by the Royal Worcester Porcelain Company (Limited), and very beautiful specimens of modern Limoges, and articles treated after the Japanese manner, are turned out from this factory. A fresh impetus was again given to the art in 1867 by Copeland (late Spode), who produced the Parian statuary which some persons so greatly admire, and who now manufactures some excellent ewers and vases of Classical shape, besides being the best English imitator of Sèvres. Many of his flower-stands, and dessert services, with elaborate centre-pieces, are extremely beautiful, and do equal credit to his designers and workmen. Ten years later the Crown Derby ware was resuscitated by a limited company; and, besides the quaint old coloured statuettes, which now greet us of yore, some of the best table-services emanate from these works, while from

Coalport come very fair imitations of Worcester, Sevres, and old Chelsea. There is a good deal of modern Dresden about too; but it is all so bad as to be worthless from any possible point of view. This, however, we do not affect to regret. However much the marvellous execution of the old Dresden ware may command admiration of a certain kind, still, everyone must admit that its manufacture constituted one of the grossest misapplications of material that a perverted ingenuity ever devised; and the sooner, therefore, that the whole thing dies a natural death, the better!

By far the most noteworthy fact of late years, connected with pottery, has been the development of the Lambeth ware by Messrs. Doulton. This has been for a long time steadily improving, and has now attained a great perfection. It may be divided into three kinds:—The “Doulton Ware” is really a revival of the fine old “Grès de Flandres,” and is produced by scratching a pattern upon the soft surface of the clay before it is fired. It is then generally coloured some neutral tint, and frequently beaded and stamped with a die, after which it receives a glaze, and passes once only through the kiln. What is called “Lambeth Faience” consists principally of hand-painted plaques of biscuit, with a dull glaze, and requires several firings. The practice of plaque-painting seems destined to become a very important branch of art. At present, it is almost in its infancy, as the management of the pigments is a matter of very great difficulty, and still but imperfectly understood. But the school which is now in work at South Kensington, and Messrs. Doulton’s spirited enterprise in the erection of large studios in their new factories, with a library and museum attached, where scores of lady-artists are constantly employed upon this work, can hardly fail to develop a thoroughly national school of china-painting. The decoration of the “Impasto” work is produced by the application of coloured clays in bold design to the surface of the article. The pattern thus stands out in relief; and additional artistic effect is imparted to it by the employment of various opaque and translucent enamels. Among all these various articles no two are precisely alike; and they combine the useful with the ornamental in the very highest degree.

Fine as the best English pottery has now become, it cannot for a moment compete in artistic excellence with the Oriental. The abolition of the old East India Company’s monopoly of trade in 1858 brought us into more immediate contact with our Indian possessions, and this, followed soon after by the opening up of Japan, created an enormous importation of Chinese, Japanese, and other Oriental wares; while the increasing taste for this class of pottery stimulated the dealers to collect large quantities of Delft from Holland, where a couple of centuries of intercourse with the natives of Japan had led to excellent reproductions by the Dutch, in earthenware, of the fine porcelains of Jeddo and Nankin. Some year or two ago there seemed some danger of a falling off in the artistic excellence of Japanese work, through the increasing familiarity with European systems of design and colouring, and the extent to which goods were made to order for this country. But the present aspect of the dealers’ windows affords ample proof that such is not the case; and specimens of Oriental ware, both cheap and costly, and finer than ever, greet us on all sides as we walk along the streets.

The rage for Japanese art has had a very mixed effect upon English pottery. On the one hand it has educated us in colour, and has taught us the true method of conventionalising natural forms; but, on the other, it is seriously threatening the purity of our designs. The peculiar *extempor*

power—if we may use such a word—of the Japanese artist, whereby, with a few bold touches of his brush or pencil, he can throw off, anywhere, a flower or spray with all the truth and vigour of natural growth, or make a bird come swooping down from the clouds, has no existence among us; and the attempt at such treatment by (*dis*)arranging fans, beakers, and ill-drawn poodles higgledy-piggledy over plates and dishes has simply resulted in a miserable fiasco. Table-services, indeed, are considerably behind most others forms of pottery. Notwithstanding the great demand for blue and white, and the numerous specimens of Nankin and Delft, that would lend themselves most happily for adaptation, as the centre of a set design with suitable borders, so arranged as to define and emphasise the form of the article in accordance with the best European traditions, there is hardly a single satisfactory pattern to be found, if we except the good old “willow,” which, always perpetuated in common earthenware, was, a few years ago, reproduced in china. Some of the best of these services come to us from the factories at Copenhagen, the chief of which is under State management, a speciality of their productions being the clever reproduction of Thorwaldsen’s models in biscuit and terra-cotta. Notwithstanding our shortcomings in certain branches of the manufacture, and in spite of a vast deal of utter rubbish produced for the benefit of the unenlightened, the present condition of ceramic art in this country shows immense vitality and increasing promise. This will be amply evidenced to those who remember the figure that we cut in the First Great Exhibition, and can revert, in their mind’s eye, to the successive Exhibitions of 1862 in London, and of 1867 and 1878 in Paris; and, lastly, will take the trouble to inspect the windows and showrooms of the best dealers in English and foreign pottery. “Excelsior” has long been, and is likely to continue, the favourite motto of the English potter.

(To be continued.)

FISH-MARKETS FOR THE METROPOLIS.

SEVERAL schemes are before the public for increasing the inadequate fish-market accommodation afforded at Billingsgate. The site at Blackfriars, suggested by the engineer and architect to the Metropolitan Board of Works, has been recommended for adoption, and will be considered by the Board at their meeting to-day (Friday), when they will be asked to seek Parliamentary powers next session to acquire the area. It may be interesting, therefore, to quote the report on this site prepared by these officials, Sir J. W. Bazalgette and Mr. G. Vulliamy:—

“The instructions appear to limit our selection of sites to the neighbourhood of the particular railway termini north of the Thames, but we suggest that the Board should not limit its selection to that particular locality, for it appears to us that a site may be obtained on the south side of Blackfriars Bridge which possesses advantages superior to any other which has been proposed. Some of the advantages of a Blackfriars site near to the Thames are that it would not interrupt or interfere with the crowded and important thoroughfares of Queen Victoria-street and Upper Thames-street. There would be no serious encroachment on the River Thames, and the property would be of much less value, whilst all the surrounding bridges over the Thames radiate towards the south; so that, although it is close by the most crowded parts of London, the fish would be at once dispersed by the different roads from the market. It is within a mile of Billingsgate and the central markets in Farringdon-road, and is in close proximity to the neighbourhood of the Borough, where the processes of drying and curing fish are largely carried on. Its main frontage would be Blackfriars-road, which is 100ft. wide, and the railways would deliver their fish into the centre of the market. It is proposed as a market for railway-borne fish, but should it hereafter be considered desirable to unite the water-borne fish

market with it, this could readily be done by forming a wharf upon the banks of the river, which is within 300 yards of it, with convenient access to the market. This site of 6½ acres is bounded on the north by Southwark-street, 70ft. wide; on the south by York-street, on the east by Bear-lane, and on the west by Blackfriars-road, to which it could have a frontage of about 300 yards.”

Not long since, we mentioned a suggestion for forming a new viaduct approach to Billingsgate, and making an upper floor to the present market for the accommodation of vans and carts. The author of this proposal was Capt. W. E. Heath, who claimed for his suggestion the advantages of an economy accruing from retaining the market on its present site, the improving of the steep approaches now leading to and from the market, and the affording facilities for the rapid discharge of fish sent by rail. Another, and more ambitious scheme is now before us, having for its object the erection of a central fish-market, the authors being Messrs. J. J. Cayley, J. Boyes, and H. H. Bridgman, A.R.I.B.A. The projectors rest their scheme mainly on the central position, river-frontage, advantageous railway communications, and convenient proximity to passenger stations, which they claim it affords. The authors base their objections to the Billingsgate site on the evidence given in the inquiry recently held before the Inspector of Fisheries into the destruction of fish at Billingsgate, in consequence of the inadequacy of accommodation at the market. Mr. Scott’s evidence showed that the proposals for carrying out the improvements, according to plans prepared by the City architect, would be so enormous that they could never be carried out. The authors of the scheme now before us contend that Billingsgate is out of date beside the present requirements of London, and that the public demand a position that will insure rapid and complete collection, and rapid trading and distribution of so perishable an article of food.

They would construct a fish-market between Waterloo-bridge and Charing-cross railway-bridge, on the Lambeth side of the river, on an area at present occupied by a bank of mud at low water, and of a width of over 300ft. The proposed market would have a front elevation to the river commencing at about the second pier of Waterloo-bridge, and keeping the curve of the river. It would be carried on columns and girders to finish at the Surrey side of Charing-cross railway-bridge. At the back of the market there would be a space of 60ft. at one end and 100ft. at the other, which would make the market 225ft. wide. The principal floor would, according to the authors, have a frontage to the river of 910ft. and an area of 191,250 square feet, or 4½ acres—more than eight times the area of Billingsgate Market, and within 5 per cent. of that of the whole cluster of markets at Smithfield, including the Vegetable Market now being erected. The floor would be on a level with the roadway of Waterloo-bridge, and open to it. Looking at the plan prepared by Messrs. Cayley and Bridgman, which accompanies their pamphlet, we find a roadway for carts (3 carts wide) runs along the wharf side, with lines of rails and platforms in connection with the Hungerford-bridge lines, while a clear space is obtained in the centre of market floor, stalls being shown round for the semi-wholesale department and retail shops with an outer terrace 15ft. wide along the frontage. The section shows a sub-floor 25ft. below the principal floor, affording additional area for carts, with inclines from Waterloo-road to Belvedere-road. The upper floor is covered by an iron lattice-ribbed roof of rather pointed section, 220ft. span, with lights along the top. At the Waterloo-bridge end a long covered platform, with rails at the sides for trucks, is shown in connection with the South-Eastern Railway; there is also a roadway underneath connecting the sub-floor with York-road. The section shows the structure of the market resting upon three rows of iron columns, the bases of which would be about level with low water. It is said that the current of the river would not be impeded, nor the navigation interfered with, the main traffic passing through the northern arches of Waterloo-bridge. Other advantages claimed for this scheme are, that it utilises a waste space by the erection of a handsome building, that by junctions between the South-Eastern, South-Western, and London, Chatham, and Dover Railways, rapid and complete collection is insured, and that the produce from all parts is quickly brought within easy

reach of all classes of the London public. All fish could be officially examined in the trucks as they arrived, before being unpacked. Rapid trading would be insured by railway communication with the systems enumerated, the river would afford floating locomotion to and from the market, and it is suggested that steam ferries to accommodate costermongers and their barrows might be established.

Another scheme for a central market has been proposed by Mr. H. J. Lecuw, of the British Lion Wharf, Bankside, which has been supported by Mr. Cohen, M.P., and others. It proposes to place the market at Backside, extending from Emerson-street on the east, to Love-lane on the west, giving a frontage to Bankside of 270 yards; from north to south the area lies between Bankside and Great Guildford-street. By taking in other blocks of property the site could be extended to Southwark Bridge. The projector of this plan claims for it all the advantages cited in favour of the Blackfriars-site, and all the facilities for the delivery of fish by land, rail, or sea. It would be in close communication with the London, Chatham, and Dover Railway, and its goods depot.

Professor Glenny and Mr. Arthur T. Walmisley, C.E., have submitted a plan to the fish supply committee of the Corporation for enlarging the market at Billingsgate, which deserves notice. It is proposed to establish an upper retail market on the level of London Bridge. The plan contemplates the removal of the present cramped premises between St. Magnus Church and the existing market, and the erection of new and commodious warehouses, easier of access, built in four distinct blocks; the upper market being of cruciform shape, with nave and transepts, covered by a glazed roof. The authors thus describe their scheme:—

The approaches to the two markets would be quite independent of each other: the retail and public entrance facing King William-street, while the wholesale traffic would be confined to the lower level of Thames-street. Ample space would be provided by setting back the now proposed buildings, giving increased width to Thames-street in front of the market for waggons to stand while loading and unloading without obstructing the through traffic of the street, and the upper and lower markets could be advantageously connected with each other for the purposes of supply by means of lifts, without annoyance to the general public. The new buildings surrounding the retail market could be raised until the present rental is not only made up, but exceeded, and the Corporation would receive in addition to the rents of the market stalls, more floor space rentals in this situation, than they would from buildings adjoining a market in any other locality, as in the neighbourhood of London Bridge they would let on as many floors as they choose to provide; a market elsewhere could only serve as a fish-market and earn a single floor space rental. The scheme combines the advantages of providing a wholesale market on a river side site, with a retail market over the same area in a good central position, possessing ready-made approaches available to the public at large, and calculated to meet the requirements of an increasing population.

Another and important scheme for an independent market has been elaborated by a new company called "The Fish Exchange, Limited," the projectors of which have secured a site at the junction of Upper Thames-street and Queen Victoria-street, an area large enough, the prospectus informs us, for all present and future requirements, and of so much greater extent and convenience than the Billingsgate-market, that they will be able to offer salesmen their shops and standings at a rent of $4\frac{1}{2}$ l. per foot against 9d. per foot now charged by the Corporation, as well as shops for a large retail business, at a lower rate, viz., 3d. per foot. The site adjoins the proposed new line and station in Queen Victoria-street for the London, Chatham, and Dover Railway, powers for which were obtained this session. The proposed site has a good river frontage and facilities for quays and landing stages, and the river is at this point free from shipping. The approaches will be numerous. Queen Victoria-street to the east, the Embankment to the west, Blackfriars-bridge to the south, and Farringdon-street to the north are all available. The company have made arrangements with the L. C. and D. R. Co. to run fish trucks direct into their station from their new

rails, on the level of the upper or van-market, and also with the District Railway for the same purpose, thus bringing the whole of the metropolitan districts into direct communication with the market. The company's scheme appears to meet many of the objections that might be urged for a more westerly site; the railway access is not to be surpassed; and the land and river frontages leave little to be desired. The directors will commence operations as soon as the required capital is subscribed. They will make the market free and open, independent of a so-called ring, and the company will be their own salesmen for any consignments ordered to them. The capital required is £500,000, in £10 shares, £1 on application and £2 on allotment, the remainder as may be required. The site near Blackfriars-bridge has been favourably referred to by the commissioners in their report.

THE RHIND LECTURES ON ARCHÆOLOGY.

MR. JOSEPH ANDERSON delivered the first of his second series of Rhind Lectures on Archæology in Edinburgh on October 17th. The subject was "Scotland in Pagan Times;" and the lecturer pointed out, from the "finds" of silver and other ornaments that have been made in the Northern and Western islands, the influence both of a Scandinavian element in the population and of Oriental commerce at some time subsequent to the beginning of the tenth century.

The second lecture was delivered on October 20th, the subject being "Viking Burials in Scotland." At the outset the lecturer gave an account of the finding of two ancient graves in the sandhills at Ballinaby, Islay, in one of which were warlike weapons and smiths' tools, in the other objects of personal adornment. It was apparent, he said, from the nature of the groups of objects associated with the two burials, that one grave was that of a man, and the other that of a woman. The man was buried with his arms and implements; the woman with her personal ornaments and household gear. It was equally apparent, from an examination of the general characteristics of these burials, that there was an obvious absence of all indications of Christianity. But they suggested, for instance, a condition of life considerably removed from absolute poverty; they presented indications of culture and taste, of skill and industry, of manly vigour and womanly grace. But the position of the graves, with the head to the east and the feet to the west, was the opposite of those referred to by the liturgical writers of early Christian times as the proper position of all the Christian dead, who should be placed with their feet to the east, so that in rising they might face their Lord as He came from the east. And there was no feature which could be more surely relied on as an indication of early Christian burial than this orientation of the grave, which was here so plainly disregarded. There was no less obviously a complete absence of all the characteristics of art and art workmanship with which they had become familiar in the progress of their investigation. There was no Celticism apparent in the art of the decorated objects placed in these graves. The characteristics that were present were all new and strange. To find such weapons of bronze or stone as were commonly styled prehistoric deposited with the dead excited no feeling of surprise, because they knew, in a general way, that this was the common custom of pre-historic Paganism. But when they found in a grave, along with the ordinary weapons of war, a group of actual tools of iron, scarcely differing in shape and not differing in material from those now in use in their workshops, they instantly realised the presence of a phenomenon at once unusual and suggestive. It was unusual in this country, because their forefathers received Christianity early, and Christianity abolished the custom of placing implements in graves. It was suggestive, because it enabled them to see how closely the characteristic customs of the man they called primeval might be linked with the arts and culture of modern times. The most typical object in the first grave was the sword—long, broad-bladed, double-edged, and tapering slightly and evenly from head to point; in the other grave, two oval, bowl-shaped brooches of artistic workmanship—a form of ornament which never occurred within the Celtic area. The special features of the form of burial were,

that it was burial unbent or with grave goods. These were features that were common to almost all forms of Paganism. But there seemed to be a special suggestiveness in the character of the group of objects deposited in the man's grave. Since he took with him his sword and spear, his axe and shield, and his smithy tools to keep them in repair, it seemed a fair inference that his form of faith must have taught him to look for a continuance of warfare in the life beyond the grave. They know that such a faith existed, and that the Northern and Western Isles of Scotland were overrun by men who held them at a time when such implements and weapons of iron were in common use. The lecturer went on to show that the forms of the weapons and implements and ornaments found in these Islay graves were identical with those associated with Viking burial in Norway during the period between the beginning of the eighth and the end of the tenth centuries; and that the range or area of this type of burial in Scotland included several of the Western Islands, and Orkney and Shetland, Caithness and Sutherland—an area which, established on archaeological evidence, coincided exactly with the area established by historical record as that which was colonised and possessed by the Norwegians in the time of their heathenism. It was incidentally stated that thirty-two brooches of the Islay form had been found in Scotland, whereas only fourteen of a Celtic or native form had been discovered. The explanation was, that the effect of Paganism was that those who had brooches were buried with them, while the effect of Christianity was that brooches ceased to be buried with those who had them. The lecturer then spoke of ship-burial in Scotland—instances having been found of this nature—where the Viking had been buried in his war galley, and a pile of earth raised over it. They had testimony in the Sagas to this custom, and evidence had been found of it in graves both in Scotland and Norway. He had, said the lecturer in conclusion, described these Norwegian burials found in Norway and in Scotland partly because they enabled them more vividly to realise the peculiar characteristics of Pagan burial, but chiefly because he was unable to illustrate the phenomena of the Iron-age Paganism of Celtic Scotland from its own remains. The archæology of Scotland was absolutely destitute of recorded data for this purpose. The un instructed excavators had some respect for stone and bronze, but old iron was shovelled into oblivion without a moment's hesitation.

The third lecture was delivered on Monday afternoon. The subject was, "Celtic Art of the Pagan Times." Proceeding to sketch groups of relics which were not only types that were of indigenous origin and confined to the Scottish area, but which also presented in their form and decoration features which they had to recognise as distinctly Celtic, the lecturer first described a curious bronze head-piece with horns found in 1820 in Tows, Kirkcubrightshire, the ornamentation of which consisted of a series of irregularly divergent spirals in *repoussé* work, repeated symmetrically but not identically on the front of the object—the curves being sometimes arranged so as to produce a zoomorphic effect. Other objects distinguished by the same characteristics were a boar's head found at Leitcheston, Banffshire, in 1816; a bronze mirror and a crescentic collar-shaped plate of bronze found at Balmaclellan, Kirkcubrightshire, of a form usually associated with interments of Pagan times in Britain; and a circular plate of a bronze mirror obtained with other objects from a Pagan cemetery at Mount Batten, near Plymouth. A mirror found in a grave at Irelan-Bahno, Cornwall, was also referred to. These mirrors, it was pointed out, differed in form and ornamentation from Roman mirrors, and disclosed the existence of a native school of art distinctly Celtic. There were then minutely described the characteristics of objects in gold and bronze from a hoard found at Shawhill, Peeblesshire: of some massive enamelled bronze armlets, from Castle Newe, Aberdeenshire, and Pitkellony, near Muthill, and Stanhope, Peeblesshire; as also of armlets in the form of a double-headed snake, found on the east coast of Scotland at places north of the Firth of Tay. A bridle-bit, with yellow and red enamels, found at Birrenswark; and harness mountings, found in Annandale, were also spoken of as illustrating the same peculiar art in a less pronounced, but equally characteristic style. It was evident, said

the lecturer, in summing up, that they had herein the decoration of all the objects a peculiar and highly characteristic style of art, confining itself to curvilinear forms, combining its simple elements in a manner that was neither rigidly geometric nor fettered by conditions of absolute symmetry, but producing, by a rhythmic recurrence of certain features, a series of designs that were characterised by a beauty of form, balance of parts, and harmonious combination. It differed from the art of the Christian time inasmuch as it presented no intermixture of forms and features that were common to Greek, Roman, and Etruscan art—no interlaced work, no meanders, or key patterns, or fret work of any kind, and no similitude of foliage or foliaceous scrolls. It was still zoomorphic, but its zoomorphism was confined to the forms of the objects to be decorated, and had no place in the designs with which they were decorated. It was more partial to the modelling of solid forms of ornament than to the elaborate decoration of surface by intricate engraved work, and these solid forms of its surface ornament never became zoomorphic. When the graver was employed it was used chiefly to produce broad effects by the contrast between plain spaces in the designs and spaces filled with punctuations or with simple parallel lines. They found this peculiar style of art employed in the decoration of metal-work in gold and in bronze. The objects so decorated were personal ornaments, arms, harness, and horse furniture. The technical skill displayed in the manufacture and finish of these objects was great, and the quality of the art displayed was high. There was implied in their production a special dexterity in preparing moulds and compounding alloys, in casting, chasing, and engraving, in the polishing and setting of jewels, in the composition and fixing of enamels. But there was also implied an artistic spirit controlling and combining the results of these various processes, giving elegance and beauty of a peculiar cast to the forms of the objects, an increasing the intrinsic elegance and beauty of the form by the harmonious blending of its special varieties of surface decoration, in which forms that were solidly modelled were intermingled with chased or engraved patterns and spaces filled with colour. A style of art characterised by such originality of design and excellence of execution must count for something in the history of a nation's progress, must have its place to fill in the history of art itself, when once they had begun to realise the fact that art was not the exclusive privilege of classic antiquity. (Applause.) The most peculiar and characteristic feature of an art so singularly decorative was the fact that it was applied so largely in the ornamentation of objects that were appropriated to the commonest uses, such as the trappings of horses and harness of horses. Philostratus, a Greek writer, who came to Rome at the commencement of the third century, had left them the information that the barbarians of the ocean spread colouring matters upon glowing brass, which thereby adhered to it and became as hard as stone, and thus preserved the designs made by them. It was matter of inference what the people were here styled "barbarians of the ocean"; but it was matter of fact that in the context he was speaking of harness and horse-trappings, and that horse-trappings of bronze decorated with coloured enamel were found only in Britain and in Gaul. Those found in Britain were by far the more abundant and richly decorated; and there was evidence that they belonged to a time when the Celtic population had not been exposed to the influences of Roman forms of culture. In the group of objects described in this lecture they had, therefore, a series of examples of the art which characterised the Iron-age Paganism of Scotland—the period that lay beyond the Christian time, and reached back till it merged in the Bronze-age culture. The phase of art which they exhibited, in its broader aspects, was not confined to Scotland alone. Its germs were found in the Iron-age decorations of Central and Southern Europe; but this peculiar system of design, which only appeared feebly and imperfectly among the relics of Continental culture, received its highest development in Britain alone. There it became a distinctive school of decoration, exhibiting different aspects in England, Scotland, and Ireland, and attaining in each of these areas a separate individuality. In Scotland and Ireland it became the prevailing and dominant style throughout the

period intervening between the close of the bronze age and the richer development of art in the style peculiar to each of these countries in their Christian time. It had been shown in the last course of lectures that Scotland possessed a national school of decorative art which flourished throughout her early Christian time, distinguished by an intense Celticism of style and character, expressing itself specially in the employment of certain elements of design which were not characteristic of the art of any other people. It had now been demonstrated that these elements which gave intensity to the Celticism of the early Christian art of Scotland were carried on into it from the prevailing culture of the preceding Paganism of the Celtic people, among whom they existed in perfect purity as a school of early Celtic art, absolutely unaffected by the influence of Roman or other extraneous forms of culture. He had still to show that in these early ages there was also in Scotland a distinctively Celtic school of architecture, producing forms of structure of such absolute originality of constructive character that nothing like them was known beyond her own borders. In the next lecture (to be delivered to-day) he should deal with the architecture of the brochs, or great dry-built towers—the prehistoric castles of Scotland.

FIRE-RESISTING STRUCTURES.

WE recently referred to a few destructive fires in the City, and among them we mentioned one which occurred at Messrs. Foster and Co.'s premises in Cheapside. As our readers were then informed, the whole interior of four stories, besides a basement, was clean burnt out, leaving a shell of crumbled stone piers on the two frontages. These fragile remains were held together entirely by the framework of iron girders, for they otherwise must have collapsed, to the danger of adjoining property, as well as of the lives of those engaged in extinguishing the fire. We have just received a set of well-taken and printed photographs showing the result of the fire on the ironwork, and they are instructive as well as interesting records of the event. In this instance the contents of the building were of a very inflammable description, and the action of the fire, fanned by currents of air from both sides, was of the most intense and trying kind. If any ironwork was exposed to danger from fire the columns and girders of this warehouse were certainly so, and to a very serious extent. The flames soon acquired an uninterrupted play from basement to roof, as there was no arching and concrete to the floors. The chief point worthy of attention in the building under notice is that the ironwork, after the raging fire to which it was exposed had abated, was found almost intact, while all the wooden joists and flooring were consumed.

The structure was designed and carried into execution by Messrs. Ford and Hesketh, architects, of 21, Aldermanbury, and the iron construction, adopted by those gentlemen and put up by Messrs. Measures Bros. and Co., of Southwark-street, appears not only to have tied the walls together, but also to have resisted the action of intense heat, and have remained undisturbed. We have thought it would be acceptable to our readers to lay before them a few of the details of the iron-construction, supplied and carried out by the latter firm. The warehouse covered a rectangular area, and there was a basement which extended under it. With the ground-floor it was five stories in height. On the return side, the building comprised four bays, and on the Cheapside front three bays. A series of double transverse girders crossed the building at every floor, supported on the piers on the outer side and the party-wall on the inner side, and in the centre they were assisted by east-iron columns varying from 9in. diameter in the basement to 6in. in the upper story. These pillars, which rested on one another, varied in height; those of the basement were 10ft., the ground floor 14ft. 6in., the first floor 12ft. 6in., the upper floors 11ft. 6in. and 10ft. 9in. in height. They were hollow 15-8in. thick of metal in the basement, and the upper ones were 7in. thick. The manner these were attached to the plate girders deserve notice. The latter were of rolled iron of I-shaped section about 12in. deep; a couple of these girders rested on the edges of the

abacus of the iron pillar, which was accurately faced to receive them, and were connected together at 4ft. intervals by gas-tubing screwed up at the ends. The flanges were drilled and bolted to the bed-plates, but there was no play allowed for expansion, &c., moreover the ends of the girders which rested on the wall and piers were tightly bedded into them. This arrangement of girders allowed the pillar shafts to run through and to be bolted together with a flange joint. In the other direction these girders were stiffened by single binders or cross girders of lighter section, which helped to keep the main pairs in position. The wooden joists rested on filets on the lower flanges of the iron girders. Perhaps the most noteworthy feature is that the columns were not coated with plaster or cement, which is known to afford considerable protection to them, but were fully exposed to the action of the fire. The five tiers of them were fiercely swept by the flames, but the only visible sign of their ravages is the burning off of the paint with which they were coated. The construction of the columns and their connection appear to have admirably resisted the trying test to which they were exposed. The bases were cast with ribs, and the columns were connected by flange-plates. The other ironwork supplied by Messrs. Measures Brothers and Co. also fully withstood the ordeal of fire and water to which it was exposed; the main façade rested on a triple-plate girder supported on cast-iron columns, which has not shown any signs of yielding, although a great dead weight rested on it. One other point of some moment is, that the ends of the iron girders were tightly fixed in the brickwork on stone templates. The mass and length of iron did not warrant the architects or engineers in making any allowance for contraction or expansion, and the result has, at least, justified this manner of construction. Opinions on this, as well as other points, differ considerably as to the effect of fire on ironwork. It has often been contended, and in theory it is quite sound, that no ironwork should be tied rigidly to the walls of a building. The chief fact to notice is, that the main girders were continuous from end to end. What might have happened if the ends of these girders had been left free to move is almost too apparent. The stonework, completely pulverised in places, would have been without rigid support, and its destruction would have been inevitable. This point, at any rate, is one upon which architects and engineers will continue to differ. In this instance, to the rigidity with which the ironwork preserved the flimsy shell of stone, alone is attributable the safety of the outer walls. The only girders bent are those in the rear of the building, which were exposed to the action of the fire on one side, and these were of small section.

We must say a word in praise of the beautifully clear photographs before us, taken by the London Stereoscopic and Photographic Company of Cheapside. One of these shows the whole ruin as it appeared on the 1st of September last, being a perspective view taken at a considerable height above the street-level on the opposite side. The architectural features of the Cheapside façade are clearly shown, even to the capitals and the pilasters which divided the windows and the lofty terminals of stone above the open parapet. The main and cross girders are also distinguished. Another view shows to a larger size, and from a nearer point of sight in Bread-street, the largest part of that front and its ruined interior. The iron window stanchions which divided the openings and the cross girders are discerned with great distinctness, while one of the raking iron principals of the roof of a similar section to the joists is visible. This photograph has, however, a special interest to the architect in showing the disintegrating action of fire on the stonework. Every stone is clearly brought out, and the crumbled masses of piers and lintels, the calcined jambs and shafts tell a tale of the greatest import to the builder in stone. The representation is a perfect photographic picture, and the value of photography in recording substantial facts of this kind cannot be overrated. The third photograph shows one of the angle windows over the ground story in Bread-street. Here through the opening we see two transverse coupled girders with their tube-bolts *in situ*, unscathed, resting on the capitals of the columns, which are perfectly plumb and equal to their original

duty. We can see also the stiffening cross binders at intervals already described, and every detail of importance. One cannot examine this scene of desolation, or look at these photographs without being led to conjecture what might have been the effect if no ironwork had existed to retain the fragile mass of calcined stonework in its place, or if the girders had not been tied together; nor can we doubt that had the iron joists been immersed in concrete, or protected by concrete flooring, the fire would have been confined to a single floor instead of devastating the whole building. We may add, in conclusion, that a careful examination has shown no material deterioration of the ironwork; the main girders are quite as straight as when first put in, and the brusses of iron are absolutely unaffected. The greatest deflection occurs in two of the main girders, which have cambered or bent upwards, owing to the action of the fire on their upper flanges. The best proof of the excellence of the work of Messrs. Measures Brothers and Co., is the fact that the old iron-work, which has been carefully shored up in position in parts left without support, is to remain, and the new masonry is to be built up to it again.

SANITARY EXHIBITION AT BRIGHTON.

IN connection with the Health Congress to take place at Brighton in December next, of which Dr. B. W. Richardson, F.R.S., will be the president, it has been decided to hold a domestic and scientific exhibition in the Royal Pavilion buildings, in that town. The exhibition will open on Monday, Dec. 12th, and will be closed on Wednesday, Dec. 21st. It will be divided into eight sections, those of (1) food products; (2) domestic, household, labour-saving and educational appliances; (3) house sanitation, this section including also hospital construction and appliances, and personal hygiene; (4) industrial dwellings, in model and plan; (5) electricity; (6) decorative art and photography; (7) horology and scientific instruments, and (8) art loan collection. From the conditions we learn that the gold, silver, and bronze medals will be awarded while the exhibition is open, in order that exhibitors may display them.

MR. STREET ON THE ROYAL ACADEMY.

AT the dinner given at the Mansion House to the members of the Royal Academy on Wednesday, the Lord Mayor, in proposing the toast of the evening, associated therewith the name of Mr. Street, "who had given to Justice a palace of which the nation might well be proud." Mr. Street, speaking with regret of the absence of the President of the Royal Academy, said it was impossible for Sir Frederick Leighton to return from Italy in time to be present at the banquet. The Royal Academy had been created by Royalty and carried on by a democratic constitution, which had worked such changes in its position that much might be expected from the prestige it had acquired. The work it carried on might be divided into two classes—that which was seen and that which was not seen. Of the first kind was the holding of exhibitions of the pictures of modern and living artists in the spring, and of the works of ancient and deceased artists in the winter. With regard to the exhibitions of works of living artists, he might point out that they not only proved sources of gratification to all interested in art, but that they afforded to young artists who had their spurs to win opportunities for gaining distinction, and instances were neither few nor far between in which the entrance into the world of popularity and favour dated from the exhibition of a good picture on the walls of the Academy. Dwelling next upon the great value of the exhibitions of works of old masters at Burlington House, he alluded to the difficulty the Academy still found in prevailing upon the owners of such valuable works to part with them even for a time. Turning then to the unseen work done by the Royal Academy, of which little was known by the public, he briefly described the schools of the Academy, in which masters, models, and casts were provided, and some 400 students were at present receiving their education. They were taught by competent masters, and were visited by 23 visitors elected by ballot from among the members of the Academy. Thus the

students were brought into intercourse with some of the most distinguished artists of the day. It was, too, worthy of note that the students received this education without payment, and that a whole profession were in this way educated without cost to itself by a society which had no subvention and no aid from the State—a case, he believed, unique among the art schools of Europe. Referring to Blackfriars-bridge and certain works contemplated at the Guildhall, he expressed a hope that when the architect had done his part, the sculptor and painter would be called in to complete the decoration of the structure. He hoped that the arts of architecture, sculpture, and painting would be so cultivated in this City that in future years people might think of London as they now thought of the old centres of civilisation and art elsewhere in Europe.

LIVERPOOL ENGINEERING SOCIETY.

THE fortnightly meeting of this Society was held on Wednesday evening, Mr. A. Helt, President, in the chair. A paper, by Mr. William Kissack, Stud. Inst. C.E., on the "Extension of the Promenade at Southport," was, in the absence of the author, read by the honorary secretary. The work, Parliamentary powers for which were obtained in 1876, consists of a promenade 25ft., carriage-road 25ft., and footpath 10ft. wide, formed on an embankment 12ft. above the level of the shore, inclosing 42 acres of land reclaimed by it. This land was bought by the corporation at a cost of £9,000; roads and sewers have been constructed on it, the portion between the roads has been filled up to a height of 2ft. above the top of the sewers, and is now being sold in building plots. By the sale of the land the corporation will recoup the whole of the money expended on the works. The sand for the embankment was brought by a line of rails laid along the shore from the sandhills at Birkdale, a distance of 2½ miles, being filled into the waggons by a steam "excavator," which filled 300 four cube yard waggons per day, thus doing the work of 70 men. The embankment is protected by a sea wall made of concrete, consisting of one of Portland cement to six of sandstone, broken to pass a two-inch riez. The concrete was deposited in layers 6in. thick, and punned with a 30lb. rammer. The toe of the wall, which is 2ft. 6in. thick, is 20ft. out from the face of plinth, and it rises with a gentle curve to the finished surface of the promenade, where it is 1ft. 6in. thick, and is finished with a plinth 2ft. high, surmounted by an ornamental cast-iron railing. The top of the plinth is 8ft. above high-water mark of a 21ft. tide, which is the highest known, and is provided with "weep holes" at intervals of 6ft. There is an approach-road to the shore at Seabank-road end, with a gradient of one in fifteen, and opposite each new street is a flight of steps of concrete. The promenade and carriage-way are laid with asphalt on stone pitching, and the footwalk is tiled with Welsh fire-clay tiles. The works, which comprise 400,000 cube yards of embankment, 8,000 cube yards of concrete, 24,000 square yards of asphalt, and four miles of sewers, have been carried out in an exceedingly creditable manner by Messrs. Gripper and Bayliss, of Westminster, at a cost of £32,000, and are from the designs of the borough engineer, Mr. W. Crabtree, Assoc. M. Inst. C.E. A vote of thanks to the author for his interesting paper was given, and the chairman announced that the next meeting of the society would take place on the 7th November, when a paper on "Tides and Tidal Scour," by Mr. Joseph Boulton, would be read. The first volume of the *Transactions* of the Society is now ready for distribution, and reflects great credit on its editor, Mr. W. S. Boulton.

PAINTERS' WORK.

THERE are several ways in which painting is measured and valued, and it is to be regretted that painters are not agreed upon some uniform rule for ordinary work. The rules given in some of the surveyors' handbooks are vague, and at variance with practice. Mr. Leaning, in his recently published book on "Quantity Surveying," recommends a rational system of measurement, which is as follows:—"Look through the dimensions from the beginning after

they are squared, and repeat the dimensions of the squaring column, multiplying by a figure according to the kind of work, as 1ft. for plain where no edges, 1ft. 2in. where there are edges, 1ft. 3in. where square-framed or moulded." Another method is to abstract the quantity directly from the bills, adding one-seventh for edges. Knetted, primed, and stopped work ought to be mentioned, also the number of oils, the priming being one. The description also ought to state, if party or extra colours are used, and the material painted, if iron, wood, brick, or cement, each kind being kept separate. Painting is measured at the yard square with the exception of a number of articles which can hardly be measured superficially.

Any work which is "cut in both edges," to use a painter's phrase, is measured by the foot run. Such things are skylight-bars and rails, shelf-edges, eaves-gutter, balusters, railing; small articles, such as gratings, rain-pipe heads, hinges, latches, &c., are numbered. With reference to the rule for measuring windows, most authorities take the squares per dozen; where the sashes are in one square, they are described as "sheets," counting two for one, to allow for both sides. When over 2ft. superficial, squares are called large squares; ordinary squares are taken per dozen, counting two for one, to allow for both sides. For painting window-frames, superficial measurement is taken for each surface. Over 24ft. superficial, they are described as "large frames," over 36ft. as "extra large frames." Graining and varnishing, staining, sizing, and varnishing, are measured by the yard superficial, the stain and coats of varnish, &c., being described. Oiling and rubbing and varnishing are taken in the same manner. Grained work is taken as an extra upon the plain work, and the description should give particulars, if the work was "combed," "grained," and "over-grained," and the times varnished. "Flatting" is also taken as an extra.

It is more difficult to measure decorative work, and here few rules can strictly be observed. Such work must consequently be measured in detail, or valued according to time occupied. Mouldings, for instance, which are picked out, cornices in different colours, ought to be separately described, and the picking out, gilding, &c., be defined. If painting is abstracted from dimensions of joiner, the measuring-book will show the superficial, say, of 4-panel square doors, and after it a circle may be drawn with "4 grain and 2cc varnish" inserted in it."

MUNN'S VENTILATOR.

MESSRS. JAS. M'HAFFIE AND CO., of Glasgow, the makers of Munn's Patent Exhaust Ventilator and Smoke Cowl, being desirous of having a trial made of the merits of that apparatus by some independent person, recently applied to Principal Jamieson, of the Glasgow College of Science and Arts, to conduct some experiments. The result was that Principal Jamieson determined to adopt the ventilator for the college buildings, and he has since submitted the following report to the makers:—"College of Science and Arts (Incorporated), 38, Bath-street, Glasgow, 14th October, 1881. Messrs. James M'Haflie and Co., Calderwood-street, Parliamentary-road. Dear Sirs,—Last session we found considerable annoyance from want of ventilation in our Junior Mathematical Practical Chemistry, and small as well as large hall class-rooms. I reported this defect to my directors, and they desired me to look out for the best system of ventilation. I inspected several ventilators; amongst others Munn's Patent, as fitted by you to the Free Tron Church, Glasgow. During a Sunday afternoon service, when the church was well filled, I had eight self-registering thermometers placed in different positions throughout the church, to test the rise of temperature, and also observed the quantity of air passing through the ventilators by means of a good anemometer. This, as well as two other tests which I made during different states of the atmosphere, satisfied me; and, in consequence of my report, we have had two of Munn's 15in. ventilators placed upon our roof here, and connected with the large hall, holding 350 persons; the small hall, 100; the mathematical class-room, 110; and the practical chemistry laboratory requiring special good ventilation. Similar tests to those already mentioned were carried out during our opening lecture, on 3rd

in-t., when the large hall was crowded in every corner. These tests, along with others since made, and a thorough inspection of the work as fitted for us, convinces me that we have got a reliable system of ventilation, with good working ventilators. I can, therefore, recommend Muon's Patent for schools, colleges, and churches, and shall be willing to let any one desiring better ventilation inspect the system erected here. —Signed ANDREW JAMIESON, Principal."

PRACTICAL NOTES ON PLUMBING.— XVIII.*

By P. J. DAVIES, H.M.A.S.P., &c.

INSIDE WORK, OR SANITARY PLUMBING.

UNDER this title, it is my intention to describe and give illustrations of the various kinds of work in this branch of the trade, many of which will be copies of work executed by myself.

My readers will save themselves much trouble by noticing that in all my diagrams the various parts with their proper initial letters, and in fixing work I always adopt the same plan on the work itself. Here follow a few instances as explanation. S.V. stands for soil-ventilator, M for main, C closet supply, D diet tie, S soil-pipe, R.W. rain-water pipe, W waste-pipe, F flow-pipe, R return-pipe, L.W. lavatory-waste, and so on, according to the name of the part.

Wherever this plan is adopted, and written or printed, in any closet, any plumber being called in to effect repairs can see at once where to take off another supply, shut down a pipe, &c., &c., without taking half a day to trace pipes. This is especially convenient in cases of burst pipes during frosty weather.

This cistern, 1, is lined with lead wiped all round the angles, as shown at A A A (in a future number I shall devote a chapter giving minute details on the work of lining cisterns); 2 is a 1½ in. standing trumpet-mouth waste, which is ground into a washer, 3, and soldered flush into the bottom of the cistern. This, of course, answers two purposes—as an overflow, and as a means of washing out the cistern. The cistern is supplied by a ½ in. main-pipe, M (by some waterworks people it is called the communication-pipe, as also in the Water Act, or Water Companies' Regulations of 1872). I shall, however, adhere to the proper title, "main-pipe." At the end of this main-pipe is soldered on the ball-valve, 6. C is the closet-pipe leading from the bottom of the cistern; by means of a flanged joint a 1½ in. strong spindle-valve, 4, is soldered to the end of this pipe, which is kept open by hooking it up on a large nail, 5, with stout closet-wire. 7 is another leaden cistern, having a standing waste, 8, and 1 in. dietie-pipe, D; this pipe supplies all water to sinks, lavatory basins, baths, &c., which is also governed by the 1½ in. spindle-valve 9, and a separate 1 in. hot-feed pipe leading to the bottom of the hot-water tank, as shown at H F H F. On the mouth of this pipe is also fixed a ½ in. spindle-valve, and hooked up as shown at 11. This cistern is supplied with water through the ball-valve 12.

HOUSEMAID'S SINK.

Fig. 13 is a housemaid's sink, lined with lead and soldered 16 in. up the angles, as shown at A A A. W is the waste-pipe from the cisterns; H a ground-in gunmetal cock, with a spanner to turn it; C the cold-water cock coming off the pipe.

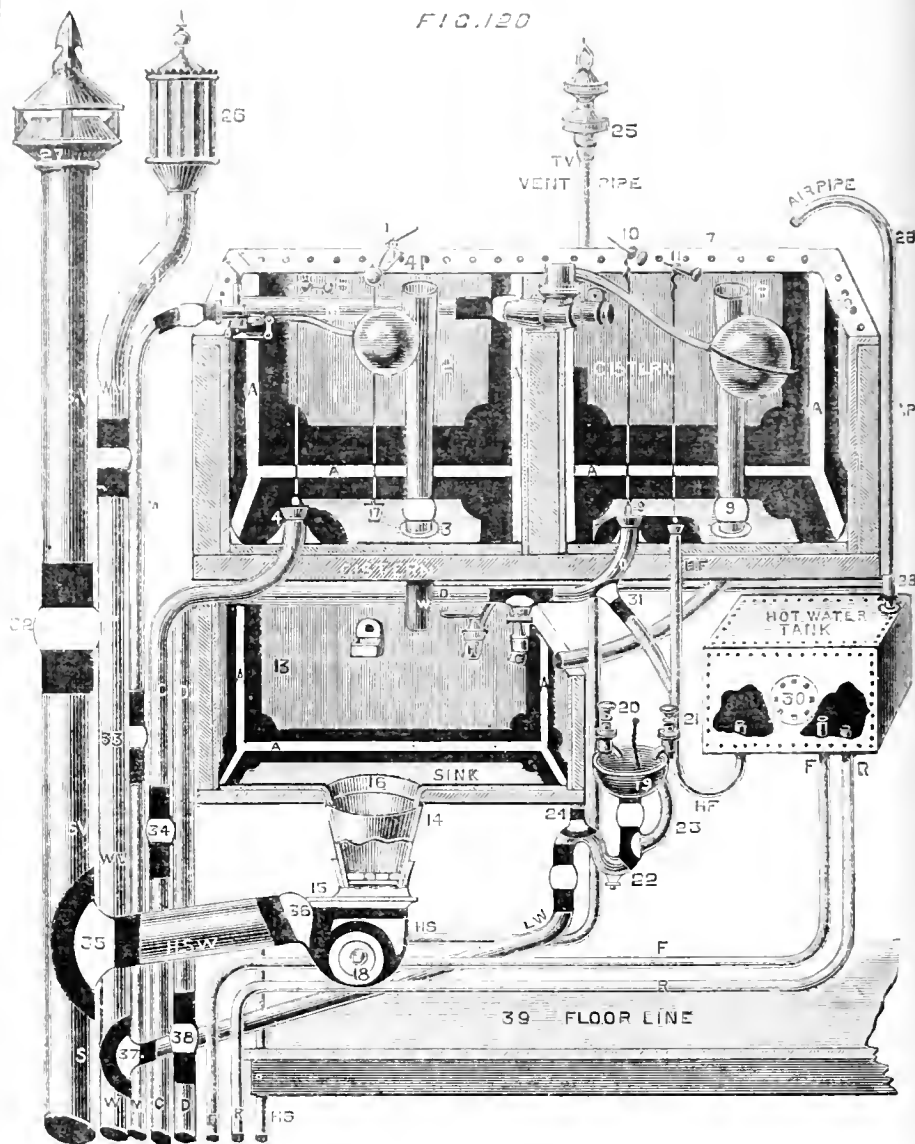
Fig. 14 is a round hopper-closet basin fixed into the dip of a trap 15. A 5 in. strainer with 1 in. hole is dropped into the bottom of this basin, which is kept in its place by a piece of lead 3 in. deep, tapered to the shape of the basin, and fitted as shown. The top of the basin stands 2 ft. 2 in. from the floor line, and the front of the sink 5 in. higher, in all 2 ft. 7 in. The lead from the bottom of the sink is worked down into the basin, as shown at 16, and the basin is flushed with a 1½ in. pipe and spindle valve, 17 in. cistern 1. In the side of the trap is fixed a ½ in. cup and screw, 18, and the waste or out-go pipe, H—S.W. (housemaid's sink) is 4 in. branched into the soil-pipe S, which is continued to the top of the cistern, and has a Stevens' exhaust cowl, 27, fixed on the top; 19 is a white washing basin, 14 in. over, 2 ft. 6 in. high, having

hot and cold water, as shown at 20 and 21; 22 is a 1½ in. trap and waste-pipe, L.W. (lavatory waste); 23 is the overflow from basin to heel of trap, fixed 5 in. above the water line. By tracing the pipe L.W. it will be seen that it does not discharge itself into the soil-pipe, but into another and separate waste-pipe, W. On the top of the trap, 22, is branched a 1½ in. ventilating pipe, 24, continued up above the roof, and having a "Weaver's" cowl, 25, fixed on the top. The 2 in. waste-pipe, W, is continued to the top of the house, and has a Buchan's ventilator, 26, fixed on the top. The hot-water tank has a piece cut away from the side, in order that you can see the method of fixing the end of the flow-pipe, F, above the

EXHIBITION OF WORKS OF ART APPLIED TO FURNITURE, 1881.

THE following is the Report of the judges appointed by the Council of the Society of Arts to make the awards of silver and bronze medals offered by the Society to the Designers and Art Workmen whose work is exhibited in the Exhibition of Works of Art applied to Furniture, held in 1881, at the Royal Albert-hall.

1. The collection of works of art included many branches of artistic handicraft, such as carving and inlaying in wood, ivory, &c., cabinet work and fine joinery, painting on various materials like wood, glass, and pottery, gilding, the process known as *pate sur pate*, beating and chasing metals like silver and brass,



end of the return, R. The flow is the hot water from the boiler-pipe. The return is the cooler water passing from the hot-water tank to the boiler, where it mixes with the hot water, and again ascends in regular order. (This will be explained in detail in a future article.) This is known as the close tank system, and no draw-off pipe be at any other place than off the top, at 28.

Fig. 20 is the vent pipe, which must be well protected from frost, and taken above the water-line in cistern 7.

Fig. 30 is the manhole in the tank, to clean out or screw up the fittings. N.B. The air or vent-pipe, 20, must never be taken the least below the top of the hot-water tank, but be fixed to the top with a proper flange.

The pipes, F R and H F are fixed with back-nuts and grommets on the side of the stationary back-nuts, because then the turning round of the nut does not turn the grommet away.

(To be continued.)

wrought-iron work, modelled and glazed stoneware, and decorative needlework. The arrangement of the objects had been undertaken by the various exhibiting firms. A definite space had been assigned to each firm, who decorated it with hangings or with painted and gilt model work, or wood paneling, &c., and then disposed within it the various objects of furniture, &c. We were much pleased with the general good taste displayed in the separate divisions and in the aspect of the Exhibition as a whole.

2. In Ray No. 1, exhibited by Messrs. Grace and Son, the important cabinet of carved walnut wood was distinguished for its excellence. A number of hands, it was stated, had been employed upon the carving which called forth our admiration. It was, therefore, not possible to single out one art workman to whom a medal might have been awarded. For the same reason no distinction could be awarded in respect of the admirable mild octagon table of walnut wood, the design for the ornamental border of which has been made by Mr. J. D. Grace. The painting done upon a cabinet of satin-wood, by Mr. Herman Seely, as well as the delicacy of his rendering of the little figures of boys in the medallion, merit the distinction of a Bronze Medal. It is Ray a tray and set of three things, in a dark, olive-green tone, ornamented with applications of well-modeled forms in white paste, exhibited by Messrs. Munn, and designed and executed by Messrs. Seely, was specially commended as worthy of a Silver Medal.

3. The decoration of the side of a room, exhibited by Messrs. Morant, Boyd, and Blanford, remarkable for the excellence and finish of the work, was based upon a scheme good in its proportions, and the blending of the delicate tones of colour adopted, with those of the damask panels, and the details of the ornamental forms used, redound to the good taste of the designer, Mr. V. Barnard. Messrs. Morant, Boyd, and Blanford also exhibited a satinwood cabinet, and we consider that Mr. H. Reich, who inlaid the frieze of interlacing garlands upon the front of the drawer and the central ornament of the flap, should be rewarded with a Bronze Medal.

4. Near Bay No. 2 hung three red lustre plates, the work of Mr. W. M. Ryan, to whom a Silver Medal should be given for suitability of design to the materials employed, as well as for the fine tones of colour and lustre obtained.

5. In Messrs. Jackson and Graham's cabinet and chimney-piece, of a so-called Oriental Greek character, extraordinarily delicate and perfectly fitting marquetry work, and very finished cabinetmakers' work, attracted attention. A Bronze Medal is due to Mr. A. Reich, the marquetry worker, and a Bronze Medal to Mr. A. Baldwin, cabinet-maker; to Mr. Marchant, who is understood to have assisted in the cabinet work, we award one of the Society's Certificates. Beneath the chimney-piece in rosewood, with plaques of inlay of ivory, ebony, and mother-of-pearl, designed by Mr. Allwright, was a wrought-iron grate, of simple design, in good taste, made by Mr. Sayer, a member of the firm of Messrs. Feetham and Co., who exhibited other grates and fire-irons of good pattern and workmanship. A piece of embroidery, designed by Mrs. Alfred Morrison, who presented the colours and selected the materials used, greatly pleased us by the excellent distribution of Oriental motives, as well as the beautiful harmony in colour displayed in it.

6. The walnut seat for a vestibule, understood to be a copy of an old French design, reflects great credit in respect of its workmanship upon the exhibitors, Messrs. Gillow and Co. The carving, by Mr. M. Anderson, of the pendent leids of the canopy, and scroll-work on the arms of the seat, is well done. Carving in satin-wood of garlands, on a small scale, but in high relief, and also of medallions, with a layer of satin-wood upon a ground of ebony, in imitation of cameo cutting, executed by Mr. Ross, to decorate the satin-wood cabinet, made for the Empress of Russia by Messrs. Gillow, showed much skill in the execution, but in a direction of doubtful taste.

7. The carving of panels of boxwood let into a rosewood cabinet, exhibited by Messrs. Holland and Sons, was commendable.

8. In Bay No. 6, some lightly constructed furniture, including a stand in oak wood, after a Japanese model, and some chairs after good models of the Chippendale and Sheraton period, shown by Messrs. H. Ward and Co., was particularly noticeable for its gracefully designed and well-out ornamental details. A rosewood chimney-piece showed good cabinetmakers' work. The designer of these pieces is Mr. Randall, whom we select for an award of a Bronze Medal, as well as for his design for a white metal fireplace and fittings. Some extraordinary specimens of glass cutting and engraving, by Mr. Northwood, who has produced a very remarkable fac simile of the "Portland vase," probably unique as a work of glass cutting of modern times; and a vase called the "Mitt-n-vase," designed by Mr. Pargeter, of the Red House Glassworks, were exhibited by Mr. Pargeter. To the glass engraver, Mr. Northwood, we award a Silver Medal.

9. Messrs. Wright and Mansfield contributed several excellent examples of inlaid work of the English 18th-century style, in the manner of Chippendale, Adams, and Sheraton, as well as work enameled and decorated in the style of designs by Pergolesi. Awards of Bronze Medals were made to Mr. Thomas Hinton, the foreman workman, and to Mr. Victor Reich, the marquetry worker, and of Certificates to Messrs. Samuel Byrne, Charles Humphreys, and Thomas Miller, cabinetmakers, by whom the more important of these works were produced. The carved and gilt mirror-frames and girandoles in the style of the 18th-century English, and of Louis XV. French periods, especially three placed over the sideboard, were noted for superior workmanship, the carving being done by Mr. John R. Wingfield.

10. The modelling of the relief ornament carved by many hands, in a deep red mahogany mantle-piece and cabinet exhibited by Messrs. Collinson and Lock, was particularly good, and we award a Silver Medal to Mr. Webb, the modeller, for this and for many other specimens exhibited. His design for metal sconces was distinguished for richness in arrangement of conventional foliage, well grouped and modelled with good effect of low relief and harmony in flowing lines. The metal-worker who wrought this design in brass is Mr. Singer, to whom we award a Bronze Medal. Of a different style, but of much excellence, the design being by Mr. Lock, the modelling by Mr. Webb, and the actual metal-work by Mr. G. Price, was a mirror frame of repoussé oxydised silver. We award a Bronze Medal to Mr. G. Price for his metal working. The whole of the collection of furniture exhibited by Messrs. Collinson and Lock was noticeable for the completeness of workmanship throughout.

11. Some wrought-iron by Mr. Sidney Phelps, of Sidney Sussex College, Cambridge, deserves mention, especially the panel for a balcony, which was of a good style of design, with interlacings of rod-iron and beaten leaves of plate iron. The figures in the small panels, of deep modelled relief in terra-cotta, designed and executed by Mr. G. Tinworth, are full of expressive action, and we consider that a Certificate should be awarded to this artist. We award a second Certificate to Mr. G. Tinworth, the designer of the large flattened circular bowl, executed in stoneware, and shown by Messrs. Doulton; and a Certificate to Mr. Edward Sears for his careful and clean painting in monochrome on two tiles, called respectively "A Saucy Companion" and "An Old Chickadee." We do not commend the skill displayed in two delicate carvings in lime-wood, the work of Mr. W. Perry. Two panels of painted glass, suitable for the decoration of a house or hall, representing "Art" and "Science," appealed to us to show a right appreciation of the application of coloured glass to windows, without detracting from its utility as a window through which light has to pass.

12. In Bay No. 9, containing articles exhibited by Messrs. Gregory and Co., the reproduction of an old English armchair, enriched with carved and turned rails, and

a little tea table, were highly finished in workmanship, and commendable for the lightness of their construction. We award a Bronze Medal to Mr. W. P. Collins, the designer of these articles. To the designer, Mr. T. W. Hay, of the woven hanging, for the drawing and arrangement of details, as well as for good harmony of colour, we propose to award a Certificate.

13. The well proportioned framework or walnut panelling, for the side of dining-room or hall, shown by Messrs. Johnstone, Jeanes and Co., in Bay No. 11, was excellent in design, but, in our opinion, the effect would have been better if simple wood panelling instead of tapestry had been used. As it was, it produced the impression of an open screen which had been filled up, rather than of a wall.

14. The carving of the students of the School of Wood Carving, South Kensington Museum, was meritorious; and the plaster executed by Miss Eleanor Rowe, of this school, showed good feeling for flow of line and the modelling of surfaces. It may be well to mention here that a principal aim of this school is to cultivate the production of wood-carving in a broad style, and at a cheap rate, similar to that used so largely for decorative purposes in the eighteenth century in this country. The works of this school are not, therefore, intended to compete with more expensive and more highly finished wood carvings.

15. We award a Silver Medal to Mr. R. Gleeson, for the suitable and graceful fan mounts, which he has designed and executed, especially that of ivory, mounted with Mahogany. The inlaid Aubusson wood table, the work of Mr. Thomas Jacob, gained the distinction of a Bronze Medal, for the beauty of the marquetry work.

16. In concluding our report upon this Exhibit on, we are of opinion that annual Exhibitions, at which are shown various classes of Fine Art applied to Industry, such as the one represented at the present Exhibition, might be usefully supplemented were designers for all sorts of handicrafts and manufactures to be encouraged to submit drawings and sketches of designs which have actually been carried out. A sect out was allotted for such drawings at the Paris Exhibition of 1878; and, in our opinion, much useful instruction and information might be gained from such an annual display of designs to the benefit of producers and consumers.

GEORGE GODWIN, F.R.S.
MONTAGUE GUEST, M.P.
EDWARD J. POYNTER, R.A.
ALAN S. COLE, Hon. Secy.

5th August, 1881.

LIST OF AWARDS.

SILVER MEDALS.

Mons. Solon, for olive-green tapestry, *after the style of Messrs. Almon*.
Mr. de Morgan, lustre plates.
Mr. Webb, modeller and designer Messrs. Collinson and Lock.

Mr. R. Gleeson, for carved fan mounts.
Mr. Northwood, for glass-cutting and engraving Mr. Pargeter.

BRONZE MEDALS.

Mr. H. S. Holz, for painted furniture Messrs. J. G. Crace and Son.
Mr. Vernon Barnard, designer of side of room (Messrs. Morant, Boyd, and Blanford).

Mr. J. R. Randall, furniture designs and design for fender Messrs. Howard and Co.)
Mr. Albert Reich, marquetry-worker (Messrs. Jackson and Graham).

Mr. H. Reich, marquetry worker of cabinet (Messrs. Morant, Boyd, and Blanford).

Mr. William Allwright, designer of rosewood chimney piece, inlaid with ivory, ebony, mother-of-pearl, Messrs. Jackson and Graham).

Mr. Baldwin, cabinet maker (Messrs. Jackson and Graham).

Mr. T. Hinton, foreman cabinet maker Messrs. Wright and Mansfield).

Mr. Victor Reich, marquetry-worker (Messrs. Wright and Mansfield).

Mr. Singer, for beaten brasswork (Messrs. Collinson and Lock).

Mr. G. Price, for beaten oxydised silver frame (Messrs. Collinson and Lock).

Mr. W. P. Collins, designs for furniture (Messrs. Gregory and Co.).

Mr. T. Jacob, for marquetry top to table.

CERTIFICATES.

Mr. Marchant, cabinet-maker (Messrs. Jackson and Graham).

Mr. C. Humphreys, cabinet-maker (Messrs. Wright and Mansfield).

Mr. T. Miller " " "

Mr. S. Byrne " " "

Mr. M. Anderson, carver (Messrs. Gillows).

Mr. T. W. Hay, designer of woven saken fabric for room decoration (Messrs. Gregory and Co.).

Mr. G. Tinworth, designer and modeller of flattened round bowl, shown by Messrs. Doulton.

Mr. Edward Sears, for painted tiles.

Miss Eleanor Rowe, for carved wood pilaster.

Mr. W. Perry, for carving in wood.

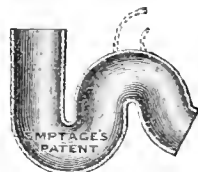
Mr. Sidney Phelps, wrought-iron work.

Mr. W. C. Codman, designer of panelling (Messrs. Johnstone and Jeanes).

EMPTAGE'S PATENT SIPHON-TRAP.

UNDER the old non-ventilation system, the U-trap was the only trap which could be relied upon to hold its seal, and, notwithstanding certain drawbacks, it had to be endured; in fact, it was "Hobson's Choice." Ventilation has brought to the front the plain round siphon-trap, which could not be relied upon under the old system, but which can now be used with safety.

The ordinary round U-trap is, however, owing to its particular shape, not to be relied upon, as, under some circumstances the seal is lost, and no amount of ventilation will remedy



this evil. To meet this difficulty, Emptage's patent siphon-trap has been designed, which, its inventor claims, has all the advantages of the U, combined with the security of the S.

SCHOOLS OF ART.

READING.—The annual distribution of prizes and certificates, in connection with the Reading Schools of Science and Art, took place at the town-hall on Monday week. The 20th annual report stated that there were instructed last year 130 pupils in art and 82 in science. At the May examinations in second grade art there were 130 attendances by 94 students: of these 37 passed in one or more subjects, ten winning eleven Queen's prizes. The local advanced art and the art class teachers' certificate examinations were attended by four students, two of whom were successful. Eleven works in the advanced, and 742 in the elementary section, were forwarded by 110 pupils to South Kensington for examination; the full grant was allowed on twelve students in the elementary, and on one in the advanced; lesser grants being made on the others. Six third-grade prizes were won by five pupils. Mr. Ernest B. Havell, national scholar at South Kensington from the Reading school, has been awarded two bronze medals for chalk drawing of figures from life and also from the antique; also two third-grade prizes. At the May examinations in science there were 22 first-class passes, 27 second-class and 22 failures. The work of the class was last year carried on under adverse circumstance but the new session had just been commenced in the noble premises erected in connection with the town-hall extension. In January next a technical school will be started, and there had recently been added classes in agriculture, and in modelling and painting on glass and china. An address was delivered, on scientific progress, by Sir James Anderson.

CHIPS.

The presentation portrait of Sir Philip Protheroe Smith, three Mayor of Truro, which was painted by Mr. Sydney Hodges, and was hung in this year's Academy exhibition, was formally handed over on Thursday week. By the request of Sir Philip it will be hung in the council-chamber of the town-hall.

The new boys' industrial school at Cockermonth, which has been erected from the designs of Mr. John A. Cory, of Carlisle, county surveyor for Cumberland, will be opened by the Home Secretary, Sir W. Vernon Harcourt, to-morrow (Saturday).

The parish-church of Whileskill, near Stroud, Gloucestershire, was reopened on Thursday week, after restoration from the plans of Mr. W. H. C. Fisher. A transept, vestry, and organ-chamber have been added, and the tower arch at west end thrown open, the vestry with gallery above which formerly encumbered this end being removed. The passages have been laid with tiles, and the flooring in the pews has been renewed. The total cost has been about £800.

The old parish-church at Lanivet, near Bodmin, is to receive an addition of a reredos composed of an artistic combination of Cornish serpentine and of coloured marbles and Beer stone. Under Mr. J. Piers St. Aubyn, the architect, Lanivet church was restored twenty years ago; but funds did not then admit of the erection of the reredos. Mr. Harry Hems, of Exeter, who has the work in hand, has promised to have it *in situ* by Christmas.

At the annual meeting of the Stourbridge School of Art, held last year, it was reported that the resignation of the master, Mr. Bowen, had been sent in and accepted.

CONTENTS.

Forms of Contract	549
Building in Southwark	550
The Water Question.—XIV.	551
Fish-Markets for the Metropolis ..	554
The Rhind Lectures on Archaeology ..	555
Fire Resisting Structures	556
Sanitary Exhibition at Brighton ..	557
Mr. Street on the Royal Academy ..	557
Liverpool Engineering Society.....	557
Painters' Work	557
Munn's Ventilator	557
Practical Notes on Plumbing: XVIII.	557
Exhibition of Works of Art Applied to Furniture, 1881	558
Emptage's Patent Siphon Trap	559
Schools of Art	559
Chips	559
Our Lithographic Illustrations	559
Building Intelligence	573
Competitions	573
To Correspondents	574
Correspondence	574
Intercommunication	575
Legal Intelligence.....	577
Water Supply and Sanitary Matters ..	577
Our Office Table	578
Meetings for the Ensuing Week	579
Tenders	579

ILLUSTRATIONS.

LUKSHMI VILAS PALACE, FOR THE GUICOWAR OF BARODA.
—ST. NICHOLAS CHURCH, WELLS, NORFOLK.—HOUSE AT LEICESTER.—THE CHAPEL, BEAUMARIS CASTLE.—ARCHITECTURAL ASSOCIATION EXCURSION SKETCHES.

OUR LITHOGRAPHIC ILLUSTRATIONS

LUKSHMI VILAS PALACE FOR THE GUICOWAR OF BARODA.

The Lukshmi Palace, designed by the late Major C. Mant, R.E., F.R.I.B.A., and being built for H.H. Maharajah Sayjee Rao, Guicowar (or "Gackwar") of Baroda, who assumes power in December of this year, is to be faced with "Soongah" stone, a vitreous grey local sandstone backed with brick, and enriched with blue, red, and yellow trap in strings, columns, panels, &c. The hoods of windows and the domes will be in coloured tiles, or white marble with finials and ribs in gold. The central portion will be occupied by H.H. the Guicowar. To the right is the zenana for H.H.'s mother and wife; to the left is the durbar hall, a carriage porch being attached to each. The decoration of the durbar hall will be in fine plaster with marble columns and alabaster and marble panels, niches, &c., with a wooden screened gallery for ladies to view durbar. The better class of the private apartments and staircases will be enriched with marble columns, panels, &c., floors of tiles or marble. The flat terrace roof will be constructed of concrete on iron girders covered with asphalt. All verandah roofs will be of concrete on teak joists with asphalt covering. The woodwork throughout the building will be teak. The windows of durbar hall and all important rooms will be decorated with stained glass. The estimated cost of the palace is £200,000, and it is being built by contract with native labour. It is now about 10ft. above ground, and will probably be completed in four years. Rajah Sir T. Madava Row, K.C.S.I., Dewan of Baroda, has taken a warm interest in the palace design, in fact, he sanctioned the late Major Mant's employment on it.

REFERENCES TO PLAN OF THE BARODA PALACE.

- | | |
|---|--------------------------------------|
| 1. Entrance vestibule. | 25. Verandah corridor. |
| 2. Grand staircase. | 27. General dining room. |
| 3. Corridor or main passage. | 28. Waterclosets. |
| 4. His Highness' Com-pansions. | 29. Bath-room for men. |
| 5. His Highness' Com-pansions. | 30. Room for palanquins. |
| 6. Guard room. | 31. Extra room. |
| 7. Raja's sitting room. | 32. General cook-room. |
| 8. Visitors' waiting room. | 33. Smaller general dining-room. |
| 9. Extra room for men. | 34. Female attendants. |
| 10. Koti-kako ns. | 35. Extra apartment. |
| 11. Clock-tower, peons in attendance. | 36. Menkuries. |
| 12. Kamdar. | 37. Guests' room. |
| 13. Karkons. | 38. Staircase hall. |
| 14. Turashk m. | 39. Co. k room. |
| 15. Open courts. | 40. Spare room. |
| 16. Durbar hall. | 41. Extra room. |
| 17. Reception room for Europeans & natives. | 42. Guard room. |
| 18. Vestibule. | 43. Bed room. |
| 19. Ransel dars. | 44. General dining-saloon. |
| 20. Open platform. | 45. General cook room to kitchen. |
| 21. Porcho. | 46. Cakes. |
| 22. General cook-house. | 47. Extra apartment. |
| 23. Laups. | 48. Gons' spare room. |
| 24. Cooks. | 49. Menkuries and female attendants. |
| 25. Cooking pots. | 50. Her Highness' staircase. |
| | 51. Carriage porches. |

ST. NICHOLAS CHURCH, WELLS-NEXT-THE-SEA, NORFOLK.

This church was struck by lightning and burnt down on the 3rd of August, 1879. It was a fine specimen of the 15th-century architecture of the county. The beautiful embellished oak roofs and the fine arcade were its chief features. On plan it consists of nave and side aisles which are continued north and south of the chancel and formed side chapels (now used as a vestry and organ-chamber), a large chancel, an elaborate south porch, and a western tower. The accompanying perspective drawing shows the interior looking east, and was exhibited in this year's Royal Academy. The whole church has been rebuilt and restored, where practicable, exactly like the old. The work has been successfully carried out by Mr. Samuel Paminter, of Braintree, Essex, the contractor, from plans and under the superintendence of Mr. Herbert J. Green, architect, of Norwich.

HOUSE AT LEICESTER.

The drawing which we publish to-day of a residence erected at Leicester for Mr. Joseph Harvey, solicitor, was exhibited in this year's Royal Academy. The architect is Mr. Stockdale Harrison, of Leicester, and the builder Mr. H. M. Hewitt, of Leicester.

THE CHAPEL, BEAUMARIS CASTLE.

BEAUMARIS CASTLE was built by Edward I., the date of its commencement being 1294, or about 12 years after the death of Llewellyn, and 10 years after the founding of Conway and Carnarvon Castles. Between those great fortresses it is exactly equidistant, and served as a connecting link. As a post of observation it was of great importance, as from its towers could be surveyed the opposite coast from Conway to Carnarvon, and the mountainous district inland, where Llewellyn had for years maintained himself against the English. There is an old account existing which describes the progress of the building in 1295, and mentions the carrying of the stone from Penmon in ships at the rate of 10d. a freight. It is nearly a square in plan, and has an outer wall with ten low circular towers. Round this wall ran a deep moat which was filled from the sea by a canal by which supplies were brought up to the castle walls in barges. The only entrance in the outer wall is on the side facing the sea, and was accessible by a drawbridge and portcullis. The walls of the main building are much higher and more massive, and have ten large circular towers, of which there is one at each angle, two on the north, and two on the south flank, (between which are the two entrances into the great quadrangle), and one on the west and one on the east side. In this latter tower, without any external features to distinguish it, is the chapel. It is reached by the narrow passage which traverses three sides of the quadrangle and crosses the chapel-porch through the small chambers on each side. In the porch there is a wide moulded archway opening into the quadrangle at a considerable height above the ground. This archway, having its threshold level with the floor, might be supposed to have been a direct entrance from the quadrangle into the chapel; but the absence of any means of ascending to it, and all traces of such if there formerly existed any, render the supposition at least improbable. Opposite this arch is the double doorway of the chapel, one opening of which has for some unaccountable reason been walled up. The chapel is very dark; the windows are so narrow as scarcely to allow a man to pass through them, and are splayed upwards from the inside, an arrangement which, on account of the enormous thickness of the walls, secured a better light and increased their height from the ground outside—an advantage from a military point of view. The small chambers contained in the thickness of the wall on either side, and reached from the passage by a flight of steps, were private oratories; the jumbs of the windows which look into the chapel are splayed so that the occupants could see the altar. The ante-chapels on either side of the porch are pointed out to visitors by the castle keepers as "confessionals," an idea, perhaps, suggested to their fertile imaginations by the narrow openings into the chapel. Here and there the mouldings have been defaced and a few stones loosened; the floor is broken and uneven, only traces of the two steps shown on the drawings remaining, and the stone bench on

either side has been partially destroyed; but with these not surprising exceptions, the chapel is in a perfect state of preservation. It would seem, from an ancient record, that in 1344 the chapel-tower was still unfinished, and that an estimate was made in that year that it would take £128 to complete it, but whether it was ever finished or not there are no means of ascertaining. Considering its size and importance, Beaumaris Castle has little history, what it does possess being comparatively uninteresting. The chapel is now the only apartment of any size that remains intact, for which circumstance, to a great extent, may be thanked the zealous builders of last century who used the massive walls as a quarry, and removed the timbers of the floors and roofs, giving to the building its present low and unimposing appearance.—JAMES F. SINNOTT.

SKETCHES FROM WORCESTERSHIRE.

The interesting sheet of sketches which we have lithographed to-day are from a series made during the Architectural Association Excursion by Mr. John Bilson. Most of the examples shown have already been referred to in our description of the visits then made. The Salwarpe Court House Bay and old Timbered House next the "Swan" in High-street, Tewkesbury, are illustrated in Habershon's work on "Half Timber Buildings." A comparison of the two renderings, besides showing that the examples drawn have suffered during the last twenty-five years but very little change; indicate a decided improvement in architectural draughtsmanship, chiefly in the direction of technical accuracy. The stone gateway from Norton Manor, shown by the small sketch in the centre of our sheet, is a charming example both of general design and detail.

CHIPS.

On Monday, a petition was filed in the Walsall Bankruptcy-court, on behalf of Daniel Moore, builder and contractor, Stafford-street, in the same town, with liabilities amounting to £19,500, and assets not ascertained. Messrs. Cotterell and Carter, Walsall, are the solicitors acting in the matter.

We understand that the walls of the Society of Engineers' Meeting Hall, in Westminster Chambers, are covered with drawings of various recently-erected iron roofs, in illustration of Mr. Arthur T. Walmisley's paper, which is to be discussed at their next meeting on November 7th.

At a meeting of the committee for the completion of St. Paul's, Truro, held last week, it was decided to instruct the architect, Mr. J. D. Sedding, of London, to prepare working drawings for the first section of the scheme, including the extension of chancel, and erection of chancel aisles, parish-room, and vestries.

A loan art treasures exhibition was opened at Goolle last week, and has been well attended.

A vestry meeting was held at St. Saviour's, Larkhall, near Bath, on Thursday week, when plans by Mr. C. E. Davis, architect, of Bath, were accepted for the extension of the chancel of church by 22ft., the reseating of the nave, the removal of west gallery, and opening out of the tower.

The Countess of Jersey laid, on Thursday week, the foundation-stone of a new mission church of St. Thomas, at Pantyrrhol, Briton Ferry, near Cardiff. The building will be erected of native rubble stone, with Bath stone dressings, and will have an open-timber roof and seats of stained deal. The nave will be 48ft. by 24ft., and the chancel 17ft. by 15ft.; accommodation being provided for 150 persons. Mr. H. Francis Clarke, of Briton Ferry, is the honorary architect; and the tender of Mr. Isaac George has been accepted for the work at £312.

The will of the late Alderman Sir William Anderson Rose, of Upper Thames-street and Tooting, has been proved, the value of the personal estate exceeding £51,000.

At the Cambridgeshire quarter sessions on Monday, plans by Mr. W. M. Fawcett, of Cambridge, were adopted, for alterations to the grand jury-room at the Guildhall in that town.

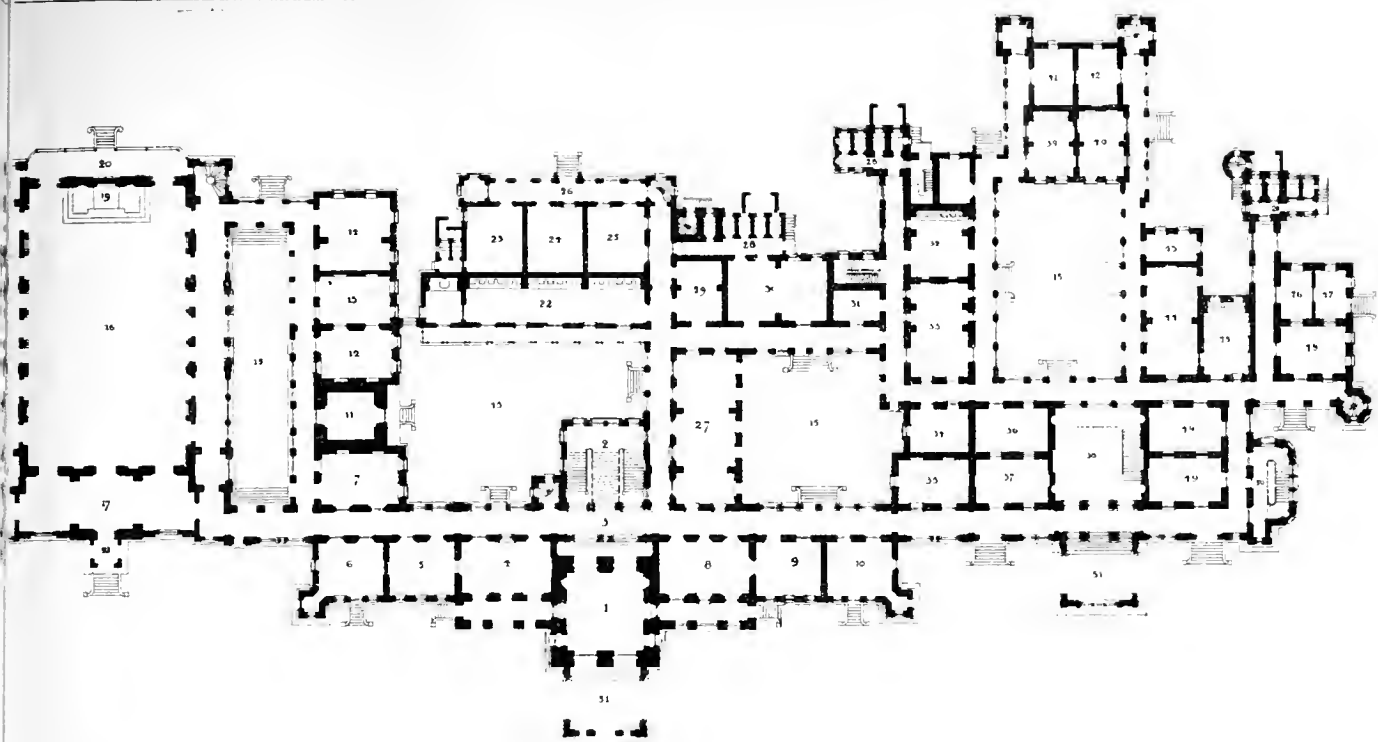
A stained-glass window was last week uncovered at the east end of north aisle in Epworth parish-church. The subject is "Christ, the Sower." The glass was supplied by Mr. W. H. Constable, of Cambridge, and the masonry and fixing carried out by Mr. F. Graat, mason, Epworth.

The Helston town council elected on Tuesday week Mr. W. Cates as borough surveyor, in succession to the late Mr. W. Eva.

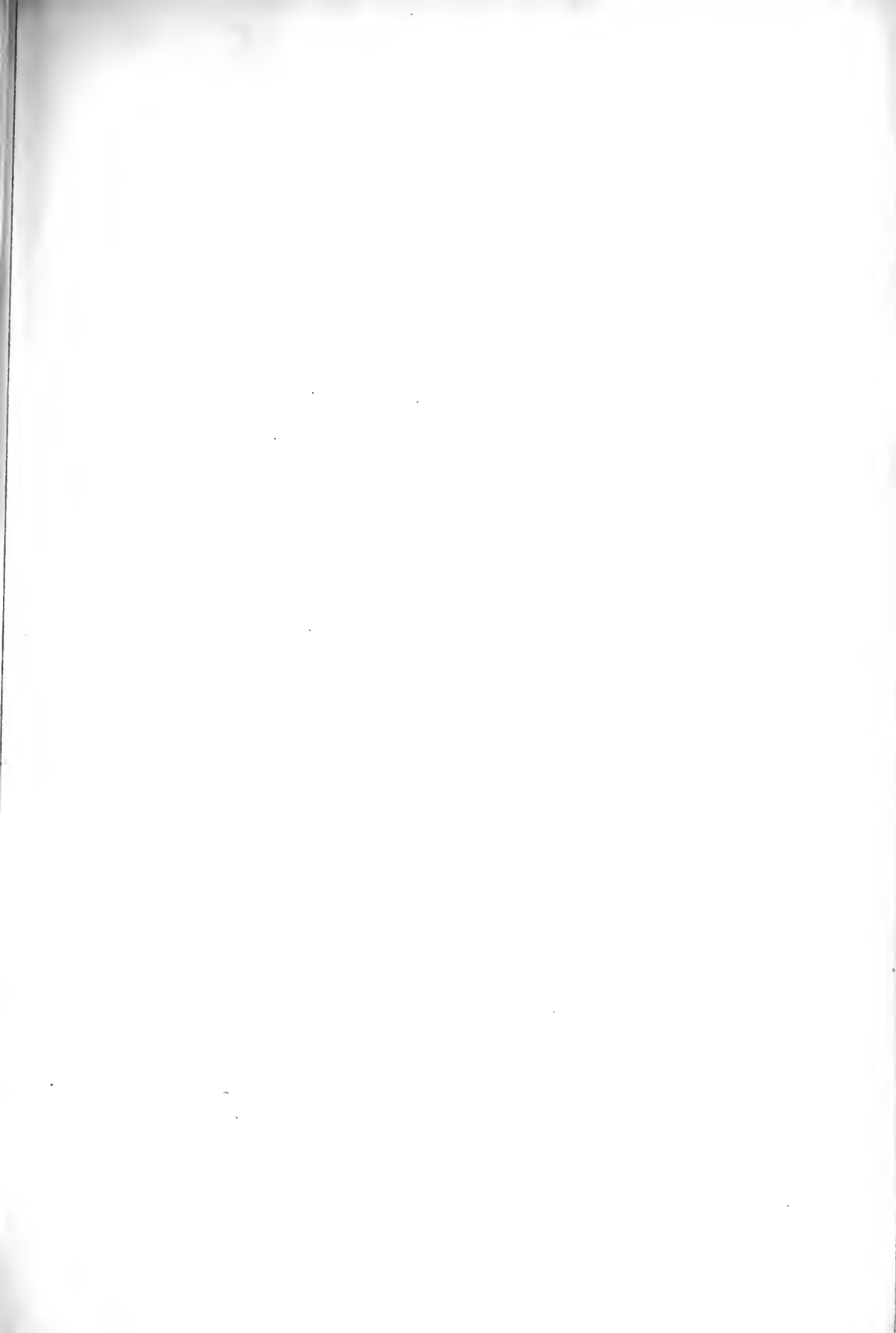


145. Lukshmi Vilas Palace, Bhopal, India. (1900)

LUKSHMI VILAS PALACE FOR H. H.









St. Nicholas Church - Wells - Norfolk

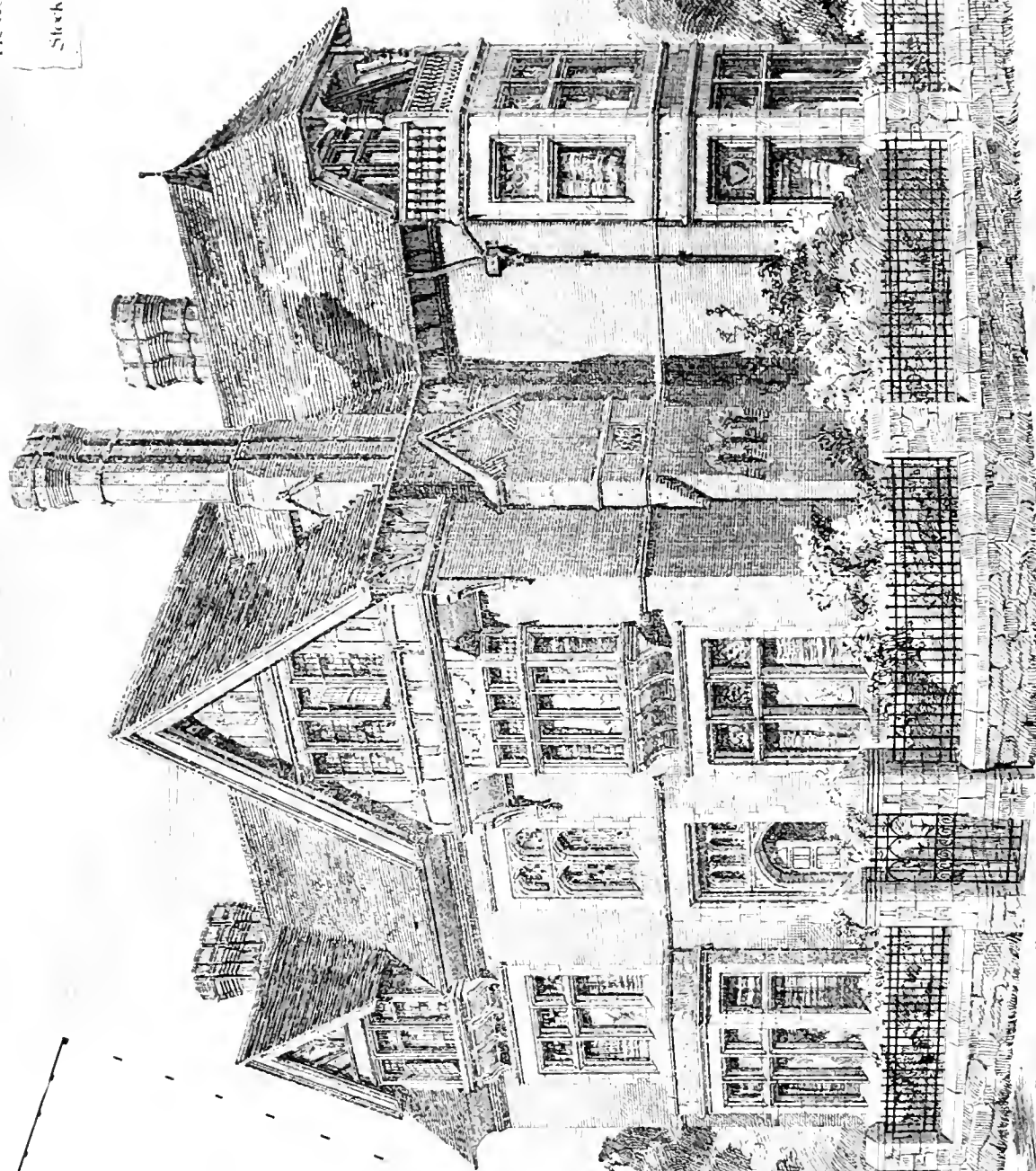
HERBERT J. GREEN ARCHITECT

Photo. by J. & J. Smith, 10, Abchurch Lane, London, E.C. 4.

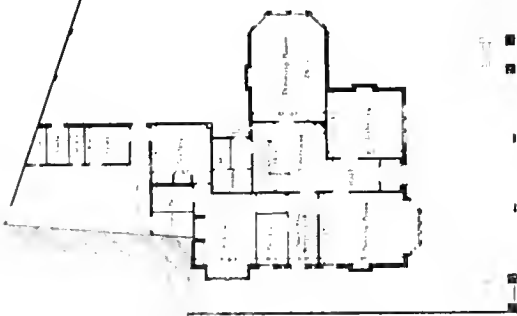
House at Leicester" for
Joseph Harvey Esq of
Stockdale, Harrison, Ash,

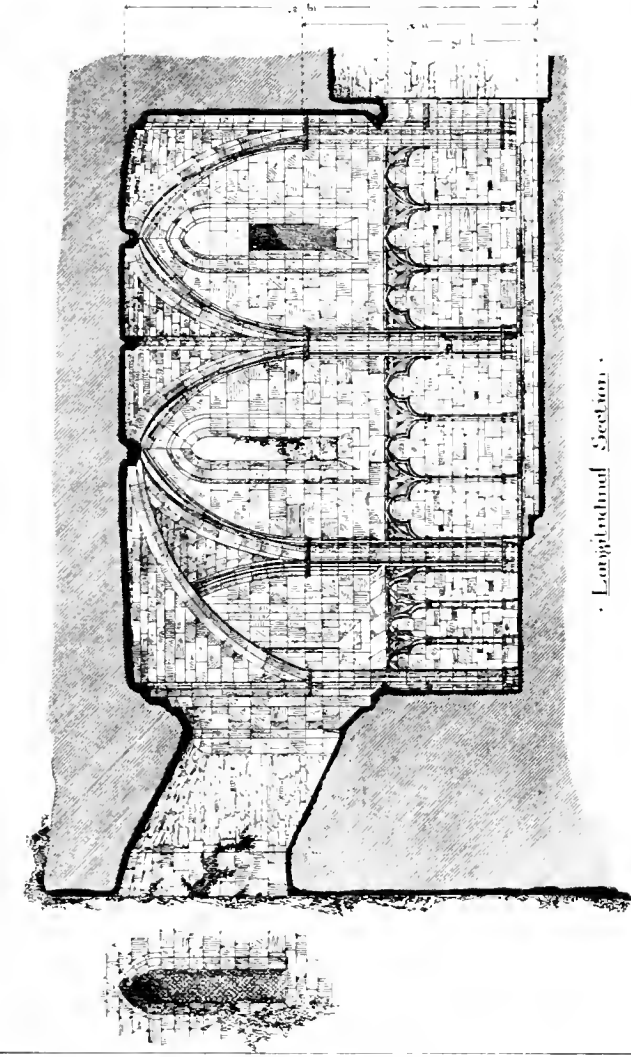


3 First Floor Plan.

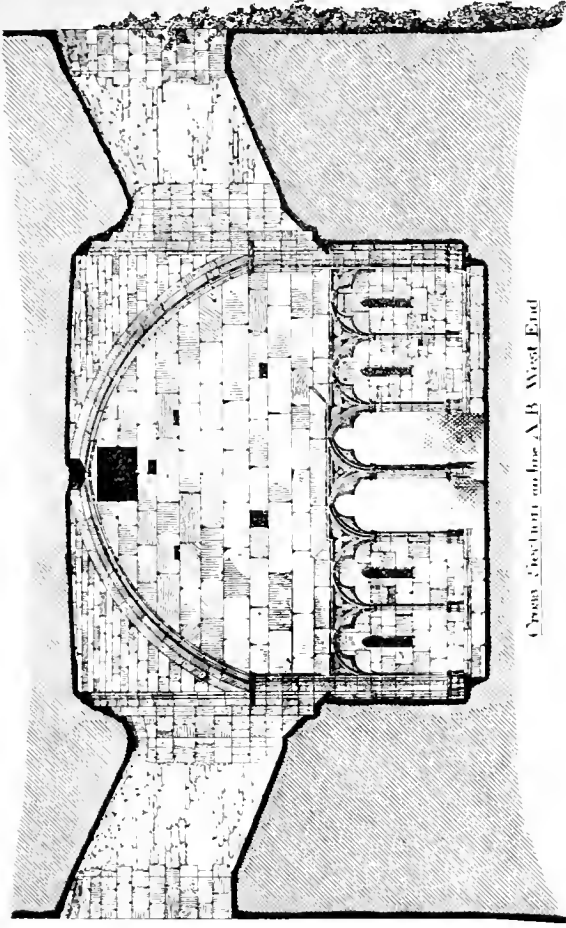


Ground Plan.



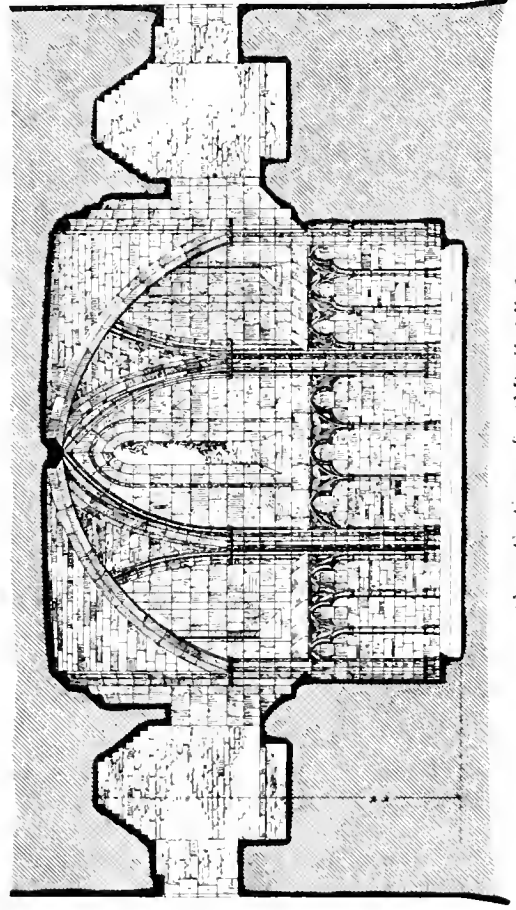


Longitudinal Section

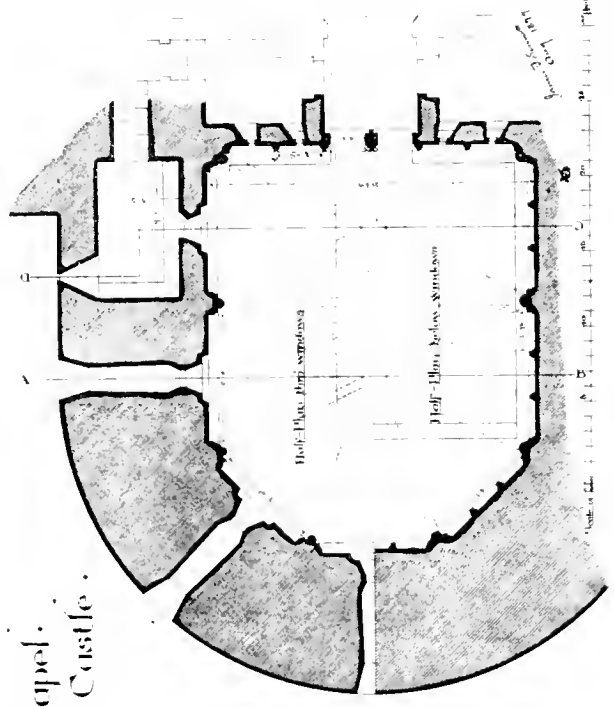


Cross Section on line A B West End

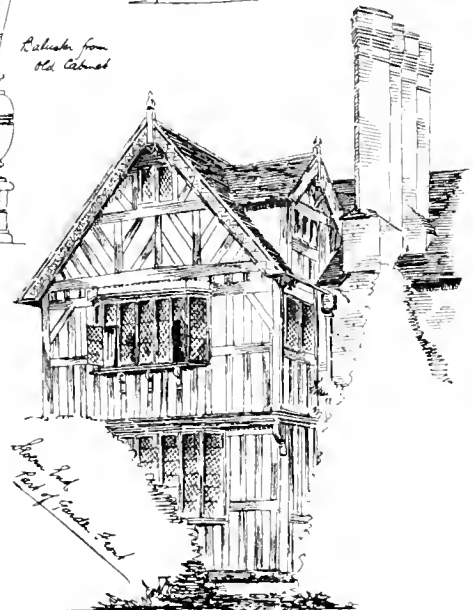
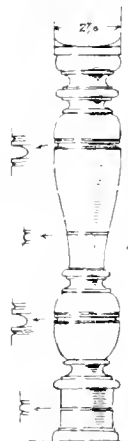
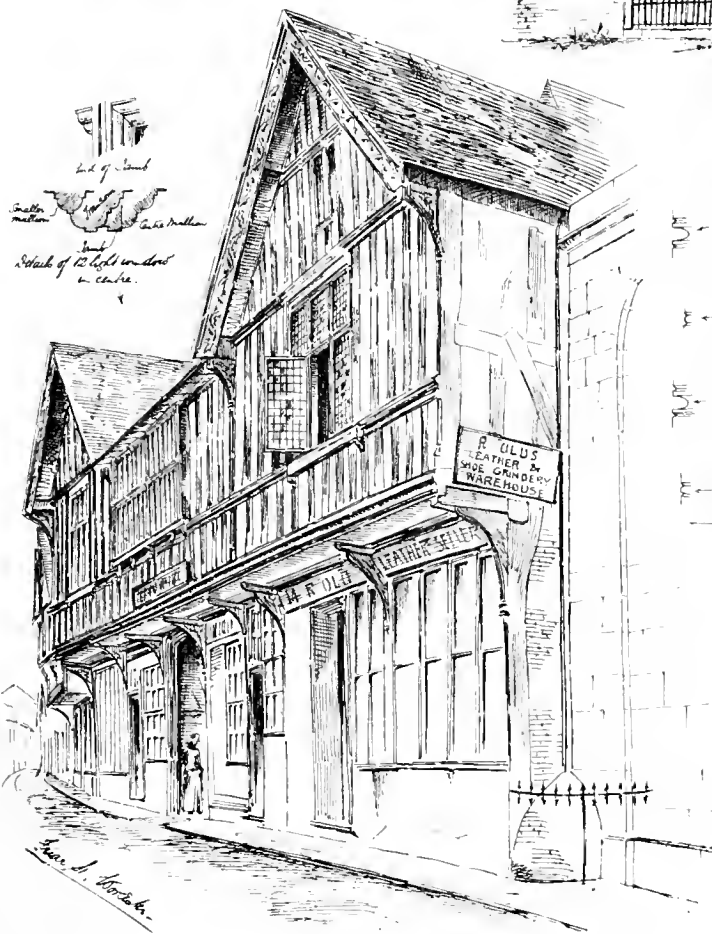
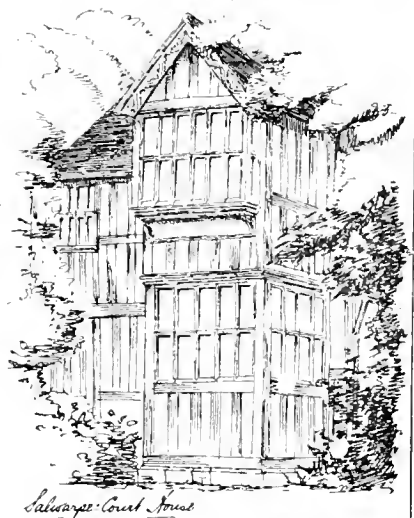
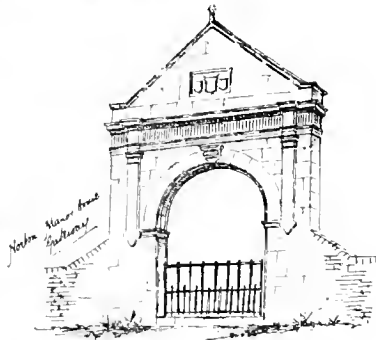
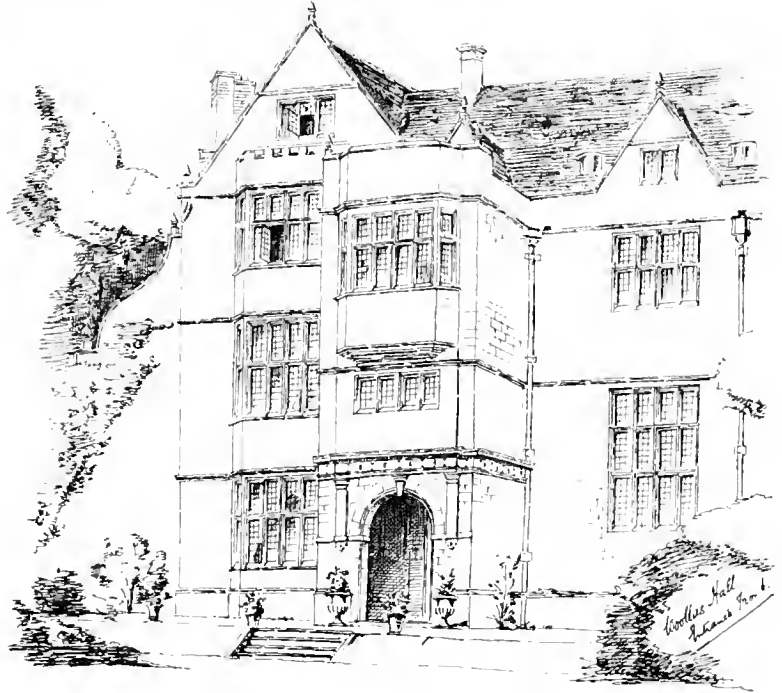
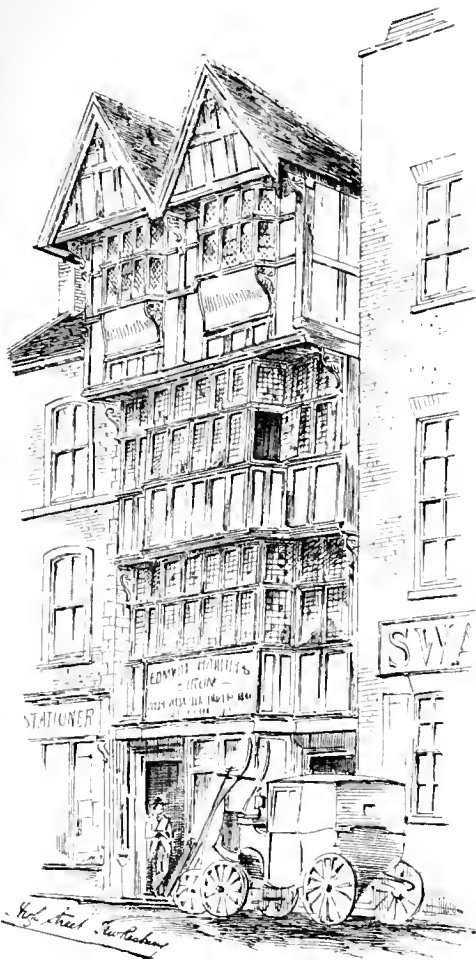
The Chapel of Beaumaris Castle



Cross Section on line C D East End



Architectural Association Excursion: 1881: Worcestershire:



W. H. R. 1881

Building Intelligence.

ASTON.—The foundation-stone of the new grammar-school, in Albert-road, Aston, was laid on Wednesday afternoon. The school will accommodate 500 scholars—250 boys and 250 girls—and has been designed by Mr. J. A. Chatwin, architect. The site faces Albert and Frederick-roads, near the Victoria-road entrance to Aston Park. On one side will be erected the boys' block, and the girls' on the other, the playgrounds and caretakers' house being between the two. The plan of each block is similar, and provides nine classrooms (32ft. by 22ft.), an assembly-hall (70ft. by 24ft., with open-timbered roof), a room for teachers, lavatories, and a room for drying clothes. The class-rooms will be arranged in two floors, the upper floor being approached by a commodious flight of stone stairs. The external elevation will be in the Gothic style, carried out in red brick with dressings of terra-cotta. An oak ventilating turret will be constructed over the assembly hall, and the caretaker's house will be so arranged as to command a view and give ready access to both playgrounds. The schools will be erected by Mr. R. N. Smith, of the Crescent, Birmingham.

FULMESTON.—The new church at Fulmeston, Norfolk, consecrated on Oct. 19, is erected in the middle of the village, and is intended to supersede the old church, which is very inconveniently situated, and which will, for the future, be used only for the burial service for funerals in the old churchyard. The new church consists of a nave and chancel, a south aisle with three arches opening into the nave, a vestry or chancel-aisle also on the south side, and shut off from the aisle and chancel by ornamental screens. On the north side there is a porch. The style adapted is Late 14th-century. The walls are built of flint with Bath and Ancaster stone dressings, and internally they are lined with red bricks, with patterns of white bricks. The roofs are open-timber roofs, that of the chancel being panelled and boarded. At the east-end there is a one reredos, with columns of polished alabaster. The pulpit is also of stone, and has an alabaster cornice and columns. The font is an old 13th-century base and columns, with the bowl renewed in accordance with the old: until now it has stood for many years in the graveyard at Croxton Chapel, Norfolk. The outer doorway to the porch is also old, and was brought from the old church at Fulmeston and reused. The seats in the nave and chancel are new (oak being used in the chancel). Those in the aisle were brought out of Croxton Chapel and refixed. The altar-table and rail were also brought from Fulmeston Old Church. The whole of the works have been executed by Messrs. Cornish and Gaymer, of North Walsham, Norfolk, under the direction of the architect, Mr. Wm. Bassett Smith, John-street, Adelphi, London.

HUDDERSFIELD.—The memorial-stone of the new Technical School and Mechanics' Institution at Huddersfield, was laid on Wednesday week. The central feature of the ground-floor plan is a large weaving-shed 68ft. 6in. by 41ft. 6in., for elementary instructions in weaving and designing, with a smaller one beyond for more advanced students. The first floor of the building, approached by these staircases, will contain mechanical, modelling, and physical science classrooms, and a large library, in connection with the reading-room and senior elementary classrooms. The second floor comprises the School of Art. The other wing of the building is arranged for elementary junior classrooms, and a retiring-room from the platform of a large lecture-hall occupying the majority of the Queen-street South front, 68ft. 6in. long by 36ft. 6in. wide, and 27ft. high. The building is designed in rather Late Geometric Gothic. The main walls will be built in extra hammer-dressed wallstone, with moulded ashlar dressings and double moulded mullioned windows, filled in the upper part with handsome tracery for the larger lights of the gabled portions of the building, with pinnacles on the angles. High-pitched roofs will cover the portion facing Queen-street South, with a large fleche containing a Boyle's patent ventilator, rising to a height of 34ft. to the top of the iron finial above the ridge, in addition to smaller louvred dormer ventilators, suitably placed, which serve to ventilate the

large hall and other parts. The slating will be green Westmoreland, with ornamental red tile ridgings and finials. The building will have a frontage to Queen-street South of 105ft., the returns to Princess and Page-streets being 135 each, and containing an area of about 1,600 square yards. The cost will be £12,000. Mr. Edward Hughes, F.R.I.B.A., has designed the buildings, which are being carried out under his supervision, Mr. Bates, of Nottingham, being the clerk of works.

LEEK.—West-street Wesleyan Schools, Leek, were opened on Monday after extensive alterations and improvements. There are now in all twenty-six classrooms for separate teachings, as against ten on the former arrangements. The larger ones are about 24ft. by 20ft., and the rest about 15ft. by 13ft. This increase will relieve the large room of the class-teaching on Sundays, and it will be used on that day for general assemblages of the scholars. The classrooms are connected with the large rooms by a system of electric bells, and the large rooms communicate similarly with each other. The additional buildings include also an infants' schoolroom, 21ft. by 33ft. The works have been carried out to the plans and under the superintendence of Messrs. William Sugden and Son, architects, of Leek. The contractor was Mr. C. S. Bromage.

NOTTINGHAM.—St. Ann's Church, Nottingham, has been enlarged by the addition of a gabled aisle, which runs by the side of the old north aisle, and it now forms a double aisle. The pulpit has been removed to the north reposit of nave arcade. The new work is of Bulwell stone for the walls, with Bath-stone dressings. The arcade has circular columns and flowered capitals, the arches being double chamfered. The roofs are open-timbered, each pair of rafters being trussed; the whole of the woodwork is of red deal, stained and varnished. Mr. Brown, of Birmingham, supplied the gasfittings. The contractor for the whole of the works was Mr. Henry Vickers, of Nottingham, and the architect was Mr. Robert C. Clarke, Journal Chambers, Nottingham. The additional accommodation gained is about 200 adult seats.

PROPOSED NEW ASYLUM, PARC GWILT, GLAM.—At the Michaelmas Quarter Sessions for Glamorganshire, held on Thursday, Col. Tuberville, on behalf of the asylum committee, reported that it having been decided to erect a new asylum at Parc Gwilt to accommodate 700 patients, the committee communicated with all the large asylums as to whom they should employ as architect. As a result they had engaged Messrs. Giles and Gough, of Craven-street, Strand, W.C., who undertook for £350 to prepare plans which should be the property of the committee whether they were used or not. The plans which were sent in three weeks ago were now upon the table. The chairman moved that the plans be considered at the next session, and that in the mean time a committee of the court be appointed to consider them. Mr. Gilbertson, in seconding the motion, asked for a thorough investigation of the plans, as the cost of the new asylum was likely to reach £120,000. Mr. Llewelyn asked whether the committee could obtain other plans in competition with those privately selected, to which the chairman replied that after the committee had reported, it would be the duty of the general court of quarter sessions to seek new plans or new architects. The motion was then carried, and a committee of a dozen members appointed.

WESTON BEGGARD.—The parish-church of Weston Beggard, Hereford, was reopened on October 13th, after restoration, at a cost of £1,200. The work has been carried out from the designs of Mr. Nicholson, the diocesan architect. The restoration comprises the rebuilding of the south wall and nave, and the rebuilding of the east wall, containing the chancel arch. New windows have been put in in the nave, and a new roof of open-timbered work, with carved oak bosses, put over the nave and the chancel. All the roofs are boarded and felt-covered, and encased with Broseley tiles outside. The portion of the chancel-roof over the sacristy has had an under-ceiling of moulded and ribbed panels put in, ornamented with carvings in oak, and moulded and battlemented cornices are run round the interior of the roofs. New windows have also been placed in the chancel. The gables of the church have been newly copped, and have had new crosses put upon them. All

the old masonry everywhere has been thoroughly restored and repointed. The restoration of the porch consists of restoring the masonry, resetting the arch, and putting a new open-timbered roof, with new copings. A new cross has also been placed over the porch. The walls of the nave and tower are laid with plain ornamental tiles, and a richer description of tile, of a very beautiful pattern, has been used in the chancel; these have been supplied from the encaustic tile works of Mr. Godwin, at Withington. New wickets, made of oak, have been placed at each entrance to the church. The stone dressings of the windows are of Luston and Ombersley stone, and the south wall is built entirely of local stone. The chancel steps are of Forest stone. The work has been carried out by Mr. W. Cullis, builder.

COMPETITIONS.

BIRKENHEAD TOWN-HALL.—The instructions to architects in this competition, have just been issued by the town-council. Following the Glasgow example, there will be two divisions in the competition, a preliminary one of sketch designs, open to all architects, and a final limited one. Mr. Charles Barry, of Westminster, has been appointed referee in both competitions, and will advise the council on the preliminary designs, selecting from them five, whose authors will be invited to compete in the final competition. The referee will also advise the council as to the order of merit of the second set of five designs, and as to the probable sufficiency of their estimates. In order to obviate the possibility of the sketch designs lodged in the preliminary competition being made use of by the competitors invited to take part in the final competition, such sketch designs will not be allowed to be seen by any one except the council and referee, and will be retained until the final competitive designs have been sent in. In the preliminary competition the drawings must be to a scale of 16in. to the inch, and will consist of plans of the basement, principal, first and second floors; elevations of each of the four fronts; a longitudinal and transverse section, a perspective view, and a block plan of the building filled in on the lithographed plan of site supplied to each competitor. All the drawings of the elevations must be executed only in pen and ink without colour of any sort, except (at the option of the competitors) a flat tint of Indian ink on the door and window-openings and on the roofs. The walls in plans and sections are to be coloured only in Indian ink, and the dimensions of each room are to be figured on the plans. No framed or glazed drawings will be received, and all geometrical drawings are to be on uniform stretcher mounts, 30in. by 22in. Designs not exhibited by "at least" as many drawings as specified, and to these scales will be excluded. The designs and envelopes, containing authors' names, will be numbered by the town-clerk in the order of their receipt, and will be known only by such numbers. Each of the final competitors will be paid £75 towards his expenses, provided he comply with the conditions for the final competition to be issued hereafter. The author of the design placed first in the final competition will be employed to execute the building as architect, unless insuperable obstacles may exist, of which the town-council, with the advice of the referee, shall be sole judges; he will be paid the usual commission of five per cent. on the work, as well as travelling expenses in visiting and directing the works, should he reside more than 35 miles from Birkenhead. The cost of the building, exclusive of internal fittings, furnishing, and decoration, is not to exceed £42,000. Stringent regulations provide against canvassing of the town-council or the referee, and the publication of drawings, photographs, or written or printed statements prior to the issue of the award in the final competition.

EAST LOOE CHURCH COMPETITION.—Thirty-three designs have been sent in for the proposed rebuilding of this Cornish church. They emanate from as many architects hailing from Penzance to Aberdeen. The 29th ult. was the last receiving day. Since then the committee have selected four. These are to be sent to a well-known London architect for adjudication.

OLDHAM FREE LIBRARY AND MUSEUM.—In this competition the Corporation have selected the design marked "F.S.A.," submitted by Mr.

Thomas Mitchell, F.R.I.B.A., of Oldham and Manchester, for the first premium, £100, and the design marked "Practical" (Messrs. Wright and Rawcliffe, of Burnley) for the second place, £50. There are 26 competitors altogether, and the limit of cost was £8,000. The permitted design follows the general arrangement indicated in the instructions, and shows, on the ground-floor, beyond the entrance hall, a library, placed centrally between reference-room and periodical-room, with floor on a level of 18in. above these apartments, and the spaces between are filled by screens, glazed with etched tinted glass, allowing of supervision. Projecting bays on either side of library form book windows and booking desk, and round the upper part of room is a book gallery. The officials will enter by a separate staircase from basement. The main reading-rooms are continuous with library. The chief or Union-street front of premises is occupied by central entrance, and on left the ladies' reading-room (although in practice "F.S.A.") says such an adjunct is not usually found a necessary or an economical feature), and on right a committee or curator's room. On the first floor are a museum and art-gallery, each 86ft. by 25ft., with a connecting hall, 33ft. by 20ft., all top-lighted by continuous lanterns. To improve the lighting of the upper casement side walls, the author provides short side lights, just below the ceiling, and has so arranged the overhanging of roofs as to prevent the admission through them of direct light. The basement shows a technological museum, patent-library, stores, curator's rooms and offices. The elevation shows a simple form of Domestic Gothic, with square-headed transomed and mullioned windows; no towers or pinnacles are proposed, but over the central doorway is a circular moulded head, with carved tympanum, and above it, in the first floor of gable, a projecting oriel. The suggested materials are Halifax pierpoints with ashlar dressings. The second permitted design is Italian in character, the principal feature being the roofing, which consists, up to Union-street, of three lozenge-shaped Mansards, the largest of which is in the centre. The effect in the front elevation is not pleasing, but it looks very well in perspective. Among other more elaborate but less suitable designs may be mentioned, "Canton," "Derby," and "Q.E.D.," neither of which could be carried out for the sum specified. A very clever water-colour in sepia is contributed by "Sepia," but the design is not suited for the purpose of the building. The sealed envelopes containing competitors' mottoes and names were opened by the town council on Wednesday.

CHIPS.

A new Bible Christian chapel at Probus, Cornwall, was opened last week. It will seat 150 persons, and was built by Messrs. Gerrans, of Tregony.

The parish-church of Merrow was reopened by the Bishop of Winchester on Tuesday week. A north aisle and a vestry have been added to the nave, the former providing accommodation for 100 persons. The north porch has been rebuilt, and a new east window put into the chancel, which has been internally decorated in Thirteenth-century style by Mr. R. Smith, of Winchester. Mr. A. W. Blomfield, M.A., of London, was the architect, and Messrs. W. Smith and Sons, of Guildford, were the builders.

One of the latest companies floated proposes to girdle the metropolis with a boulevard after the Parisian fashion—a broad roadway, with a circumference of 25 miles, planted with trees, and including tramways. Blackwall, Brixton, Shepherd's Bush, and Hampstead are the boundaries the boulevard would touch. The plans have been drawn and issued.

New municipal buildings at Llankeston, including a council-chamber and two committee-rooms, and a castellated tower, are approaching completion, and will be opened during the next fortnight.

The parish-church of Carlton-in-Cleveland, near Stokesley, was entirely destroyed by fire on Wednesday week. It is believed to be the action of an incendiary.

Mr. Bat Smith, of Spanish Camp, Texas, has patented an improved composition for preserving wood, consisting of eight parts of coal-tar, one part of crude carbolic acid, and three-fourths part of crude pyroligneous acid, mixed and heated, but not permitted to boil. The wood to be treated is placed in a vessel filled with the compound, where it remains until saturated.

"To a practical man with a taste for mechanics, and the bumps of construction fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *Engineering*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Two pence of all newsmen, or post free 2d—31, Tavistock Street, Covent Garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 5s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and SIXPENCE for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 49c. gold); To France or Belgium, £1 6s. 6d. (or 3fr. 30c.); To India (via Bimlasi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few double volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—E. and Co.—R. G.—C. B. K.—C. C.—J. B.—E. J. G.—P. E. Co.—J. C.—R. and R.—W. G.—A. H. I. Co.—R. F. C. Co.—N. F. L. Co.—A. M.—T. B. and Son.—M. J. C.—C. of H.—H. B. and E.—W. K. and P.—J. C. E.

"BUILDING NEWS" DESIGNING CLUB.

ERNEST, J. B. E. H., and OTHERS. (Due notice will be given of our future arrangements.)

Correspondence.

THE INDIAN PUBLIC WORKS DEPARTMENT.

To the Editor of the BUILDING NEWS.

SIR,—Your excellent article in the number for 21st October referred only to the recent reprint of Sir Andrew Clarke's minute under review. You did not touch upon the reductions which were the outcome of this minute, but which would never have taken place to the extent they did had he remained at the head of affairs. He suggested the reduction of about 100 men, and proposed a very good scale of pension for those who should be retired. The state of things which necessitated such changes was entirely due to the action of the Government of India. They had had resented to them, time after time, the inadequacy of the pension rules to clear off incompetent or worn-out men.

In 1879, the Government of India Council sent out specially appointed men, on a five years' contract. At the end of that time they should have either dispensed with the services of these men, or entered into a further agreement for a definite term of years; but they preferred to keep them on, and thus blocked the promotion of juniors. A remonstrance was sent up, and I am led to believe that the Government of India issued an intimation that the former should be kept on the supernumerary list. They did not do so, however, and continued to them all the privileges which had

been uninterruptedly enjoyed by the Department until 1879.

In consequence of the Afghan War, however, there was a great outcry for reduction, and, of course the I.R.W. must be operated on, and nearly 300 men were politely, but in very plain language, informed that if they sent in their resignations by the 31st December, 1879, they would receive the bonus and pension awarded. About 329 men were thus got rid of; possibly the odd 29 went voluntarily, but by far the larger majority sent in their resignations under pressure; and in some cases of very considerable pressure, too. Amongst these were many so-called "Stanley Engineers," whom Sir Andrew Clarke distinctly states could not be made to retire, as they were covenant men, and entitled to all the rules of pension, &c., of the Department.

You will thus see that injustice was first done to the Department by bringing in outsiders and placing them on the establishment rolls instead of on a supernumerary list, thus blocking the promotion of the juniors. A further injustice was then done to the Department as a whole by discharging such a large number compulsorily.

There are also a number of military officers in the Department, a few belonging to the Staff Corps, but by far the larger number to the Royal Engineers. Of the latter there are two classes—the old local army men, now borne on the Imperial list, and the Imperial R.E.'s; the former of the two entered the service with a view to being employed in the Public Works Department, or its then equivalent, and had certain rights which prevented their being turned out. Not so an Imperial Royal Engineer, however; he had only to take his turn of foreign service, and might have been relegated to military duty without interfering with his prescriptive rights. This course was not taken, however; but, as the *Builder* says, a two-years' holiday was given to a limited number on furlough pay, but counting for pension. This boon, had it been extended to the civil members, would have been eagerly availed of by many.

The fact, however, is that the present secretary to the Government of India in the Public Works Department took advantage of a necessary reduction to work for the benefit of his own corps, as he found that amongst the civil members of the department there was a large body growing up who would eventually come in for the higher appointments in the department, and that this growth must be nipped in the bud by reducing the numerical strength of the civil element. In fact, so great is his antipathy to the civil branch that in a report signed by him, which was published, however, without his sanction, there actually appeared a proposal to do away with it altogether, and to substitute Royal Engineers and natives entirely.

From the above you will see that the known discontent in the department results entirely from the action of Government; first, because the Government never keep the promises made, and are so constantly reorganising the department that the members never feel their prospects safe for one day; and second, because the civil body is entirely unrepresented, and in the hands of Royal Engineers, who invariably "reorganise" for the benefit of their own corps.

Until, therefore, the Government of India take steps to improve pension rules, and thus insure an even flow of promotion and guarantee that their interests are properly represented by men of their own body, civilians will not work with that amount of vigour which is necessary for the good of the department work, and the sooner that Government recognise this, the better for all concerned. In their discontent, however, Sir A. Clarke emphasises the fact that he has seen

NO DISLOYALTY TO GOVERNMENT.

FREEMASONRY AND THE "SATURDAY REVIEW."

SIR,—I thank "Veritas" for his letter, and regret that I cannot spare the time, nor even you the space, to allow me to write fully in answer.

"Veritas" quotes some good names of writers on Freemasonry, the true history of which has yet to be written.

I must admit that it is difficult to prove that lodges of speculative Masons existed before 1717, but there were certainly lodges of operative masons in the middle ages, and the connection with them of the Knight Templars can be easily explained.

Whether Freemasonry be ancient or modern, it is now a powerful society doing a great work, and is quite undeserving of the absurd and untruthful statements made by the Papal press.—I am, &c.,
KNIGHT TEMPLAR.

PRACTICAL EXPERIMENTS WITH CLOSET-TRAPS.

SIR,—I have always maintained that a round siphon-trap, to be safe, must be ventilated independently of the soil-pipe vent, which should also be full bore. I have not the least doubt, therefore, that under conditions described by Mr. Davies, Beard and Dent's ∇ -trap did lose its seal: it would have done so had the soil-pipe been only 5ft. instead of 45ft. long, the head vent being powerless in the matter; but, if Mr. D. will add to his trap B a 2in. independent vent-pipe, he will find that he cannot untrap it by means of his plug, although he will most probably do so with a pail of water, the effect of the two kinds of flushes upon the seal being very different.

Mr. Davies says, "This experiment proves at once that the ∇ -trap is unsafe for a valve-closet." Now, here Mr. D. is wrong. Having carefully watched the effect of flushes from a Underhay valve-closet upon the seal of a round siphon-trap fully ventilated, and having also tried a great many experiments with apparatuses, fitted up for the purpose similar to those shown upon page 540, which very nearly represent the action of a valve, I find that beneath a valve-closet is the safest place to fix a round ∇ -trap, and that it will there hold its seal secure; it is, however, when fitted in connection with other apparatuses very insecure.—I am, &c.,

DANIEL EMPTAGE, S.E.

Dane Hill Sanitary Works, Margate, Oct. 22.

P.S.—Mr. Davies has now a capital opportunity, in connection with his 50ft. scaffolding arrangement, to verify or otherwise his statement on page 356, that the rocking motion caused by draught up and down the soil-pipe acted upon the seals of siphon-traps in such a way that they became untrapped, and no doubt he will, when satisfied upon the point, reply to my letter upon the subject on page 408.

SIR,—In the above experiments, as described by Mr. P. J. Davies on p. 510 of your journal, it seems to me that, although the experiment on the ∇ -trap, as compared with that on the ∇ -trap, was relatively fair, yet the failure of the ∇ -trap can be accounted for as follows:—The cap G, Fig. 1, being taken off, and the plug removed from the right hand basin, Fig. 1, the rush of the water through the ∇ -trap would completely charge the outlet, as shown by K, Fig. 3, and the trap would thus lack the necessary ventilation to counteract its siphonic action; again, even though the outlet were not so charged, would not the air, drawn from the top of soil-pipe, follow the course of the water, to fill up the vacuum thus caused, and instead of increasing the atmospheric pressure at the outlet of the ∇ -trap, tend to draw from it and aid siphoning?

Now, it would be interesting to know whether the result would have been the same had a special ventilating pipe 1½in. diameter been carried from the apex of the ∇ -trap in an upward direction, and connected to the soil-pipe below the top, for the purpose of supplying a weight of air on the outlet side of the trap to equivoice that on the inlet or basin side—a point in connection with this form of trap which, in his fourth lecture, Mr. Hellyer considered so essential, and which is confirmed by the experiments of Dr. Lissauer (see p. 384). Mr. Davies mentions that when the cap G, Fig. 1, was replaced on the top of the soil-pipe, the action was precisely the same: this would seem to show that when the cap G was removed, in the first experiment, that the air supplied did not aid the ∇ -trap in preventing siphoning, and that what the trap needed was separate ventilation, as just mentioned. The experiment in a similar manner on the ∇ -trap did not cause it to siphon or wave out; but this is not surprising, as it is admitted its fault (if any) does not consist in its liability to siphoning.

The trap L, Fig. 3, siphoning out when B basin, Fig. 1, was discharged is a very likely occurrence, as it could scarcely be said to be ventilated, although the cap G was off, and to prevent its siphoning required the special ventilating-pipe from the trap to the soil-pipe, or, as Mr. Hellyer recommends, by a separate 1½in. pipe carried up above the trap B, Fig. 1, and then connected to soil-pipe, or left open in this case.

Mr. Davies says, as regards the consequences of the experiments, that nothing in them is new to him. In his account of the experiment with the Eclipse trap, he says:—"The water rushed through and left the water-seal broken ½in. below the dip." Now on referring to his former description of this trap, p. 354, I read, "This trap is a good and useful one." The two accounts certainly do not correspond, and I am at a loss to know how it can

have two such good qualities and yet be liable to have the water-seal destroyed at the first rush of water. Is it that this is new to Mr. Davies, or that the trap lacks something, and that, probably, special ventilation?

I presume that the ∇ -trap used in the experiment A, Fig. 1, Pullen's, was made according to Mr. Davies' model scale.

The outcome of this long-sustained and animated discussion cannot but be beneficial to both plumbers and interested outsiders, and the best thanks are due for this to Mr. Hellyer in the first instance.

As one of the outsiders, I write simply for information.—I am, &c.,
W. U. O.

WATER-TRAPS AND SIPHONS.

SIR,—In reply to Mr. Buchan's letter, let me tell that gentleman his patent being dated 1875, the £ 00 stamp duty has to be paid next year. Now, of course, it will answer Mr. Buchan's purpose very well to entice me into argument, and find out whether his patent is worth anything or not; however, I am not disposed to be any man's patent agent for nothing; but as he is very anxious that the winner of the palm should bear it, I quote the following from an old book many years anterior to the date of his patent:—"I have the above cesspool or receiver placed or formed so as the bottom of the receiver may be some distance below the bottom of the sewers, so as the sewerage or heavy matter may have a fall. This fall causes an eddy or irritation of heavy matters, which will continually be in motion under the mouth of the siphon; this motion will cause the stone, sewage, or other matter to pass off in the siphon." Farther than this, I have seen a drawing with precisely the same action as that in Mr. Buchan's trap, and that is dated nearly ten years earlier.

In reply to the query whether I have drawn my trap (Fig. 100) upside down to make it appear like his (Fig. 101), I must express an opinion that it is a very great piece of audacity on his part, as my patent is dated 1876, exactly as shown in my drawing, whereas his half ball-trap is dated 1875; so that if anybody is a copyist, it is himself.

With reference to Jennings' trap, the ball is quite independent of the water, as it rests on the aperture S, as shown in Fig. 103. In conclusion, I cannot help thinking that Mr. Buchan is not a careful reader, and that he is simply asking me for information, and as my time is fully employed, I must decline to answer any more of his letters unless privately, as even this, his last letter, is only in the interest of his own trap, and by this answer I have shown plainly that he need not be too certain that he is entitled to the patent at all.—I am, &c.,

P. J. DAVIES, Hon. Mem. A.S.P.

CHIPS.

A new mission-house is about to be built at Sowerby Bridge, near Halifax. The contract for masonry has been let to Messrs. George Sutcliffe and Son; that for joinery to Mr. George Hoyle, of Millbank, and that for plumbing, &c., to Mr. J. Stafford, Sowerby Bridge.

It is reported that the Sultan has given orders for the remains of the Temple at Jerusalem to be restored, and the surrounding place to be cleared of all rubbish. On that place stands the Mosque of Omar, the revenue of which has always been forwarded to Constantinople; but for the future it is to be appropriated for the above-mentioned purpose.

The rural sanitary authority of the Barnsley Union, at their last meeting, approved of plans prepared by Messrs. Dixon and Moxon, architects, Barnsley, for new cemetery, chapels, curator's house, and the laying out of four acres of land in Hunningley-lane for burial purposes for the parish of Ardsley, near Barnsley, the outlay on which will be about £2,400. The same architects have also just commenced a similar work for the Craggstone burial-board, which is to cost about £1,800, and it is expected to be completed in May next.

Mr. Lewis Angell, engineer and surveyor to the West Ham Local Board, has been awarded a *honorarium* of 200 guineas, with salary increased to £800 per annum, without any interference with his private practice. Mr. Angell declined £1,000 per annum with limitation to consultative practice.

One hundred and forty-nine applications were received for the post of surveyor to the city of Hereford. The committee selected the following five gentlemen to attend the special meeting of the council, held on Monday, the 24th inst.: Messrs. J. Parker, Bridgwater, borough surveyor; T. Tyler, Hereford, assistant surveyor; A. Holt, Beverley, borough surveyor; E. Kenworthy, Handsworth, surveyor to local board; W. L. Franklin, Reading, assistant surveyor—when Mr. Parker was elected. The salary is £250 per annum.

Intercommunication.

QUESTIONS.

[6738].—Working and Detail Drawings.—Never in the course of my employment having an opportunity of learning or studying working and detail drawings connected with the building trades, shall be obliged if some reader of the *Building News* will inform me if there are any books published on the subject that would teach me?—JOURNEYMAN PLASTERER.

[6739].—Window Tracery.—Are there any cheap books on tracery? If so, will someone kindly give address of publisher and price of book?—E. C.

[6740].—Concrete Houses.—I should be much obliged for information or hints on this subject. I want the floors and staircases (as well as the walls) to be of concrete throughout, and self supporting. Some years ago I prepared for an architect whom I was then assisting, designs for miners' cottages, in which the floors were of concrete, some four or five inches thick, and without iron joists in them, and he assured me they would be perfectly safe, but I did not see the buildings, and have had no other acquaintance with this kind of work. I should like to be told what is a fair thickness for walls, floors, and staircases, and how the latter are best constructed; also the best materials, and the cost in comparison with brick and wood in a country where gravel is fairly cheap. Will cement concrete stand heat, or must chimney openings be lined with brick? I should finish the stairs in cement, and form architraves and skirting of the same material, building in, I suppose, wood blocks for fixing locks, hinges, &c. The floors would be covered with parquet, or with pitch-pine strips laid in patterns.—D. LEE ET DECORUM.

[6741].—Mounting Engravings, Tracings, &c.—I have for years past been collecting the most choice plates from *Art Journal*, *Illustrated London News*, *Illustrated Dramatic News*, *Graphic*, *Punch*, *Vanity Fair*, &c., &c. (the *Building News* plates I bind). It was my intention, long ere this, to properly catalogue them, and put them in a scrap book or scrap-books, but upon looking through them, I find I have so many, in fact, I have created a "Frankenstein," and am frightened; yet, on the other hand, they are useless in their present state; perhaps some correspondent who may have "gone in" for something of the kind could give me the benefit of his advice, as to the best and quickest way of putting them into a scrap book, and whether there is any kind of scrap-book made for this sort of thing. With respect to tracings, which are purely architectural, if I use gum, I fear it will be an awful job. Is stretch any good? Having never done anything of the kind before, I am somewhat at a loss. How about paste, and also should I paste them all over (some are very large), or only round the sides, in case I use paste? Perhaps another collector will come to the rescue and oblige.—HAMILTON IS A FIX.

[6742].—Compressibility of Air in Sewers.—Suppose an air-tight pipe sewer, 2½in. diam., 1000 yards long, and having 2½in. fall from end to end. The top end is completely covered and sealed by water, which is occasionally discharged into the pipe-sewer, by opening a sluice, to flush. How long time would elapse, and how far would the water travel in the pipe before the air be disturbed at the lower or debouching end of the pipe-sewer, which is always open? Can this be calculated? Suppose the same pipe, not air-tight, say it is built of bricks and mortar, and has many branch sewers and drains from dwellings running into it, would not the pressure of the flushing-water—which always seals the whole diam. of the upper end of the pipe, while the lower or debouching end is always open—free air through untrapped openings and weak traps for a given time, and on subsiding draw air into the pipe? Suppose the same pipe was not covered or sealed by water when being flushed, and the pipe running half full for a time, how would this act upon the air in the pipe-sewer, from the moment the sluice is opened until the last drop of water leaves the pipe at the debouching end? The wind blows up from the debouching end, but forget this in answering these questions. My impressions are:—1. That air would be pushed before the flushing-water, and escape from untrapped openings and weak traps before the air be disturbed at the opening or debouching end of the pipe. 2. That air would escape at the top end of the pipe for a few minutes directly after opening the sluice. 3. That a very little air, if any, would be pulled in the pipe during the steady run of the water half filling the pipe, but that air would be pulled in when the water subsided. 4. That in sewer-pipes under these conditions air should not be bottled up by trapping street-gullies, and not providing for ventilation.—SANITATION.

[6743].—Liability of Yearly Tenant.—For what dilapidations is a farmer liable, who has held a farm within fifteen miles of London for fifteen years as a yearly tenant without there being any sort of agreement whatever? Is he liable for inside and outside painting of house, whitening ceilings, papering walls, renewing sash lines and broken glass, repairing tile and wood floors, repairing roofs of house and buildings, renewing decayed wooden eaves, spouting, and fencing, making good defective weather boarding and tarring same, repairing and pointing up brickwork, &c.? I am told the custom of the district, or estate, is for the tenant to pay for labour, landlord providing materials. With the exception of providing a few new gates, nothing has been done during the tenancy, but in the absence of an agreement can this be enforced? Again, I am told that if the tenant be at all liable, it is only for dilapidations during the last year, but how is the amount of this to be ascertained with buildings in such a wretched state? Should not the landlord or his agent have applied to the tenant to carry out the repairs from time to time, or have done the repairs himself? I have Fletcher's "Dilapidations," which is a valuable book, but is somewhat vague on this point, and therefore I should be obliged if any of your numerous contributors could give me some clear information on the subject.—SERIA.

[6744].—Measuring Hay-Ricks.—Would some practical reader kindly give me a few hints on measuring hay-ricks, or the name of a good book on it, and oblige—KANYARA.

[6745.]—**Fines**—In the event of a contractor failing to complete his contract within the specified time (without extension of time being granted by the architect) can the fine usually mentioned in the agreement for such incompleteness be legally enforced?—**NODLEY**.

REPLIES.

[6679.]—**The White House** is so-called because it happens to be painted white. It was built, says Johnson's Encyclopædia, between 1818 and 1829, of freestone. It is 170ft. long and 85ft. wide, and two stories high.—**R. M. TUTTLE**, Providence, R. I., U.S.A.

[6681.]—**Beer-Stone**.—The question is asked whether Beer-stone is a good workable material; and whether it has been largely used in church building as interested folk assert it has been. There is no doubt of Beer being easily worked. Reviewing South of England soft stones, it is more cheaply masoned or carved than Ankerst, Tisbury, Ketton, Ham Hill, Painswick, or Doulton. It is readily worked than Caen, and almost as cheap in the labour that has to be put on to it as Bath. Beer-stone is as much like Church (without the abominable "pins" which occur in the latter) as any material I know; but is, I think, a better stone. I certainly know no more economical stone in the market for pits, font, arcades, &c., &c. I had a fine block of it delivered at my yard only yesterday, sound as a bell, and weighing over seven tons; it will be cut up into a reedus for a Cornish church. I do not know how largely the company assert that it was used in former ages; but of the one thousand and odd fifteenth-century churches existing in Devonshire, Beer-stone was, without a doubt, the material used for dressings in three-fifths of them. At Exeter's cathedral a great deal of the most delicate interior work is of Beer. The porch screens, the marvellously beautiful sedilia, whose light masonry stands to-day as if its stonework since William de Montacute carved it in 1143; a window, and without a rival in the country for grace and elegance; Bishop Oldham's ornate little chapel, in the south-east of the choir, simply one mass of Late perpendicular detail; the last-mentioned rich Speke Chapel, the exquisite Late Early English arching in the Lady and neighbouring chapel, &c., &c., are chiefly wrought out of Beer-stone. In the Devonshire churches generally, the roof-screens are almost invariably of oak; one exception to this rule is the singularly fine one at St. Mary's, Totness. This grand perpendicular screen, and the adjacent pardoys, are of Beer-stone; whilst the windows and dressings of very many West country churches are of Beer-stone. I am not prepared to say whether it stands atmospheric influences better than Bath. The oldest genuine Beer-stone outdoor masonry that I know is the quaint Guildhall front, in Exeter's High-street. This was built in 1591, and since then, I believe I am right in saying, has not been touched. The detail is in a somewhat decayed state, but it speaks well for the stone that it has stood in place, and has done serviceable duty for 287 years. Readers will remember my friend, Mr. James Crocker, F.R.I.B.A.'s carefully-measured drawing of this front which was published in this journal in 1874 or '5. A large fire occurred a fortnight ago immediately in front of the Guildhall all in question, by which four houses were consumed. One of these was formerly an old inn called the "Eagle." I have seen a reference made to it dated 1437. In 1472, during the mayoralty of Hugh Gernyn, it was ordered that "the Eagle over against the Guildhall shall be employed and put to the use of a Cloth Hall, and that all foreign clothiers resort to the cloth with their cloths shall sell the same in that house, and not elsewhere within the city." Afterwards the building became a famous book-shop, known during the latter part of last century, far and wide, as "Dyer's Library." The street is very narrow thereabouts, but the devoting flames which unfortunately consumed this historical old house with its three neighbours, happily did no harm to the Beer-stone facade of the venerable Guildhall opposite. Why Beer-stone fell into disuse during the past two hundred years I have no idea, without it may be attributed simply to the fact that the land on which the quarries are situated belonged to folks with ample means, who had no particular stimulus there for pushing it in the building market. Further, it is only within the last few years that the quarries have been in communication with the railway; from this they are now some 2½ miles distant. I believe the stone lies, in the open quarries, in some eight or nine beds. The uppermost one of all is burnt for lime. Amongst my masons the fifth and seventh "spotty" beds are the favourite ones.—**HARRY HEMS**.

[6685.]—**Variation of Compass**.—If "L. L. U." will refer to the *PHILADELPHIA VIEWS*, Vol. XXXIX, p. 662, for 3rd December, 1881, he will find a method of obtaining the variation in the most accurate manner if he is able to obtain the correct Greenwich time, which has the most decided advantage of being worked in daylight, and therefore decreases to a minimum the chances of error. The best article I know of is in the "Land. Brit."—**W. G.**

[6707.]—**Softening Putty**.—I find in an old note-book the following:—"A red-hot iron will soften or remove the hardest putty." I have never tried it myself.—**C. F. M.**

[6708.]—**Plumbers' Solder and Smudge**.—The information desired can be obtained from a letter in the *BUILDING NEWS* of June 18, and one of a series of papers on June 24 in the same journal, both being by Mr. P. A. Davis and published this year. The book mentioned last week in *Woods's Series* should have been "Buchan's" not "Buchan's."—**H. M. LACHLAN**.

[6709.]—**Run full Sewage, &c.**—Besides the work given in "G. H. G." last week "F." might study the two works by Mr. G. Drysdale Dempsey, C.E., published in *Woods's Series*:—"The Drainage of Towns and Buildings" and "The Drainage of Districts and Lands"; these can be had separately or in one volume, the price of the latter being 3s. 6d. Also "Drainage and Storage of Water" by Mr. J. Bailey Denton, C.E., a criticism wherein will be found in the *BUILDING NEWS* for Sept. 4, 1874, and "Remarks on How to Estimate it" in the same journal, Aug. 16, 1878. Mr. Dempsey gives us an extreme a fall of two inches in twenty minutes on a hot July day.—**H. M. LACHLAN**.

[6713.]—**Shoring**.—I am much obliged to "G. H. G." for his answer. It occurred to me that there might be

some Institute Paper at least on the subject, or else on Damp-rooms Structures. I mention the latter because the case I have in view might be considered analogous. It is that of an external wall, about 35ft. high, supporting a mansard roof. It is proposed to remove all the middle portion of the wall, leaving the upper 10ft. and the lower 5ft. remaining. On the lower portion iron columns will be erected, 10ft. apart, supporting a girder, which will carry the upper portion, and consequently the roof. Knowing, from various instances of falls of old houses and walls, that old brickwork is treacherous enough to deceive experienced men, I am more anxious to know what dangers to be on the watch for, than to take up this valuable column with the discussion of principles already taught in textbooks on mechanics. I cannot think that carelessness can have been the sole cause of those falls of old walls which have happened under the very eyes of competent architects; and if I can be referred to some book, or treatise, I shall esteem it a favour. I am unable to attend Mr. Roger Smith's lectures.—**W. G. M.**

[6718.]—**Back Pointing in Tiling**.—I should say the inside pointing; this is, however, only an opinion.—**HUGH MACLACHLAN**.

[6719.]—**Specifying Painters' Work**.—It would be difficult for anyone to say which is the best kind of paint to use, there being so many various kinds in the market, most of which I believe are very good. I would not remove old paint on stucco unless very badly blistered, if a few blisters are found, break and stop them. If new work three or four coats; if old, two will be sufficient. Do not paint repaired stucco for at least six months, and if it has been done in autumn leave the painting for another year. See answer to 6715.—**HUGH MACLACHLAN**.

[6721.]—**Seats for Lecture Hall**.—It depends on the size and plan of the hall. If small, there is no better plan than to have the seats parallel and facing the platform. If it is wide, with, say, four rows of seats, arrange the central ones as last, but turn the side ones at an angle towards where the speaker would stand. If any seats are at the sides of speaker, turn them inwards at right angles to the central rows. In very large halls the seats have been placed in concentric rows, the position of speaker or some point behind being used as the centre. Avoid where possible a part of the auditory looking another in the face unless at least 2½ ft. apart, also have no concentric rows of small radii, as this serves to jam, so to speak, the knees of those using them.—**H. M. LACHLAN**.

[6725.]—**Draughts**.—These are caused in the case mentioned by the difference of the internal and external temperatures. The warmer air of the room strikes against the glass, which being of a much lower temperature owing to the cold outside, chills the warmer air and causes it to fall on any person in the room situated below the window or skylight. To remedy, use double windows as in Russia and Germany in the winter, or at least double glazing with an air space between about 1½ in. wide. With skylights it is better to have two where possible, an inner and an outer. By this means a body of air of medium temperature is interposed between the interior and the exterior.—**H. M. LACHLAN**.

[6726.]—**Girder**.—Would "H. D." please to state whether his girder is supposed to be loaded on the upper or lower boom (top or bottom). I believe it is structurally incorrect, but if he gives me the information asked for I will try to answer the question and show improvements in girder. He may work it out himself if he will study any of the works given in my answer to No. 6674, or perhaps better still, one of those mentioned by "G. H. G." in answer to some question on the same or a similar subject in the present volume of the *BUILDING NEWS* (since June); my copy is not at hand or I would mention the number. I do not believe there are near one hundredth of the books on the subject given by P. Playfair. The "Graphic method" properly so called appears to have been introduced in 1857 by Professor Maxwell.—**HUGH MACLACHLAN**.

[6727.]—**Window Lights**.—No, nor ever likely to be so, the present law being considered by authorities already too stringent.—**H. M. LACHLAN**.

[6728.]—**Drainage of Towns**.—Read the books referred to by "G. H. G." and myself in answer to No. 6709, in last week and this.—**H. M. LACHLAN**.

[6730.]—**Asbestos**.—Atmospheric burners must be used. Asbestos fire with eleven jets, heating a room about 14ft. by 12ft., consumes 3½ ft. of gas per hour when full on. Oven, 1600, by 18 in. by 24 in., with twenty-four jets, consumes 24½ ft. per hour, and circular burners, 3 in. diam., for kettles, &c., 10ft. per hour. Asbestos fires are doubtless more expensive than coal, but for convenience, cleanliness, and saving of labour, there is no comparison between the two. For cooking, I think gas will be found the cheaper, and it requires much less skill in management. Great care, however, is required in making proper provision for carrying off the fumes, as the heat generated is insufficient to make a good draught in the flue. With asbestos fires it will be found that when turned partly off they make a roaring noise. To obviate this, I have had a separate service laid to these fires from the meter, and a stop-tap fixed near the meter, so that they can be regulated from that point. A separate service is also a convenience, because it insures a regular supply for lighting. For sitting rooms in general use, coal fires are doubtless preferable, but for offices, bedrooms, and rooms in occasional use, asbestos fires are invaluable.—**J. D. TAYLOR**.

[6731.]—**Old Crosses in West of Cornwall**.—Scarcely all the ancient crosses, with which this remote part of England abounds, are of grey granite. In some instances the material seems to have been brought a considerable distance, as for instance in the case of that at Pridmore, which stands at least ten miles from anywhere where granite is procured. It is a tall cross over 5ft. high, and is of the common shape assumed by Cornish crosses, i.e. a tall upright shaft surmounted by a circular head. Upon the face of the cross. In some instances there are also sculptured figures. Amongst the crosses of this local shape, I may mention those existing at Anjarden, Brance, and Tremegon Hill near Sancerre, and three at Sancerre itself. Also at Trevaun, St. Paul, Velensayer, Boskenna, Nun Carrog, Cronz-an-wra, and Trevoargance, all little places near St. Buryan, and one, too, at St.

Buryan, as well as at Trevillyn, and at Maen, near Sennen, and also at Sennen itself. At Penden, near St. Just, and at St. Just, at St. Erth (2), at Hea, Tremebath, Trengwainton Cairn, and Pore-an-Grow, all in the neighbourhood of Madron. There are others, and two exist at Madron; on St. Michael's Mount, at Phillack, Illogan, Gwinnar (2), Zennor, Trengwainton, Bosworth, and Penzance. There are more, again, at Brumman Cairn, Treowen Hill, and Rosejarn, near Lelant, and upon the roadside between Lelant and St. Ives are others. At Lelant itself there are three more. At Camborne there are two. Between Carnal-green and Clowance, and at Clowance also old crosses are to be seen. At Connor Down, near Gwinnar, is another, and at Cury, Rosemorton, near Gulval, Whitecross, near Ludgvan, Trewheld, near St. Hilary, and at Gwythian there are old crosses also. At Helston there are two, and the same number at St. Levan. At Chygydden and at Rosepheth, both near St. Levan, are others, and there is one at Penbeagle, near St. Ives. All of these assume the same definite outline. Some are more fragmentary circular heads, others are perfect. The finest, perhaps, as regards height, is at Cury Churchyard. It is 9ft. high. The most elaborate is in the graveyard at Sancerre. It is between seven and eight feet high, has a figure carved upon its uppermost part, and is otherwise highly ornamental. Besides these crosses of purely local shape, there are many still to be met with which assume the Latin form. Amongst them may be mentioned remains at Trefere—St. Paul Down, Ludgvan, Bosworth, and Tremethick, near Madron, at Chyowne, and at Trengwainton Down, both near St. Buryan, and at Hucher Drift by Sancerre. Also at Escalls, near Sennen, Mether Uny, near Helston, Landewednack, St. Keverne, and there is one upon the Breaze road. Whilst these crosses are all more or less characteristic ones, there are others in Western Cornwall whose forms are unique in the locality. The fine cross (10ft. 6 in. high) in St. Ives churchyard, and a similar one at Lanteglos (10ft. 6 in. high), are unlike anything else that I know in the county, and so is the pinnacled and canopied sculptured head of a highly ornamental cross preserved at St. Michael's Mount. Again, in the churchyard of Gulval, and in St. Mary's churchyard at Penzance, there are crosses of curious form. In a garden at Helston is one of rare design. It was found many years ago at Trevaun, in the parish of St. Kew. I believe that the above embraces all the not resting old granite crosses down "west along," but possibly there may be a few others which have slipped my memory.—**HARRY HEMS**.

[6732.]—**Down-Draught in Chimneys**.—Having had one that baffled the skill of four chimney doctors, and was pronounced an incurable (for when the wind was in the S.W. down came the smoke), I then called on Mr. Shorland, the inventor of the patent Manchester grate and several other useful systems of warming and ventilating, who at once cured it. The most remarkable thing in connection with this cure is that it never smokes into the room now, and when the wind is where it used to be when it filled the house with smoke (for it literally blew the fire out of the grate into the room), now it burns the brightest, still there is no great consumption of fuel. My chimney is in an outside wall against the S.W., in a very exposed situation, no houses being near for many miles.—**JOSSEPH MEE**, Brookside, Whalley Range, Manchester.

[6737.]—**Pull on Casting**.—The following will probably aid in answering "Severne's" question. First, taking the weight of casting into account, let the pull at B be called P; the load at C, W; the horizontal distance BC, x; and the vertical distance AB, y. The part of the casting AB, being vertically over A, does not tend to turn either way, and may be neglected, but the part BC the weight of which is called w, tends to turn in the same direction as the load, thus assisting it, and should be taken into account. See diagram in last week's issue. Now, taking the moments of the several forces about A as a centre, we obtain—

$$\text{Moment of the load} \dots \dots \dots W \times x, (1)$$

$$\dots \dots \text{part of casting BC, very nearly} \dots w \times \frac{x}{2}, (2)$$

$$\dots \dots \text{pull} \dots \dots \dots P \times y, (3)$$

To cause equilibrium, (3) must be equal to (1) and (2) taken together.

$$\text{therefore } P y = W x + w \frac{x}{2} = \frac{x}{2} (2W + w)$$

$$\text{and } P = \frac{\frac{x}{2} (2W + w)}{y} = \frac{2y}{x} (W + \frac{w}{2})$$

But in this case $x = y$, therefore $P = W + \frac{w}{2}$. If the weight of the part of casting be neglected, $P = W$, or the pull at B is equal to the load at C, and as the load is 2½ lb., the pull will also be 2½ lb. The problem may be worked graphically thus—Resolve W into two forces, one acting through A, the other horizontally through B. Treat in the same manner. Add the two horizontal forces acting through B, which will be equal to P.—**ANTHONY R. F. TLEW**.

A Swedenborgian Church is about to be erected in the Station-road, Snodland, Mid-Kent, from the plans of Mr. Henry Bridg, of Maidstone. It will be built of Kentish ragstone, with Bath stone dressings, and will be Gothic in style, consisting of nave 50ft. by 30ft., chancel 20ft. long, organ chamber, vestry, and tower.

The town-hall and market-house at Maesteg were publicly opened on Saturday. The building is Queen Anne in style, and is built of stone with terra-cotta dressings. It consists of a covered market on ground floor, a public hall seating 1,300, and an assembly or board-room above, and offices for the clerk, solicitor, and surveyor; in the tower has been placed a town clock. Mr. H. C. Harris, of Cardiff, was the architect, and Mr. George Thomas, of Newport, Pembrokeshire, the contractor.

LEGAL INTELLIGENCE.

BUILDING MATERIAL.—At the Edmonton Petty Sessions, on Monday, before Mr. J. Abbiss and other magistrates, Henry Capsey, of May-house, Stamford-hill, builder, was summoned, at the instance of the Tottenham Local Board, for being engaged in building on the north side of St. Ann's-road, Stamford-hill, a house which was not solidly put together. Mr. E. Crowne appeared in support of the summons. Mr. De Pape, surveyor to the Local Board, produced three samples of mortar which he had taken from near the mortar mill, the mortar heap, and from the walls of the house respectively, and which crumbled to pieces when touched with the fingers. Defendant admitted the use of the two last-named samples, which he said were what he had made use of for years in the metropolitan district, but the first-named sample had been shot there by mistake. There was a second summons against the defendant for a similar offence. He was fined £5 in each case, and £2 10s. costs, the alternative being 21 days' imprisonment. The penalties were paid.

WATER SUPPLY AND SANITARY MATTERS.

WAKEFIELD WATER SUPPLY.—The first sod of the proposed Ringstone reservoir, on the Rishworth Moors, for the supply of Wakefield, was cut on the 18th inst. The site of the reservoir is a tract of high-lying wild moorland, on the Savile estate, 20 miles west of Wakefield. The average annual rainfall is 45in., and the subsoil is gritstone and shale of the Millstone-grit formation. About 3,200 acres of gathering-ground will be available, and after providing two millions of gallons per day as compensation to millowners, about four millions of gallons per day will be yielded for Wakefield in the driest seasons. The principal works are:—1st. A compensation reservoir called Green Withens reservoir, to contain 240 millions of water, situate at the uppermost end of the gathering-ground, for the supply of millowners. 2nd. A storage reservoir, called Ringstone reservoir, to contain 200 millions of gallons, situated at the lowest end of the gathering-ground, to be used principally for the supply of water to Wakefield. 3rd. A storage reservoir, called Ardsley Reservoir, to contain 300 millions of gallons, situated about three miles north-west of Wakefield; this reservoir is entirely devoted to the supply of Wakefield, and will contain about five months' supply at the present rate of consumption. 4th. A service-reservoir on Lindle-hill, about two miles from the town-hall at Wakefield, intended to contain a few days' supply. 5th. A catchwater-conduit, called the Moss Moor Catchwater, from the uppermost part of the gathering-ground down to Ringstone Reservoir. 6th. A line of iron pipes to be laid from Ringstone Reservoir to Ardsley Reservoir, and thence into Wakefield. These will be 21in. diameter for the first three miles, and 18in. the remainder of the way. There are other intended catchwaters and filter-beds, the latter between Ardsley and Lindle-hill, but these works will not be proceeded with at present. The contract for pipes has been let to Messrs. Cochrane, Grove, and Co., Middlesbrough, at about £47,000; that for stop-cocks and fittings to Messrs. Guest and Chimes, of Rotherham, at about £700; and the pipe-laying to Mr. Samuel Jowett, of Brighouse, at £10,000. About three miles of pipes have been delivered, and laid in the ground. The contract for the Ringstone Reservoir has been let to Messrs. Metcalfe and Sons, of Bradford, at £31,710. The site is not in the valley itself, but in a saucer-shaped hollow, 400ft. above it, placed between three hills. Two embankments will be needed to retain the water. The western or main one will be about 1,600ft. long, and 60ft. at deepest part. The base will extend to 400ft. in breadth, and the embankment will taper upwards to 20ft. at the top. It will contain about 200,000 cubic yards of earth, and will have a water-tight puddle wall placed in its centre from top to bottom throughout its length. It will be pitched with stone on its water slope, and soiled and grass sown on its outer slope. The lesser embankment will be 1,200ft. long, and about 24ft. high at the deepest part. The base will be 120ft. broad, tapering to 40ft. at top, on which a roadway will be carried. The weir and bywash will be placed at southern end of main embankment; the former will be 30ft. long and of solid masonry, the bywash 15ft wide and 550ft. in length, pitched with stone throughout. The valves will be constructed in valve-shafts 10ft. in diameter, built in brickwork and covered by domed entrances built in masonry. The engineer for the whole of the works is Mr. E. Filtiter, M.I.C.E., of Leeds, his resident deputy being Mr. Ellis, of London. Mr. McGawley is clerk of works.

EASY-GOING SEWERAGE SUPERVISION.—Some curious irregularities in connection with the inspection of a sewerage contract, of which Mr. Alfred Williams, C.E., was the engineer, were

brought to light the other day at a meeting in committee of the local board for Bromley, Kent. The object of the meeting was "to select test cases for investigation in the district sewered under Mr. Garton," who is in the service of the board as inspector at a salary of three guineas per week. The Chairman explained to Mr. Garton that the board were desirous of testing the work executed under his supervision, to ascertain whether the extras certified for, especially the large items of concrete, were actually supplied. In the course of an examination, Mr. Garton admitted that he could not indicate on the plan of the Burnt-Ash-lane sewer, where had been laid the twelve lengths of concrete, paid for under certificate No. 8. After some further fencing with the question, he said the truth was when No. 8 certificate was paid this concrete was not executed, and he consented to pass the item in order to oblige Mr. Potter, the contractor, who was very short of money at the time. It was done at the solicitation of Mr. J. G. Stead, then the contractor's clerk of works. The charge was not, he protested, a fraud, as the concrete was eventually laid down. This certificate was passed in August, 1880, and a week or two after Mr. Garton said he went to Winchester to be married. Pressed as to whether Mr. Potter sent him any money when there, he denied it, but ultimately admitted that Mr. Potter sent a wedding present of £5 to his wife. He was then shown a letter written on the Bromley local board official paper, which he admitted was in his handwriting; it was addressed to George Potter, and ran thus:—"Sept. 22, 1880. Dear George,—I am just off. Please send the other money as soon as you can, as I could not speak to you this morning. Send P.O. order to me at No. 17, St. James'-villas, Winchester, made payable to me at the Post-office, Winchester—please send it as soon as you can—send it from London please—be sure to send. Yours truly, John Garton." In reply to other questions, he said the "other money" referred to business transactions with the contractor, which had nothing to do with the certificates. He could not explain the letter. A member remarked that they were free to put their own interpretation on the affair. In reference to the concrete in the Ravensbourne-road sewer, Garton said no concrete was laid, and although a charge had been made for it, he had struck it out in May. On the suggestion of Mr. Stead, the June bills were examined, and the items were found to be certified and paid for. Some discussion arose as to the extra depth of manholes, and Garton said the 630ft. of concrete charged for in certificate No. 8 was at the bottom of 23 manholes, which were used as pumping stations. The members then visited Burnt Ash-lane, the district certified for, and found no concrete round the pipes, although it was charged for in the certified bill as having been laid 2ft. 6in. wide and 9in. deep. At an adjourned inquiry, held last week, Mr. Thurston, the inspector of nuisances, was examined as to the work done while he acted as assistant-inspector of sewerage, and other irregularities as to the amount of concrete used were elicited, he being unable to tax his memory with the amount of the material used. In the Burnt Ash-lane sewer he saw but two pieces of concrete laid. On Friday last, says the *Bromley Telegraph*, to which journal we are indebted for our report, four openings were sunk at as many manholes, in Burnt Ash-lane, under the supervision of the board's surveyor, and the allegation made by Garton, that these places had all been used as pumping stations, was negatived by the nature of the soil, which—except in one place—proved to be a bed of fine dry sand.

LONDON WATER SUPPLY.—About a dozen delegates from vestries and district boards in London met on Wednesday in the Vestry-hall of St. Martin's, under the presidency of Mr. E. J. Watherston, to consider the question of the water supply of the metropolis. There were representatives from Islington, Kensington, Limehouse, Wandsworth, Mile-end, Clerkenwell, Fulham, and a few other places. Mr. Watherston explained that the meeting had been called to urge the Government to take steps to deal with the water question next session, to which end it was necessary that Parliamentary notices should be given next month. The consequences of the inability of the Government to legislate on this subject last year were most serious, owing to the reassessment of the metropolis, of which the water companies had not been slow to avail themselves. Further delay was very much to be deprecated. The Grand Junction Company and Southwark and Vauxhall Company failed last summer in their high service supply. Moreover, if the question were shelved any longer, either by the apathy of Parliament or by the action of those who desired the previous unification of London government, it was difficult to see how Parliament could avoid granting extended capital and fresh powers to the water companies, all of which would add considerably to their claims for compensation when the inevitable

day of purchase arrived. As it was, the revenues of the companies had increased, and were increasing at a rate even beyond all previous calculation—a circumstance attributable not only to the normal increase of houses, estimated at about 25,000 annually, but also to the fact that the companies, released from the arrangements for purchase, had, in many instances, although admittedly within their Parliamentary limits, raised their charges upon the basis of the re-assessment of metropolitan property. Some discussion took place as to the action which the conference ought to take, but ultimately it was agreed to transmit a memorial to the Prime Minister representing the increasing charges which the ratepayers of the metropolis had to pay to the water companies without obtaining any equivalent in the shape of a purer or more copious supply, and urging the Government to legislate on the subject next Session on the lines of the report of the Select Committee of last year. A small committee was appointed to receive and consider the reply which Mr. Gladstone might make, and to report to the conference on an early day.

CHIPS.

Three hundred yards of the new sea-wall at Eastbourne have been swept away by the sea; the estimated damage exceeds £10,000. The contractor, Mr. Jackson, attributes the damage to the refusal of the town council to erect certain groynes.

Primitive Methodist Sunday-school buildings, accommodating 300 children, were opened in Tipton-street, Sedgley, on Sunday. Mr. Hulton, of that town, was the builder.

St. Mary's parish church, Cold Brayfield, was reopened by the Bishop of Oxford on Monday week after restoration.

The partnership between Messrs. Branch and Rayner, architects, of London and Brighton, has been dissolved.

The memorial-stone of a new Congregational church was laid at Burgess-hill, Sussex, on Wednesday week. It will be Tuscan in style, built of brick coated with Portland cement; the dimensions are 60ft. by 40ft., and accommodation will be provided for 400 persons. Mr. E. J. J. Hamilton, of Brighton, is the architect, and the contract for erection has been taken at £1,995 by Mr. Simeon Norman, of Burgess-hill.

Last week judgment was given in the sheriff's court, Greenock, in an action brought by a labourer named John Creighton against the Greenock Foundry Company for £127 as damages for injuries received by him in defendants' service in March last. The sheriff said he was obliged to dismiss the case, as notice in writing was not given to the defendants by plaintiff within six weeks of sustaining injury, as required by the Employers' Liability Act, 1880.

During the late congress of the Kent Archaeological Society, a visit was paid to the site of a Roman villa discovered at Wingham, about four miles from Sandwich, by Mr. George Dawker, who had, at that time, laid open one apartment only. Since then he has excavated several more rooms, and ascertained that the villa appears to have been very spacious. Two of these rooms have ornamented tessellated pavements; and a third, which appears to have been a bath, is decorated also upon the walls with tessellated work in black and white, to which it would be difficult, in this country, to point to another example.

The Sussex magistrates at the Michaelmas Quarter Sessions last week accepted the recommendation of the highways committee, and appointed Mr. Thomas Skinner, of Horsham, as county roads surveyor, at a salary of £100 a year. The duties are to personally inspect all main roads, including those over bridges, to give directions to parish surveyors, and to grant certificates under the Highways and Locomotives Act, 1878. Extra remuneration will be given should the surveyor be called upon to report on and superintend repairs to ordinary highways.

The foundationstone of a new Primitive Methodist school-chapel was laid at Kluishill, New Swindon, on Monday week. The building will be 34ft. by 27ft., will seat nearly 200 people, and will cost about £300. The contract for erection has been taken by Mr. T. Colbourne, of Stretton Cross-roads.

The old grammar school, at Steyning, Sussex, is about to be enlarged and renovated, from the designs of Mr. Gordon M. Hills, of Adam-street, Adelphi, London.

The first meeting for the third session of St. Paul's Ecclesiological Society was held on Tuesday evening at St. Paul's Chapter-house, when Mr. Alfred Tylor read a paper upon "The Roman Antiquities recently discovered in Warwick-square, E.C."

Our Office Table.

GRATIFYING evidence is given of the benefits, in a sanitary sense, afforded in London by the model dwellings known as the Peabody Buildings. It seems that the deaths in these buildings, calculated upon sixteen years' experience, have been at the rate of only 16.7-10 per thousand per annum, while the general death-rate for the metropolis during the same period has been 23.4-10. According to Mr. Vigers' evidence before the Select Committee on Artisans' Dwellings, the death-rate in crowded districts surrounding the buildings may be taken at 30 or 40 to the thousand. This is encouraging news in prospect of the working of the alterations now being carried out in Birmingham under the provisions of the new Improvement Act.

THE removal of the machinery from the Abbott's Cliff leading to the shaft at Shakespeare's Cliff, in connection with the Channel tunnel experiments, is now complete, having occupied upwards of two months, and boring operations will be commenced almost immediately. The scheme is now in the hands of the South-Eastern Railway Company, who, we understand, have entered into a contract for the drilling to be extended another mile. For the present the boring will be continued in the direction of Dover. Several workshops and sheds have been erected at the mouth of the shaft, and a powerful engine has been fitted up. The arrangements are now much more complete than formerly, and are calculated greatly to facilitate the progress of the work. The cuttings from the face of the chalk are carried to the rear of the engine by caps, and afterwards conveyed in an iron skiff from the engine to the mouth of the shaft by means of pulleys attached to a drum, which is worked by machinery. With the present arrangement, the same amount of work will be able to be performed with a considerable reduction of labour, about 30 men only being required instead of double that number, as at the Abbott's Cliff heading.

THE custom of employing artists to paint the outside of houses with artistic designs, which formerly prevailed in the South of Europe and Germany, has lately been revived in Munich. The *Kunst Kronik* gives an account of two houses which are attracting some attention from the beauty of their exterior decoration. One is an hotel, and has been painted in the style of the Later Renaissance; the other is the house of an artist, and is said to offer a rare combination of fitness and aesthetic worth. The process employed in this kind of painting is not fresco nor the water-glass method used by Macleise in his wall-paintings at Westminster, but some kind of mineral painting (*Mineralmalerei*), of which further particulars are promised. If it will withstand the influences of climate, it will be of service.

THOSE in favour of the appointment of a Minister of Fine Arts may feel some interest in the recent action of the French people, who certainly display an intelligent interest in the cause of Art, and have on one or two occasions tried the expedient suggested. Their verdict seems to be that under the Empire the result was corruption, and under the Republic feebleness and uselessness. By a decree just promulgated, the semi-independent posts of Director-General of the National Museums and Permanent Secretary of the Fine Arts Department, are, together with the titular Minister, suppressed. The administration of science and art, as we should call it in this country, is made a subordinate branch of the Education Department, under the special direction of the Under Secretary of State for that service, and the executive officers acting directly under him are to be the Director-General of the National Museums and the Director of Art Works, on whom will devolve the selection of all paintings, sculptures, and other products for the national collections.

THE report of Colonel Henderson for the year 1880, just submitted by him to the Home Secretary, shows that house building in the Metropolis is proceeding steadily. From the year 1873 the proportions of this business have been increasing, each year adding vastly to the total number of structures and the aggregate

superficial area occupied by them. In 1875 there was 10,023 houses added to London, and, roughly speaking, these figures rose by nearly 3,000 in 1876, another 2,000 in 1877, and 1,300 in 1878. In 1879, 21,589 houses were built, forming 401 streets and two squares, and making a length of over 71 miles. Last year there were built in London 21,945 new houses, forming, 145 streets and two squares, and measuring over 69 miles.

THE first statutory meeting of the Sanitary Protection Association for London was held on Tuesday at the Society of Arts' room, Adelphi, the president, Professor Huxley, in the chair. Mr. Timothy Holmes, M.A., the treasurer, stated that the association had been in operation only for a few months, and for a certain portion of that time its action had been suspended by legal difficulties. The number of members enrolled up to the 15th of this month was 126, the total contributions, together with a loan of £100 from Professor Jenkin, was £391 11s., and the total expenditure £316 3s. 6d. Professor Fleeming Jenkin, F.R.S., explained the origin, objects, and working of the association, which, he said, gave sanitary advice to its members on very cheap terms. Professor Huxley said that, to put it briefly, the association was a new co-operative store for the supply of good advice, and the modest success which had hitherto attended it was very likely due to the antipathy inherent in human nature to the reception of good advice. Their good advice, however, had this peculiarity—that they did not expect anybody to take it unless he liked. His interest in this association came from the remote connection he once had with medicine and hygiene. He had been led to the conviction, strengthened by every day's experience of life, that when we aggregated close upon four millions of people on something less than 50 square miles, if we did not take care we should be desolated, not like old London by the Plague or Black Death, but by those other forms of disease as fatal in their way which have the terrible peculiarity of being easily disseminated by the very means we took to get rid of them, unless those means were perfect. Disagreeable as the old cesspool system was, it was attended with very little danger compared with that which waited upon the water sewage system if that system was imperfect, for then it was an admirably contrived arrangement for distributing disease and death in our own houses and in the houses of people who lived adjacent. There were two ways of meeting the danger. One was by the action of Government in some shape or other, which would not be tolerated in England, besides, the expense and difficulty of working such a system rendered it impracticable. The other way was to do the inspection of her oneself or by persons whom one could trust, who, like the officials of that association, had no interest in making a report. Therefore, it was for the public good that the association should become a great one, and its work be carried out as widely as possible.

THE first meeting of the one hundred and twenty-eighth session of the Society of Arts will be held on Wednesday, the 16th November, when the opening address will be delivered by Sir Frederick J. Bramwell, F.R.S., Chairman of the Council. The following are among the papers which will be read during the session:—"The American System of Heating Towns by Steam," by Captain Douglas Galton, C.B., F.R.S.; "Stained Glass Windows," by Lewis Foreman Day; "The Production and Use of Gas for Purposes of Heating and Motive Power," by J. Emerson Dowson; "Gas for Lighthouses," by John Wigham illustrated by an exhibition of some of the gas flames and apparatus used in lighthouses; "The Relation of Botanical Science to Ornamental Art," by F. Edward Hulme, F.L.S., F.S.A.; "Tools and Cutting Edges," by D. A. Aird; "The Teaching of Forestry," by Colonel G. F. Pearson. The usual short course of Juvenile Lectures, given during the Christmas holidays, will be by Mr. W. H. Preece, F.R.S., the subject being "Recent Wonders of Electricity."

TYPHOID fever, with a fatal result, having been generated by the unsanitary condition and overcrowded state of the Exeter Post-office, the Sanitary Authority desired to inspect the establishment, in order that they might direct the necessary steps to be taken to improve the condition of the building. The Postmaster declined to permit the entry of the authorities, but

yielded when a magisterial order was presented. The state of affairs in the telegraph department was so bad that the Town Council pronounced the building to be dangerous to the health of the city. It was intimated that certain improvements were to be made, but the Postmaster declined to give particulars, claiming that Crown property was not subject to the Public Health Act. Application was then made to the Local Government Board. They communicated with the Postmaster General, who this week wrote giving the Council particulars of the proposed work, and promising that the new Post-office should be erected as speedily as possible.

LORD PENZANCE, sitting as Dean of Arches, had before him on Wednesday an appeal from the decision of the Chancellor of the Diocese of London, granting a faculty to the Rector of St. Mary-at-Hill, Thames-street, to carry out alterations in his church estimated to cost about five hundred pounds, to be taken from pious trust funds amounting to upwards of two thousand pounds annually. The appellants denied the necessity of the proposed expenditure, and stated that the average attendance at the church was only twenty persons. Lord Penzance reserved judgment.

THE Exhibition of Smoke-Preventing Appliances will probably open about the middle of November. This undertaking has been carried out by a joint committee of the National Health and Kyrle Societies, the object being to introduce to the notice of the public smoke-preventing appliances, in order to bring about the desirable result of smoke abatement. The exhibition will be held in the east and west arcades, and in the buildings adjoining the Royal Albert Hall at South Kensington. The chief departments will be domestic, industrial, and novelties. Trials will be made upon the exhibits, and gold, silver, and bronze medals and certificates of merit, are to be awarded upon the report of a special committee. At a general meeting of the joint committee held last week, Mr. W. R. E. Coles, hon. sec., who is working indefatigably to forward the general arrangements, announced that Dr. Siemens, a member of the committee, had offered a prize of 100 guineas to be given for the best method of arrangement "for utilising fuel as a heating agent for domestic and industrial purposes, combining the most economy with freedom from smoke and noxious vapours"; for the "Ladies' Prizes" (consisting of two sets of prizes of 50 guineas each) it was stated that there had been received from Messrs. Rathbone 10 guineas, the Baroness Burdett-Conings 10 guineas, Lady Pollock two guineas, to be awarded on trial by experts for the best open grates, and the best kitcheners combining (1) freedom from smoke, (2) simplicity in arrangement and use, (3) economy. The Society of Arts have also offered a medal to be presented by the special committee, and it is requested that Lord A. Churchill should represent them in reference to this award. Mr. D. Kinnear Clark has been appointed as attesting engineer to superintend the trials, and Mr. James Richards, of the Royal Albert Hall, has succeeded Mr. Gilbert Redgrave as superintendent of the exhibition, the latter having been compelled to resign in consequence of his appointment as secretary of the Royal Technological Commission.

CHIPS.

On Tuesday last Messrs. Driver and Co., of Whitehall, sold by auction at the Mart, Tokenhouse-yard, some small detached plots of land in Crown-road, Munster-road, and Margravine-road, Fulham, containing together 2 acres 3 rods and 10 perches, which realised a total sum of £1,810, or at the rate of about £1,720 an acre.

THE new lecture-theatre and other buildings lately added to the Birmingham and Midland Institute were opened last week. The new buildings have been erected by Messrs. Horsley Brothers, of Newton-street, at a cost of between £25,000 and £30,000, from the designs of Messrs. Martin and Chamberlain. They include a number of rooms affording largely increased accommodation for the Industrial Department and for the School of Art, and a lecture theatre capable of seating nearly 1,200 persons.

A new Baptist chapel in Grove-road, Eastbourne, was opened on Thursday week. It measures 63ft. by 39ft. inside, is faced with Johnson's red bricks with Bath dressings, and seats 500 people. Mr. Skinner, of Eastbourne, was the builder.

The memorial to the late Earl of Beaconsfield which is to be erected in Parliament-square, will be placed next to that of Lord Derby, and will look towards the Houses. It will be cast in bronze, will be 9ft. in height, and will stand on a granite pedestal 10ft. 6in. high. The design, as accepted by the committee, represents the Earl in a peer's robe, with a scroll in his left hand, and his right hand by his side. The work has been entrusted to Mr. Mario Raggi, and will cost between £4,000 and £5,000.

New schools are about to be built in Quarry-street, Stonehouse, for the East Stonehouse Local Board. Mr. H. J. Snell, of Plymouth, is the architect.

A new redos has just been placed in the parish-church of Hythe, Kent. It has been executed from the designs of Mr. G. E. Street, R.A., and contains a *bas relief* by Mr. H. Armistead, R.A.

The Wesleyan chapel at Wantage, Berks, was reopened on Tuesday week after renovation, including new seats throughout the chapel of varnished yellow deal, new organ gallery and rostrum of pitch-pine, and decoration in colour. Mr. Wannicot, of Farnham, was the architect, and Mr. John Wheeler, of Wantage, the contractor.

The district of Southwater, Durham, is about to be drained from plans by Mr. John G. Reah, surveyor to the local board.

A new chapel is in course of erection at Croft. It is Gothic in style, is faced with local granite, backed by brickwork, and will seat 250 persons. Mr. Gee, of Croft, is the builder.

New schools are about to be erected for the Aberdeen School Board in King-street, from the designs of their architects, Messrs. Ellis and Wilson, of that city.

ROYAL INSTITUTE OF BRITISH

ARCHITECTS.—THE FIRST ORDINARY MEETING OF THE SESSION, 1881-82, will be held on MONDAY EVENING, the 7th November, at 8 p.m., precisely, when the Ballot will take place for Seven Fellows and Thirty six Associates, and the opening address will be delivered by G. E. STREET, R.A., President.

NOTICE TO CANDIDATES FOR MEMBERSHIP.—No applications for the Associateship, under the old rules, will be received after the 31st December, 1881. The first Obligatory Examination will be held on the 15th, 20th, 30th, and 31st March, 1882, and the second in July. The regulations and programme of these examinations may be obtained gratis at the office of the Institute.

J. MACVICAR ANDERSON, Hon. Sec.
WILLIAM H. WHITE, Secretary.
9, Conduit street, Hanover-square London, W.

MEETINGS FOR THE ENSUING WEEK.

THURSDAY.—Annual Dinner, Builders' Benevolent Institution, Freemasons' Tavern, 5 for 5.30 p.m.

Throat Irritation.—Soreness and dryness, tickling and irritation, inducing cough and affecting the voice. For these symptoms use Epps's Glycerine Jujubes. Glycerine, in these agreeable confections, being in proximity to the gland at the moment they are excited by the act of sucking, becomes actively healing. Sold only in boxes, 7d. and 1s. 1d., labelled "JAMES EPPS and Co., Homoeopathic Chemists, London." A letter received:—"Gentlemen,—It may, perhaps, interest you to know that, after an extended trial, I have found your Glycerine Jujubes of considerable benefit (with or without medical treatment) in almost all forms of throat disease. They soften and clear the voice.—Yours faithfully, Gordon Holmes, L.R.C.P.E., Senior Physician to the Municipal Throat and Ear Infirmary."

Lamplough's Pyretic Saline is refreshing, most agreeable, and the preventive and curative of FEVERS, BILIOUSNESS, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by Chemists throughout the world, and the M-Ler, 113, Holborn Hill. Use no substitute. See Medical Testimony.

Holloway's Ointment, aided by his Pills, presents the only rational mode of curing pimples, boils, carbuncles, abscesses, and other disordered diseases. Tainted blood, the fountain of these evils, is thoroughly purified by the Pills, and its evidences on the surface are effectually eradicated by the Ointment, without pain or danger.

Doubling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to CHARLES TRASK, Norton-sub-Hamdon, Ilminster, Somerset. —[Advr.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates. General Repairs and Alterations Executed. Experienced Workmen always in readiness, and sent to any part of the country. —[Advr.]

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE
CORSHAM DOWN
CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.
PICTOR & SONS, BOX, WILTS.
(See trade advt. on p. XXV.) Advr.

TENDERS.

Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ABERDEEN.—For street-improvement works for the Town Council. Mr. William Boulton, borough surveyor:—

Accepted tenders.

For Deep-lace:—
McDonald, P., foot pavement 94. 3d. per square yard, kerb and channel 6s. 4d. per lineal yard.

For Springbank-place:—
Urquhart, W., and Co., macadamising carriageway 1s. 9d. per square yard.

For Skene-square:—
Cameron, J., causewaying carriageway 6s. 4d. per square yard.

ABERGAVENNY.—For the erection of additional buildings at the pauper lunatic asylum at Abergavenny, for the counties of Monmouth, Brecon, and Radnor:—
Horsman & Co., Wolverhampton £42,000 0 0
(Accepted.)

BARNET.—For proposed cottage residence, Hadley-road, New Barnet, for Mr. J. Woolley. Mr. Joseph White, architect:—

Gould and Brand	£387 0 0
Butcher	503 15 0
Poole (accepted)	500 0 0
Noble (withdrawn)	

BETHNAL-GREEN.—For the erection of a school for 1400 children, in Mansford-street, Bethnal-green, for the London School-board. Mr. E. R. Robson, F.S.A., architect to the board:—

Briss, W.	£15,493 0 0
Chappell, J. T.	15,439 0 0
Sargeant, J. F.	15,186 0 0
Kirk and Randall	14,996 0 0
Peto Bros.	14,964 0 0
Williams, G. S. S. & Son	14,790 0 0
Lawrence E.	14,778 0 0
Tongue, W.	14,664 0 0
Wall Bros.	14,523 0 0
Grover, J.	14,487 0 0
Jerrard, S. J.	14,419 0 0
Higgs & Hill, Crown Works, South Lambeth (accepted)	14,344 0 0

[Cost of site (area 21,780 square feet) £8,538; (a) cost of school buildings only, including closets, £12,600; (b) cost of tar pavement and playground, £300; (c) cost of boundary walls and gates, £600; (d) cost of teachers' rooms, £300; (e) cost of schoolkeeper's house, £350; (f) cost of making good adjacent walls, £34. Special expenditure chargeable to site, viz.:—(g) Extra depth of foundations, £160; total, £14,344. Cost per head of (a) £9; total cost per head, £10 4s. 10d.]

BURGH (GLASGOW).—For construction of a reservoir in connection with the waterworks supply works at Burgh. Mr. W. R. Copland, C.E., West Regent street, Glasgow, engineer:—

Dempster, R., and Co.	£6,342 0 0
Buchanan, J.	5,359 0 0
Shannon, A. M.	5,134 0 0
Adams, W. and T.	5,095 0 0
Morrison and Mason	4,772 0 0
Warnock and Walker	4,749 0 0
Steuart, R. B.	4,680 0 0
Chalmers, T.	4,679 0 0
Fleming, J.	4,632 0 0
Boyle, A. H.	4,616 0 0
Duncan, W.	4,522 0 0
Haure, W.	4,307 0 0
Waddell, G.	3,983 0 0
Flett, W. G.	3,635 0 0

CAMBERWELL, S.E.—For paving roads, for the Camberwell Vestry:—

For mason's work:—Mowlem and Co., Grosvenor Wharf, S.W. (accepted) as per schedule.

For roadwork:—Harris, W., Southampton-street, S.E. (accepted).

CHELSEA, S.W.—For the enlargement of the Parkwalk School, Chelsea, by 400 places, for the London School Board. Mr. E. R. Robson, F.S.A., architect to the board:—

Tongue, W.	£3,581 0 0
Briss, W.	3,366 0 0
Downs, W.	3,247 0 0
Higgs and Hill	3,187 0 0
Chappell, J. T.	3,156 0 0
O'drey, W.	3,098 0 0
Grover, J.	2,988 0 0
Kirk and Randall	2,810 0 0
Wall, C., Chelsea (accepted)	2,729 0 0

(a) Cost of enlargement, including closets, £2,455; (b) cost of tar pavement and playground, £13; (c) cost of boundary walls and gates, £26. Special expenditure chargeable to site:—(d) extra depth of foundations, £56; (e) works to form connections to present schools, &c., £170. Total, £2,720. Cost per head of (a), £6 2s. 9d.; total cost per head, £6 16s.]

CHINGFORD.—For new roads and sewers, for the London Land Company, on their estate at Chingford Station:—

Philbey, Romford	£1,109 13 0
Dunmore, Hornsey	833 0 0
Bloomfield, Tottenham	800 0 0
Harris, Camberwell	793 0 0
McKenzie, City	782 0 0
Kebble, Regent's Park	765 0 0
Pizzey, Hornsey	750 0 0
Killiohback, Camden Town	755 0 0
Jackson, Leyton	744 0 0
Peill, Bromley	739 0 0
Wilson, Walthamstow (accepted)	697 0 0

CHURCH ROAD.—For road and sewer works on the Unit-d Land Company's Church-road estate, No. 2:—
Stockwell, Jas. ... £1,955 0 0
Pizzey, Jas. ... 999 0 0
Crockett, W. ... 965 0 0
Harris, W. ... 920 0 0
Tomes and Wimpey ... 914 0 0
Rowland Bros. ... 890 0 0
Neave and Son ... 888 0 0
Dyer and Humbley ... 851 15 0
Wilkes and Co. ... 811 0 0
Felton, G. (accepted) ... 783 0 0

CLIFTON.—For extension of Clarence Mills, Cleckheaton. John Kirk and sons, Huddersfield and Dewsbury, architects:—

Masons:—Hart and Brier, Dewsbury.
Joiner:—Fisherwood, W., Cleckheaton.
Plasterer:—M. rtin, J., Cleckheaton.
Plumber:—Ritchie, W., Cleckheaton.
Painter:—Burnhill, J., Cleckheaton.
Slater:—Thompson, J., Dewsbury.
Ironfounder:—Stead, W., Cleckheaton.

COLCHESTER.—For the 1st and 2nd sections of the restoration of St. Mart n's Church. Mr. E. J. Dampier, Colchester, architect:—

O'dridge	£776 0 0
Dobson	740 0 0
Dupont	695 0 0
Gardner and Son (accepted)	651 7 0

Architect's estimate, £690.

COSWAY.—For concreting new reservoir for the Town Council. Mr. T. B. Farington, borough surveyor:—

Jeffrys, R. Colwyn	£913 0 0
Nicholls, S., Liverpool	719 0 0
Thomas, W., Bangor	646 0 0
Lockwood, H., Manchester	562 0 0
Lowe, L., Farnworth near Bolton	455 0 0

* Accepted.

CROUCH HILL, N.—For erecting new stables, &c., at Holly Park, Crouch Hill, for Mr. Marner. Mr. J. Hamilton, architect:—

Goodman	£280 0 0
Morton	257 0 0
Harper	254 0 0
Stammur	243 0 0

DARLINGTON.—For taking down Brookside Chapel, and rebuilding same on an enlarged plan for the purposes of a parish church. Tenders for nave and chancel postponed. Mr. J. P. Fritchett, Cleveland-terrace, Darlington, architect. Quantities by the architect:—

Accepted tenders.

Mason's and plasterer's work:—
Dongil, H., Darlington ... £359 2 7

Joiners:—
Gent, E., Darlington ... 72 2 1

Slaters:—
Wandles and Sons ... 45 14 0

Heating apparatus:—
Longbottom ... 28 0 0

Plumbers and glaziers:—
Watson and Prince, Darlington ... 25 4 6

Painters:—
Scur and Sowerby, Darlington ... 19 15 0

Total ... £779 15 2

DEWSBURY.—For (Contract No. 16) sewerage and surface-water drainage, comprising about 3,850 lineal yards of pipe surface drains and 4,412 yards of pipe sewer. Mr. K. J. Duff, borough engineer:—

Pattinson, S. and W., Sleaford	£5,707 17 6
Small, T. and Sons, Dewsbury	5,006 6 5
Barralough, W. & Son, Rastrick	4,409 16 11
Schofield, J., Dewsbury	4,304 5 0
Kitchen, J., Bradford	3,824 3 9
Turner, T. W., Dewsbury (accepted)	3,535 2 10
Parkin, W. H., Ravensthorpe	3,366 0 0

EAST PARSONS, SUSSEX.—For converting the w.c.'s at the workhouse into earth closets:—

Infield (accepted) ... £32 0 0

ELSTREE.—For road and sewer works on the United Land Company's Elstree estate:—

Marriott Bros.	£939 0 0
Felton, G.	849 0 0
Clarke, J.	825 0 0
Stockwell, J.	735 0 0
Rowland Bros.	650 0 0
Wilkes and Co. (accepted)	646 0 0

FINSBURY PARK.—For the erection of Congregational Church, with vestries, schoolroom, &c., in Seven Sisters-road. Mr. C. H. Pearle, 12, Southwark-street, S.E., architect. Quantities by the architect:—

Scarrab	£13,119 0 0
Brass	12,000 0 0
Manley	11,889 0 0
Macey and Sons	11,946 0 0
Little	11,652 0 0
Williams and Son	11,589 0 0
Nightingale	11,423 0 0
Fatman and Fotheringham	11,283 0 0
Dove Bros.	11,175 0 0
Harris and Wardrip	10,992 0 0
Roberts, L. H. and R.	10,284 0 0

FELIXTON, LOWESTOFT.—For new lodge, &c., for Sir Savile B. Crossley, Bart, Somerleyton Hall. Messrs. Bottle and Olley, Great Yarmouth, architects:—

Swatman, J. and B., Lowestoft	£530 0 0
Bedwell, A., Lowestoft	445 0 0
Rounce, J., Bundeaton (accepted)	411 1 0

HAMMERSMITH, LONDON, W.—Road-making and paving works in Dorville's-road, Hammersmith, for the Fulham District Board of Works:—

Nowell and Robson, Kensington	£600 0 0
Turner, E., Hammersmith	580 0 0
Toms and Wimpey	173 0 0
Coat, W. G., Hammersmith	549 0 0
Alfred, Hammersmith	548 0 0
Carter, H., Fulham (accepted)	519 0 0

(Surveyor's estimate, £642.)

HALIFAX.—For widening and setting Doctor Hill, Halifax. Quantities supplied by the engineer, Mr. E. R. S. Escott:—

Naylor, E., Halifax	£1,235 0 0
Hudson, W. H., Halifax	1,181 0 0
Pickles, G., Halifax	1,167 0 0
Spink and Brier, Halifax	1,166 0 0
Bowers, H., Halifax	1,126 0 0
Paton, W. H., Halifax	1,048 0 0
Keen, J., Halifax	1,073 0 0
Carey and Son, Halifax	1,062 0 0
Bottomley, J., Halifax	1,000 0 0
Brook, J., Halifax	983 0 0
Bedford, S., Halifax	932 0 0
Calcraft, J., Halifax	974 0 0
Hall, J., Halifax	339 0 0
Mann, S., Halifax (accepted)	823 0 0

(Engineer's estimate, £1,040).

HALIFAX.—For public improvement works in Old-lane, Mill-lane, Halifax. Quantities supplied by the engineer, Mr. E. R. S. Escott:—

Feenley and Firth, Halifax	£3,356 0 0
McKnight, J. S., Halifax	2,951 0 0
Bowers, H., Halifax	2,918 0 0
Pickles, G., Halifax	2,800 0 0
Brier, Son, and Wilson, Dewsbury	2,242 0 0
Brook, J., Halifax	2,184 0 0
Hopkinson, W., & Sons, Halifax*	2,165 0 0

(Engineer's estimate, £2,300).

HATFIELD.—For the erection of headquarter police stations, for the county magistrates of Hertfordshire:— Wade and Pady, St. Nots (accepted), £5,870. [Nine tenders received.]

HEMEL HEMPSTEAD.—For erection of two semi detached villas. Mr. Walter T. Feldon, Hemel Hempstead, Herts, architect:—

Sear, J.	£862 10 0
Monk, C.	759 0 0
Flint, T.	700 0 0
Horn, E.	690 0 0
Capper	653 0 0
Carlin, W.	630 0 0
Philbey, G.	500 0 0

HEMEL HEMPSTEAD.—For erection of a pair of villas at Hemel Hempstead, Herts. Mr. Walter T. Feldon, architect:—

Sear, J.	£1,225 0 0
Monk, C.	1,068 12 0
Horn, E.	990 0 0
Capper	912 0 0
Carlin, W., St. Alban's (accepted)	745 0 0
Philbey	635 0 0

HEMEL HEMPSTEAD.—For erection of shop front. Mr. Walter T. Feldon, Hemel Hempstead, Herts, architect:—

Sear, J.	£350 0 0
Carlin, W., St. Alban's (accepted)	335 10 0

HIGHAM.—Mr. W. J. Beale, of Lombard Works, Battersea, writes us: "The list of tenders for schools, Higham, published last week, was incorrect, as mine was the accepted tender, and not that of Messrs. Vernon and Ewens."

HUDDESFIELD.—For erection of four houses at Mold Green. Mr. T. Wood, 5, Imperial-parade, New-street, Huddersfield, architect:—

Accepted tenders.

Masons:—Brook, S. and Son, Huddersfield.
Joiners:—Calvert, F. and H., Mold Green.
Plumbers:—Milnes and Garside, Huddersfield.
Plasterer:—Broadbent, H., Mold Green.
Painter:—Luna, J., Huddersfield.
Slaters:—Pyeock, W. and Sons, Leeds.

Total amount, £705.

HUDDESFIELD.—For erection of two dwelling-houses and boundary-walls, &c., in Wasp Nest-road, Fartown. Mr. T. Wood, 5, Imperial-parade, Huddersfield, architect. Quantities by the architect:—

Accepted tenders.

Mason:—Hill, J., Huddersfield.
Joiner:—Kirkby, J., Hillhouse.
Plumbers:—Mellor and Crowther, Huddersfield.
Plasterer:—Perrin, T., Huddersfield.
Painter:—Cross, H., Huddersfield.
Slaters:—Goodman, W. and Sons, Huddersfield.

Total amount, £794 10s.

ILKINGTON, LONDON, N.—For alterations, additions, and repairs to 34, Colebrook-row, Ilkington, for Mr. Leopold Jacobs. Mr. W. P. Griffith, architect. Quantities not supplied:—

Bamford	£347 10 0
Ebbage	535 0 0
Lidstone (accepted)	525 0 0

KENSINGTON, W.—For the erection of studio at Kensington. Mr. W. Paice, architect:—

Bodien (accepted).

KENSINGTON, W.—For the completion of five residences at South Kensington. Mr. Thomas, architect:—

Oldrey	£6,488 0 0
Manley	5,412 0 0
Burton and Bickley	5,331 0 0
Toten and Son*	5,290 0 0

M'Manus (withdrawn).

LEANS.—For erection of schools, outbuildings, and boundary-walls in Dewsbury-road, Leeds:—

Accepted tenders.

Excavator's, brick, carpenter's, and joiner's work:—

Wood, J., Leeds	£5,500 0 0
-----------------	------------

Slater:—

Leeson, J., Leeds	373 16 0
-------------------	----------

Plumber's and glazier's:—

Lindley, J., Leeds	307 0 0
--------------------	---------

Ironfounder and smith:—

Tennant, J., Leeds	226 10 6
--------------------	----------

Plasterer:—

Eastwood, H. J., Leeds	219 10 0
------------------------	----------

Painter's:—

Barber, W., Leeds	78 0 0
-------------------	--------

£7,704 16 6

LEAMINGTON.—For additions to the town depot, Adelaide-road:—

Lissaman, W.	£480 0 0
Mills, T.	450 0 0
Houghton, T.	438 0 0
Gascoyne, W.	424 0 0
Randall, W.	406 10 0
Bowen, R.	381 0 0
Harper and Stevens (accepted)	380 0 0

LUCKETER.—For erection of a shed 38 yards long and 14 yards span, with iron columns, retaining walls, &c., at the Cattle Market Siding. Quantities by the borough engineer and surveyor, Mr. J. Gordon, M.I.C.E.:—

If iron principals are used.		If wood.	
Plant, A.	£1,156 0 0	£1,029 0 0	
Hewitt, H. M.	1,133 0 0	1,000 0 0	
Jewbury	1,128 0 0	1,034 0 0	
Hutchinson & Son*	1,098 0 0	1,063 0 0	
Major (error)	832 17 6	835 17 6	

*Accepted, for iron principals.

LEIGHTON BUZZARD.—For shop front at Leighton Buzzard, for Mr. J. Haskins. Mr. F. Gotto, Leighton Buzzard, architect:—

Gibbs, Leighton Buzzard	£134 10 0
Webb, Leighton Buzzard	123 0 0
Forster, Leighton Buzzard	100 10 0
Dawson, Linslade, Bucks	98 10 0
Cook and Sons, Leighton Buzzard*	94 10 0

*Accepted.

LEIGHTON BUZZARD.—For converting two buildings into cottages, for Mr. R. Black. Mr. F. Gotto, Leighton Buzzard, architect:—

Whiting, Heath	£186 18 0
Gibbs, Leighton Buzzard	145 0 0
Webb, Leighton Buzzard	130 0 0

LIMEHOUSE, E.—For the enlargement of the Thomas-street School, Limehouse, by 480 places, for the London School Board. Mr. E. R. Robson, F.S.A., architect to the Board:—

Wood, F. and F. J.	£5,436 0 0
Pritchard, G. S.	5,239 0 0
Lawrence, E.	5,281 0 0
Nightingale, B. E.	5,181 0 0
Cox, C.	4,921 0 0
Harris and Wardrop	4,920 0 0
Jerrard, S. J.	4,850 0 0
Atherton & Latta, Poplar (accepted)	4,900 0 0

(a) Cost of school buildings only (including closets), £4,080; (b) cost of tar pavement and playground, £40; (c) cost of boundary-walls and gates, £180; (d) cost of teachers' room, £100; (e) cost of cookery class-room, £350; (f) cost of new infants' w.c. buildings, £50; total, £4,800. Cost per head of (a), £8 10s.; total cost per head, £10.]

LONDON, E.—For proposed new parsonage house at St. Peter's, London Docks, for the Rev. R. A. J. Suckling, Mr. Bowes A. Paice, architect. Quantities by Mr. C. Poland:—

For foundations and pulling down old building:—	
Dawson	£1,490 0 0
Lang and Son	1,407 0 0
Higgs and Hill	1,149 0 0
Colls	1,075 0 0
Dove Bros.	990 0 0
Brown	945 0 0
Cooper	878 0 0
Manley	790 0 0
Palmer and Son	725 0 0

For superstructure:—

Dawson	5,900 0 0
Colls	5,873 0 0
Lang and Son	5,229 0 0
Higgs and Hill	5,180 0 0
Dove Bros.	4,925 0 0
Brown	4,900 0 0
Palmer and Son	4,675 0 0
Cooper	4,644 0 0
Manley	4,447 0 0

LONDON, E.C.—For lighting the Saloon and Egyptian Hall, at the Mansion House, with electric lights and Swan incandescent lamps, for 12 months:—

Crompton, R. E. and Co. (accepted)	£425 0 0
------------------------------------	----------

LONDON, E.C.—For supplying and fixing complete low-pressure hot-water apparatus, for warming the Saloon at the Mansion House:—

Wontner, Smith, Son and Co. (accepted)	£326 0 0
--	----------

LONDON, N.—For erecting twelve houses in the Harringay-road, Green-lanes, N., for Mr. J. T. Pickburn. Mr. Smithers, architect:—

Harper	£4,906 0 0
Pawson	4,200 0 0
Henderson	4,200 0 0

LONDON, W.—For alterations and repairs to 14 and 15, Dorset-street. Mr. Haynes, architect:—

Vears and Co. (accepted)	£385 0 0
--------------------------	----------

LONDON, W.—For alterations and additions to Mr. Harrod's Stores, Brompton-road. Mr. A. Williams, architect:—

Larter and Son	£1,189 0 0
Martin, Wells and Co.	1,182 0 0
Langmead and Way	1,126 0 0
Benstead and Sons	994 0 0
Sprake and Foreman	980 0 0
Patman and Fotheringham	943 0 0
Stimpson and Co.	939 0 0

LONDON, W.C.—For completing certain works at No. 61, Russell-square. Mr. W. Paice, architect:—

Downs, W. B. and Co. (accepted).	
----------------------------------	--

LOUGHBOROUGH.—For widening and repairing the bridge over the brook leading from East Leake to Gotham, for the Highway Board. Mr. J. F. Hodson, surveyor:—

Faulks, Loughborough	£297 0 0
Haywood, Gotham	196 17 0
Sharnan, Kegworth (accepted)	158 0 0

LOWEA NOAWOOD.—For the enlargement of the Gipsy Hill-road School, Lower Norwood, by 400 places, for the London School Board. Mr. E. R. Robson, F.S.A., architect to the Board:—

Marsland, J.	£5,186 0 0
Jerrard, S. J.	5,116 0 0
Kirk and Randall	5,113 0 0
Hobson, J. D.	5,100 0 0
Stimpson and Co.	5,076 0 0
Lawrance, E.	5,069 0 0
Nightingale, B. E.	5,033 0 0
Tongue, W.	5,027 0 0
Wall, C.	5,000 0 0
Higgs and Hill, South Lambeth*	4,958 0 0
Shepherd, W. (withdrawn)	4,061 0 0

*Accepted.

(a) Cost of enlargement, including closets, £2,480; (b) cost of tar pavement and playground, £103; (c) cost of cloakrooms for entire school, £1,360; (d) cost of covered playgrounds, £250; (e) cost of teachers' rooms, £200; (f) cost of works to present buildings, £370. Special expenditure chargeable to site:—(g) new drainage for entire school, £195. Total, £4,958. Cost per head of (a), £6 4s.; total cost per head, £12 7s. 11d.]

MANNINGHAM, BRADFORD.—For the erection of stabling for 60 horses, car-shed, house, &c., at Manningham. Mr. C. S. Nelson, Albert Chambers, Park-row, Leeds, architect:—

Booth, C. and Son, Clayton, near Bradford (accepted)	
--	--

(Forty-four tenders for the whole works were received.)

MEXBOROUGH.—For erection of a wall at Castle Hill, for the town council:—

Iye, G. (accepted)	£31 8 0
--------------------	---------

NEWARK.—For alterations to the police station at Neath, for the county magistrates of Glamorgan-shire:—

Thomas, J. (accepted)	
-----------------------	--

NEWARK-ON-TRANT.—For erection of six houses in Friary-lane, Newark, for Mr. J. Gregory. Plans prepared by Mr. G. Sheppard, Newark, borough surveyor:—

Baines, C.	£293 0 0
Cressland	853 0 0
White	850 0 0
Smith and Lonn	835 0 0
Duke (accepted)	820 0 0
Combes, W.	770 0 0

NEW MALDEN.—For the erection of a villa residence on Norbiton Park Estate, New Malden, Surrey, for Mr. F. Sledge. Mr. T. L. Heward, architect. Quantities supplied:—

Worman, G.	£819 0 0
Thorn, H.	749 0 0
Saunders, J. (accepted)	747 0 0

NEW MALDEN.—For erection of bridge over Beverley Brook on Blagdon Estate, New Malden, for Messrs. Gussette, Wadman and Daw. Mr. T. L. Heward, architect:—

Pollard (accepted)	£167 0 0
--------------------	----------

NEW MALDEN.—For erection of stable and coach-house, at Ripley Villa, New Malden, for Mr. F. S. Merryweather. Mr. T. L. Heward, architect. Quantities supplied:—

Earle, J.	£120 0 0
Worman, G.	117 0 0
Saunders, J. (accepted)	91 0 0

NOTTINGHAM, W.—For the enlargement of the school in Edinburgh-road, Ladbroke-grove-road, by 400 places, for the London School Board. Mr. E. R. Robson, F.S.A., architect to the Board:—

Tongue, W.	£3,218 0 0
Rankin, J.	3,149 0 0
Higgs and Hill	3,090 0 0
Wall Bros.	3,090 0 0
O'rey, W.	2,937 0 0
Scrivenor, W., and Co.	2,905 0 0
Grover, J.	2,868 0 0
Shepherd, W.	2,808 19 0
Simpson and Co., Prompton-road*	2,773 0 0

*Accepted with addition of £50.

(a) Cost of enlargement, including closets, £2,523; (b) covered playgrounds, £250. Total, £2,773. Cost per head of (a), £6 6s.; total cost per head, £6 18s. 8d.]

POPULAR, LONDON, E.—For paving and making-up Clifton-street, Poplar:—

Trickett (accepted)	£233 0 0
---------------------	----------

READING.—For house and premises in the Bulmershe-road, for Mr. Thomas Wilson. Mr. W. Simmons, Friar-street, architect and surveyor. Quantities supplied by the architect:—

Bottrill, Kings-road (accepted)	£898 0 0
---------------------------------	----------

[Two other tenders received, for £903 18s., and £1,295 respectively.]

RICHMOND, SURREY.—For drainage works on the Halford House estate, for the select vestry:—

Sims, E., Richmond (accepted)	£94 0 0
-------------------------------	---------

SHERIFF.—For renovation of farm premises, for Sir T. W. P. Blomfield, Bart. Mr. William Tomlinson, Coventry, architect:—

Shilton, Stoke Gilding	£230 0 0
Fox Bros., Atherton	210 13 9

SOMERSET, NEAR GREAT YARMOUTH.—For additions to Blood-hills farm-house, for Mr. F. Charsley. Messrs. Bottle and Olley, Great Yarmouth, architects:—

Davey, R., Yarmouth	£452 0 0
Harbord, J., Caister	420 0 0
Wilson, W., North Walsham	392 10 0
Bartram, R., Aylesham	383 10 0
Batchelor, J., Statham	364 0 0
Went, J. H., Yarmouth	358 0 0
Cooper, T. T., Yarmouth (accepted)	328 0 0

For deep well, pump, &c., to the above:—

Norman & Son, Yarmouth (accepted)	£46 0 0
-----------------------------------	---------

SOUTHEAST-SEA.—For construction of 522 lineal yards of 12in. pipe-culvert, with manholes, &c., in London-road, Southend, for the Local Board. Mr. A. Cayton, surveyor. Quantities supplied:—

Spenslow, Southend	£240 5 4
Steward, Southend	233 15 6
Nicholson, Chelmsford	226 9 6
Wilks and Co., London	217 10 4
Strachan and Co., Wood Green*	215 16 4
Storey, Southend	162 5 1

*Accepted.

THE BUILDING NEWS.

LONDON, FRIDAY, NOVEMBER 4, 1881.

THE MARYLEBONE FEVER DENS.

WITHIN a short distance of Regent's Park, and close to the Marylebone-road, a closely-packed neighbourhood of tenements exists, which, for some years, has been suffered to become the haunt of small-pox, typhus, and other infectious diseases. As long ago as 1876 it appears these dwellings were described, in an official report, by the late Dr. Whitmore, the officer of health, as unfit for habitation, yet they have been allowed to remain, and once more threaten a populous district with an epidemic. We now refer more particularly to a number of small houses in Charles-street, Lisson-grove, some of which have recently been condemned, by the medical officer of health, owing to another outbreak of fever. A few days ago an inquiry was opened by Dr. Danford Thomas relating to the death of Mrs. Burton, the wife of a labourer, living at No. 12, Charles-street, Lisson-grove, alleged to have been caused by the insanitary condition of the house in which this family lived. This woman, her husband, and four children occupied the front kitchen of the house in question, and one of the daughters had been removed to Homerton Fever Hospital previously to the death of the mother, owing to an attack of typhus fever. Here a family of six, according to the evidence, occupied one bed in a room not fit for a cat or dog to live in, the basements standing in a mass of wet black soil, 5ft. or 6ft. in depth. Dr. Norman Kerr said he had not been out of this street for six weeks; that both the mother and daughter had been suffering from typhus of the most severe type; and that the bedding on which Mrs. Burton had been lying had not been disinfected. From the same witness we learn that the neighbourhood was saturated with the poison of the fever, and that in three houses in this street there had been no less than 19 cases of typhus fever in six months. Eight houses in the same street have been officially reported to the vestry as unfit for habitation. The district surveyor reports that the footings of some of the walls do not reach any solid foundations, though they extend 4ft. or 5ft. below the floor level; that there is no damp-course, and the damp invades not only the basements, but the first floors. Mr. Tomkins, the surveyor, expressly states in his official report: "The houses were generally in so dilapidated a condition that no structural alteration could make them habitable." In one of the four condemned houses, the back walls were much bulged and very damp; the basement-rooms were only 6ft. 3in. high, and the floors laid on the ground. We learn also that these houses are let out in tenements, as many as five persons sleeping in one room, and that the high rent of 2s. 6d. a week was paid for the wretched cell called a kitchen in which the family we have referred to dwelt. According to another authority we learn that typhus fever broke out in Charles-street in August last; there had been 30 cases, of which 14 were confined to four houses. The magistrate gave an order to vacate these four houses, pending proceedings to be taken for their destruction; but proceedings under *Torrens' Act* take time, while the fever is still at work.

When we read these statements of facts we shudder to think of the many other similar plague-spots which exist in the metropolis, the existence of which is not

brought prominently before the public, and of the numerous instances of people stricken down by diseases the real origin of which is misrepresented. Utterly disgraceful as the state of Charles-street is to our boasted sanitary progress, it will be admitted by many who have taken the pains to visit that locality, that streets and tenements many times worse are to be found in London and elsewhere, in the shadow of our palaces and cathedrals, and under the walls of our colleges and great public schools.

One of the greatest difficulties vestries and authorities have to contend against in carrying out remedial measures, is the opposition of the freeholders and owners of properties of this class, as well as in every instance the legal procedure required to carry out provisions under the various Acts, and the apathy and indifference arising from ignorance which exist among the labouring classes. We need only refer the reader to the numerously-attended meeting of the vestry of St. Marylebone, held last week, to hear appeals from the owners of certain houses in Charles-street, which had been condemned by the medical officer of health and surveyor as unfit for habitation, under the provisions of the *Artisans' and Labourers' Dwellings Act*. The reports of those gentlemen (Mr. Blyth and Mr. H. T. Tomkins, the surveyor) afforded ample ground for the vestry to put in force the powers they possess under the above Act, yet there were not wanting those who, from personal interests, objected to the demolition of these houses. The owners of several of these tenements, scarcely fit for the habitation of cattle, without denying the reports, set up a plea that they had only an interest in their leases of nine or ten years, and that it would be a hardship upon them to destroy the houses, and make them rebuild. No doubt, it is a hardship for a lessee holding for a short term to be compelled to rebuild; but the vestry have a paramount duty to fulfil in the interests of the public. The surveyor employed by the lessees differed from the parish surveyor, inasmuch as he thought structural alterations would meet the requirements, and the vestry ultimately decided that the two surveyors might be allowed a week's consultation on the subject.

After a personal inspection of this fever-haunt, we can fully justify the opinion that nothing less than reconstruction would satisfy the most ordinary conditions of public health. Charles-street is a short street leading out of Lisson-grove. The houses are chiefly brick and stucco, of two stories above ground, some of them occupying a very narrow frontage, with little or no outlet in the rear. No. 12 looks as if its foundation had yielded, for the front is not plumb, and the stucco seems in a very crumbling and dilapidated condition. An iron railing in front of the houses incloses a narrow area, and upon it, at the time of our visit, washed clothes were hung out to dry, evidence that there were no back-yards sufficient for such a purpose. A squalor-stricken aspect pervades this short street of dingy-looking houses, of which there are about 17 on each side. Each contains about six rooms, and many of these single rooms hold separate families. The interior of some of these rickety tenements is far worse than their exterior would lead one to suppose. The condemned houses are on one side of the street, and each of them contains two dirty, dismal basement-rooms about 6ft. high, in either of which it could scarcely be possible to believe that any human being could live. As for flooring, these rooms have only a few rotten boards; others, the damp earth; bare the walls, once plastered, show the white bricks, and are in a miserable, damp, and dirty state. In one instance, the floor, which had been taken up for examination, brought to light a reeking accumulation of soil saturated by sewage matter, and it was

upon such filth that the unfortunate woman and her family had lived and slept. It can hardly be imagined that such cellar-like rooms could be let as tenements. They are about 9ft. square and very low. The closets in the back yards of these houses are indescribably filthy: they are simply abominations. The upper rooms, though more habitable, are dirty and dilapidated; the stairs look very shaky, and the ceilings, floors, and walls more or less broken, and a comfortless sort of life at the best must be passed by the inmates with such wretched surroundings.

The "Report of the Dwellings Committee of the Charity Organisation Society," just issued, deals in a very direct manner with the momentous question of housing the poor, and the difficulties encountered in carrying out the provisions of the *Dwellings Acts*. It throws a good deal of light on the possibility of the very existence of such fever dens as we have been describing. The obstacle to all action in providing the working classes with suitable dwellings in the interior of London rests, as the Committee point out, on the inability to purchase for this object. Building associations are powerless to deal with corporate or private owners directly, and the only remedy is for some authority, such as the contemplated Municipality in London, or the Corporation or Metropolitan Board of Works to compel purchase of condemned property such as this for improvement, allowing compensation to the owners under arbitration; but it cannot be denied, that for capital to be available for buildings of this class the Loan Commissioners should lend at a lower rate than 4 per cent. With regard to the question of repairs, *Torrens' Act* throws the responsibility of repair chiefly on the owner, and the *Artisans' Dwellings Act* upon the local authorities. The former, as it stood in 1875, contemplated demolition of dwellings unsuited for habitation, and therefore could not be largely applied to the metropolis. It is evident also in the working of any Act, the perplexities arising out of several ownerships in one area have to be met. These have, to a certain extent it is true, been removed by the *Artisans' Dwellings Act*, 1875-79, which proposed that ill-built and densely-inhabited parts of the metropolis, where fevers and deaths were constantly taking place, should be pulled down and reconstructed, provision being made for the tenants thus displaced. The action taken under this Act has been very small in the City. The two Acts are rather conflicting. The report before us, in one of its conclusions, states: "It appears in the metropolis, owing to the different incidence of the rating and other causes, the effect of the *Artisans' Dwellings Act* of 1875 has been to weaken local responsibility and to impede action under *Torrens' Act*." The Charles-street experience has, undoubtedly, proved the truth of this remark, and we think the recommendation of the committee, that *Torrens' Act* might be enlarged so as to include a few houses not themselves uninhabitable or removable for the erection of open spaces or the opening out of alleys and courts, one deserving attention. But there are other obstacles in the way of carrying out these Acts. The present system of local government rather impedes than facilitates the removal of such neighbourhoods as we have described. The medical officers and inspectors make up a large army of sanitary officers, who have, in many cases, private practice and business to attend. The cost of acquiring cleared areas under the Acts of 1875 and 1879 for the erection of labourers' dwellings have, however, been the main obstacle in the way of improvement. A very important table is given in the report, which shows the high prices paid by associations and others for land for dwellings. Some of these are as high as 4s. 10d. and 13s. 4d. per square foot. Another table

gives the cost, per family, of providing dwellings. In central positions the average cost per family has ranged from £171 to £315; but the cost on Miss Octavia Hill's plan is about £118. It is evident that no association without special aid can make these figures remunerative. The rents charged are out of all proportion to the wages of the labourer. The very lowest estimate, as given by Mr. Gatliff, is about £52 a room, which, at 7½ per cent., would be 1s. 6d. per week; rates and taxes, ground-rent, &c., would bring it to 2s. 2d. for each room—more than the poor can afford to pay. This rent is exceeded by many. Many rooms let at 4s., and such a price can only be paid by the upper class of artisans. The value of property, the procedure under the Acts, the compensations to owners and lessees, have proved, as the report informs us, so serious a hindrance and burden on the rates, that action in London and large towns has been suspended. Land acquired at £1 1s. 8d. per foot has been sold with difficulty at 4s. 8d. per foot, and the conclusion to be drawn is easy. The wages of the working man of the lower class cannot afford to pay for clearing away costly sites at such a price, and also to provide a fair dividend on the outlay in building improved dwellings. Thus, it is very fairly contended in the report of the Minority Committee that there is no "reasonable prospect of such a reduction of this initial outlay as will ever bring the cost of central sites in the metropolis, and the dwellings erected on them, within the means of those on whose behalf the Legislature has endeavoured to intervene, and that this condition is one of increasing difficulty." The recommendations of the Committee, are the following: (1) That the scale of compensation under the Artisans' and Labourers' Dwellings Act of 1875 and 1879 should be reduced, and the mode of procedure simplified. (2) That these Acts should be converted into a Towns Improvement Act, in the application of which the needs of the labouring classes should have due consideration, but that no rigid rule should be laid down with reference to the replacing of dwellings on cleared sites. (3) That effectual means should be taken to insure the application of Torrens' Act in London, and of the Sanitary, Public Health, and Building Acts, both in London and in the suburbs. (4) That all railway companies should be required by law to run cheap workmen's trains similar to those on the Great Eastern Railway to Enfield. Every one who has watched the labours of Associations for improving the dwellings of the poor, and the very inadequate realisation of the objects they had in view; the tardy response of those classes for whom dwellings have been built, and their occupation by a class of artisans who can better afford to pay higher rents, will endorse these recommendations. We believe nothing will be done to rebuild central town sites till the Legislature reduces the compensations paid to owners for unhealthy areas. The price to be paid for such localities as that to which we have directed attention should take into account the miserable condition of the dwellings from which rents are extracted, and the price paid should be more in the nature of a fine on the owners than compensation. Such an enactment would tend to make owners more careful of their own interests and those of their tenants, and the houses would be accordingly looked after. The compulsory adoption of improved bye-laws for suburban dwellings is also one of the chief preventive measures demanded in localities which are now rapidly filling up in the suburbs, by the labouring class in search of dwellings. By such means, legislation may yet do something so arrest the disgraceful condition of the houses of the poor, and induce owners of houses to keep them in a state suited for a civilised community.

HANOVER GALLERY EXHIBITION OF PAINTINGS.

THE autumn exhibition of paintings and water-colour drawings at the Hanover Gallery, New Bond-street, opened last Saturday. C. W. Pittard, whose "Dominio Sampson" appears first in the list, has shown a decided talent for humorous caricature. Bold and vigorous in execution, in which the pigment is put on with no sparing hand, is Oliver Baker's "Derbyshire Mill." The colour is natural. A well-painted distance is given by Geo. Bassett, "On the Elen, Westmoreland." Quite Burne-Jonesian in style is Albert Besnard's "Sweetness." The face is more indicative of misery than sweetness, and the ideal of the painter is evidently borrowed from that intense realism of the ascetic side of life, which the disciples of "high art" affect. The features and hands, by the way, are very delicate, and the face belongs to one of those beings which are too unearthly to be human. The same artist's "Sorrow," a full-length figure of a woman draped in a long black robe, is another conception in the same vein. The woman's hand clutches her heart and has inflicted a deadly wound, from which the blood has poured into a pool at her feet. The idea is too sanguinary and painfully realistic to meet with admirers, and we turn to other pictures. "The Market Boat, Venice," by W. Henry, is pleasing in subject and colour. T. Whittle's picture of "Our Saxon Forefathers in a Pleasure Boat" is crude, and we pass on to notice J. W. Bottomley's "Driving Home" as a well-studied group of cattle. "On the Tummel, Perthshire," by Robt. Harwood, is a very pleasant autumnal landscape. The distant mountains and the yellow foliage which overshadow the stream are effectively painted; and near it we mark "Alderney Cows," a clever study (20). "In Maiden Meditation" (21)—R. Macchell seems to us spoiled from the fact that the artist has injured his subject by the crowded and garish accessories of the room. The mantelpiece with timepiece and other ornaments is faulty in drawing, and the composition and colour are wanting in repose. The best part of the picture is the light which falls upon the delicate china service on the table. F. Tully Lott's "Canterbury Cathedral from the Stour" is pretty; the distance and old gabled houses facing the river are carefully painted. No. 25, "A Diana of the 16th century" is a well-executed study, and the features and dress are painted with much expression and care.

Many pictures of incident are hung. We notice J. Cayton Adams's "Waiting for a Bite," a fresh-looking study; E. J. Broughton's "Confirmation" (32)—three young girls at the altar, the fault of which is a stiffness in the drapery, but it is otherwise feelingly painted; W. M. Egle's "Grace," a prim little girl with hands clasped at the table dressed in a Dolly Varden cap, noticeable for the transparent flesh tints and finished execution. The dark green tapestry background and dado are in good keeping. F. A. Verner's Canadian picture (31) is bold in its masses of water and foliage, but the touch is heavy; T. Ireland's "September Morning" is truthful and freshly painted; and H. Caffieri is the exhibitor of two or three of his charming bright woodland pieces. "Morning in June," a study of a birch glade with children, is springlike, and we never tire of the light sunny effects of this master of foliage in its brighter aspects. The light of the sky is produced, as in all his pieces, by a skilful dappling of white pigment on the green, a mode of handling productive of very soft aerial effects. No. 85, "Misty Morning," is full of soft misty sunlight, and both are thoroughly French in feeling.

Among figure studies we must mention

Rosa Koberwein's ideal face amidst a shady folial background (43); the expression is sweet, though we think hardly an embodiment of the poet's lines which seem to have suggested the theme. The most remarkable picture, probably after that of "Sorrow," is Margaret L. Hooper's imaginative canvas "Twilight—Our Lady of Oblivion" (58). The conception is thoroughly poetical, and the face and drapery of the tall, life-size figure, which is painted in the dark, sombre hue of night, are unmistakably those which we have seen in Mr. Burne-Jones's ideal pictures. The drapery of a blueish green and the background of funeral pines, are strikingly conventional—to bestow no higher praise. "A Modern Sibyl" is another clever subject by the same artist, evincing power. We must also note on the same wall some very pleasing landscapes and subjects of incident. "Dutch Boats," by C. Thornley, is pleasantly grouped; "Will-o'-the-Wisp" (45), by O. P. Yglesias, is equal to the artist's former work—the mist and impasto handling are skilful; "Easter Tide on a Welsh Stream" (65), by H. Howard, is a conscientious transcript of Nature; "French Poppies" is boldly painted with a depth of tone in background which reminds us of an old canvas. There is a little crudeness about Ellen Conolly's "Village Smithy," though the rendering of the forged iron is admirable. A very singular piece of technical execution is J. H. Pollen's "Genoa from the Land" (78), also "Florence" (117). The canvas is unprepared, and the pigments are put on the rough texture, producing the peculiar effect of a coloured crayon drawing a little way off. The surface presents a dead absorbent appearance, more conducive to effect at a distance. A. Heleke's "Showery Weather" is a freshly-painted bit of common, and A. Durer Lucas's "Wild Heath" for finished execution surpasses anything in the gallery. The same artist sends "Blackberry" (106) and an ivory fan, with the seasons and months emblematically represented by miniatures of wild flowers, both delicate *morceaux* of execution and finish. John R. Dicksee, in "Alice Lee Woodstock," shows a happy rendering of an age which artists delight to portray. Leonard Cattermole's "Pass in the Corner" is decorative in conception and colour, and clever; and we must not forget to mention the charming sketches by Clara Montalba (136, 142, 143); Matthew E. Hale's well-drawn and chastely coloured face, "Modesty," especially the same artist's skilful and masterly portrait of a lady, her face shaded in a large black brimmed hat and white frilling, and entitled "Patience." Both are ideal studies of womanhood, and are painted with feeling and power. A few other pictures of merit strike us in Nos. 142, 143, 146, 151, 153. H. T. Schäfer sends a pleasing *genre* subject "Sea Breezes"; No. 144 is pretty; No. 80 is fresh, and 77 may be looked at. One of the smaller pictures of simple incident which merits attention for feeling and colour, is No. 109, by James E. Christie, a little girl in a poppy field. A vigorously-painted picture, and dramatically told incident, is by A. Ballin (153), but is too black in its shadows to be ranked as a gallery picture. It is to be regretted such studies as No. 40, 279, 282, 283 have been hung.

In the water-colours, we can only glance at a few drawings. "Roses," by Emily Jackson, is crisp and truthful in colour. "Confidential" (175), by C. J. Lewis, two girls on a rustic bridge; and Rosalie, W. Watson's sentimental bit of apple blossom and a pair of youthful lovers, go together.

We single out an architectural sketch of "Innholder's Hall, College-street," by Charles J. Watson, a clever bit of old London street architecture; a view of "Lincoln" (230), by Andrew B. Donaldson, in that

artist's hard and conventional style of colouring; "Antwerp Cathedral," by Miss Deane (234); and "St. Jacques, Dieppe," by Lennard Lewis; the last shows some interesting work, and the colouring is transparent. A rather washed-out effect is given in Max Ludby's "Early Spring." Mrs. Paul Naftel contributes a small Welsh sketch, which is skied (246), and we may refer in commendation to a sketch by Miss Deane (248), an old Inn-yard at Bacharach, by J. D. Barnett; a sunny sketch in the New Forest, by Miss Kate Prentice; a hold drawing of a Cornish Valley (305), by Henry Bailey; Linnie Watt's "Blossom," also Nos. 326, 330, 322, &c. A large historical drawing by Andrew B. Donaldson represents "The Expiation of King Henry V. for the Soul of Richard II." There is undoubted skill shown in this curious Mediæval composition, and the drawing and colour are in strict harmony with the theme. We cannot leave the gallery without bestowing high praise on a terra-cotta bust of an Italian boy by Henrietta S. Montalba, a sister of the talented painter, and Geo. H. Saul's marble medallions, representing Night and Morning, are able contributions to the sculpture.

THE WATER QUESTION.—XX.

FLOOD-REGULATION AND WATER-STORAGE.

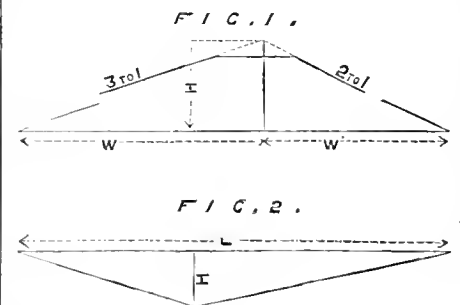
TO stand in the middle of an extensive valley, by the river, and consider how the injurious effects can be prevented, any reservoir for that purpose would seem to need to be preposterously large, to have any effect there. But that is not the point from which the question should be regarded; it would be beginning at the wrong end; rather, let every thousand acres downwards from the watershed be considered separately or at most in areas of a few thousand acres together, and making sure provision for the floods of each, proceed step by step towards the middle and lower portion of the valley. It is said that in France this question has been discussed since the year 1856 with regard to the valleys of the Seine, the Rhone, the Loire, and the Garonne (*vide* Foreign Abstracts, Min. Proc. Inst.C.E., Vol. LXVI., "On the insufficiency of reservoirs for diminishing the danger of floods," by M. Gros), and that in the case of the Garonne a reservoir capacity of 720,000,000 cubic yards would be required "to protect Toulouse" from a flood similar to one which occurred there in 1875, and the conclusion is that the reservoirs which had been proposed for providing against floods in these vast areas must be abandoned. No doubt the French engineers have sufficient reason for coming to this conclusion, on this scale of things. The Seine, as appears upon a geographical map of France, is 400 miles long, and drains 30,000 square miles; the Loire is 530 miles long, and drains 45,000 square miles, and the Garonne is 300 miles, draining 32,000 square miles, and the Rhone 35,000 square miles in France besides a further tract in Switzerland; indeed, these four rivers appear to drain about two-thirds of the whole country. But for the purposes of river-conservancy in England the requirements are less grand. Here we have in England and Wales but 57,800 square miles altogether, divided into 211 distinct watershed areas or river basins. Many of these, however, are not injuriously affected by floods. The number is made up of 54 draining 7,046 square miles towards the south coast, being an average of 130 square miles; 30 draining towards the east coast, an area of 16,084 square miles, the average being 536; 29 draining towards the north-east coast, an area of 13,291 square miles, being an average of 457; 17 towards the north-west coast, draining an area of 2,345 square miles, or an average of 133; and 81

on the west coast draining 19,029 square miles, or an average of 236 square miles each. Even these are large areas, and a thousand or two thousand acres is a very small part of some of them, and the regulation of the flow off the ground of excessive rainfalls on any such area would do but little to mitigate the effects of floods in the lower part of such large areas. But it stands good for its own position, and if it deals with floods upon its own area it is an effectual work, so far; and the effect may be extended downwards to any distance to which favourable sites extend.

Referring to the example last given of a regulating dam made separately, if it cost £10 an acre it would be an expensive work, for at 5 per cent. interest it would be equivalent to a yearly contribution of 10s. per acre towards getting rid of the floods in the lower part of the valley, which, being made, it would entirely prevent in proportion to its own area. But a separate dam to be made for a drainage area of 1,000 acres only, and costing £10,000, would be an extreme case in point of expense, and we have purposely adduced it for that reason. Where the provision for regulating floods can be combined with a useful reservoir the expense would be very much less. An example has been given of a reservoir and of a regulating dam, each made separately, the reservoir to contain 46,000,000 cubic feet for a drainage area of 2,000 acres where the average annual rainfall is 33in., and the dam to contain 12,000,000 cubic feet per thousand acres of the drainage area irrespective of annual rainfall. Let an example now be taken in which the two are combined: The rainstorm producing 4in. in depth of water, of which a quantity equivalent to 3in. in depth might flow into the regulating dam in a short time, was taken in the preceding examples as proceeding from 1,000 acres of ground, but it might extend over the whole 2,000 acres taken as the drainage area in the example of the reservoir, and in that case 24,000,000 cubic feet of water would have to be provided for in addition to the 46,000,000 of the reservoir, making together 70,000,000 cubic feet. This would be impounded by an embankment 70ft. high.

The quantities of earthwork in embankments of different heights on the same site are proportionate to the cubes of the heights, if to the height of the bank itself be added a height equal to the width of the top of the bank divided by the ratios of the two slopes added together; thus, if the slopes are 3 to 1 and 2 to 1 respectively inside and outside, and the top width of the bank is 20ft.,

$\frac{20}{3+2} = 4\text{ft.}$ to be added to the actual height of the embankment to find the apex in which the prolongation of the two slopes



would meet, and to which point the height is to be measured. Fig. 1 being a cross section, and Fig. 2 a longitudinal section of an embankment, the cubic contents are—

$$\frac{L \times H \times (w + w')}{2 \times 3}$$

In many embankments some part of the

ground towards the middle of the bank is more or less flat, but for the purpose of comparing the quantities of earthwork in embankments of different heights, the side slopes may be assumed to meet in a point, somewhat lower than the actual surface of the ground at the middle of the bank. If there are on a particular site 80,860 cubic yards in an embankment 60ft. high above this point, there would be in one 70ft. high—adding in each case 4ft. for the apex—

$(64)^3 : (74)^3 :: 80,860 : 125,000$ cubic yards, and, deducting the puddle wall, the embankment would be 116,000 cubic yards, for a storage-room of 46,000,000 cubic feet, with the addition of a space of 24,000,000 cubic feet to receive a flood from 2,000 acres.

The water coming into the 46,000,000 c. ft. space would be discharged by the same valves and in the same manner as has been described, the only difference being that the valve tower would be 10ft. higher, and the water which would rise into the upper space of 24,000,000 cubic feet would be discharged by a separate sluice, nearer the end of the bank, at the level at which the waste weir would otherwise be laid, and by the same means as was before described for a separate dam, there being for this discharge a separate culvert; and it might advantageously be placed near that end of the embankment at which the byewash would be made, and might discharge into it. The sill of the sluice would be laid at a depth of 10ft. below the assumed top-water level of the flood space, leaving the lower space, or reservoir proper, intact; but the invert of the culvert should be laid a foot lower. In the other case the height of the sluice-opening was described to be greater than the width; in this one the width should be the greater, and it may conveniently be made twice the height.

In this reservoir there would be a depth of 10ft. above the level, which would otherwise be the top-water level, to contain a flood, instead of its running away over the waste weir otherwise provided at the height which allows 46,000,000 cubic feet of water to accumulate before any passes over it. The top-water level is 10ft. higher, and the top of the bank is 6ft. higher still. This provision of 24,000,000 cubic feet of space for a flood stands instead of the provision of a waste weir and byewash, which, logically, are unnecessary. But to run no risk let them be provided, although they will not be required, in all probability. But they need not be so capacious as if no such flood-space were provided. Let them be of half the capacity. The estimate would then stand thus:—

	Quantity.	Price.	
		s. d. £	
Clearing the seat of the embankment	15,600 sq. yd.	0 2	130
Excavation of the puddle trench	13,000 c. yd.	5 0	3,250
Clay puddle	22,000 "	2 6	750
Embankment	116,000 "	1 6	8,700
Load on top of embankment	1,000 sq. yd.	2 0	100
Covering the inner slope with stone	9,000 "	2 0	900
Soiling the outer slope	7,200 "	0 2	60
Excavation for culverts and valve-tower	5,600 c. yd.	4 0	1,000
Ditto for byewash	2,000 "	1 0	100
Concrete in foundations	500 "	6 0	150
Ditto in byewash	1,200 "	7 0	420
Brickwork in culverts and valve-tower	"	21 0	1680
Gravel puddle	30 "	4 0	160
Stone sills, caps, coping, &c. ..	1,200 c. ft.	2 0	120
Valves, sluice, and other ironwork ..			300
Footbridge			200
Gauge-weir			100
			19,520
Contingencies			1,980
			21,500
Land and fencing			6,500
			£28,000

Adding to this a sum of £3,000 for expenses other than those of works and land, the cost of the combined reservoir and regulating dam in this situation would be £31,000, and deducting the cost of the

reservoir alone, as found before—viz., £22,000, the cost of the provision for floods thus combined with a storage reservoir would be £1 10s. per acre, or equivalent to a yearly contribution, at 5 per cent., of 4s. 6d. per acre.

Thirty-three inches annual rainfall, adopted in the example of a storage reservoir, is not far from the average of the whole of England and Wales, but the average of the upper and middle portions of the river basins is greater. The work about which these general remarks are made can be practically dealt with in no other way than by taking each case as it arises with its attendant circumstances; but we may give one other example, with a more extended area and a greater rainfall, where the area is 3,000 acres or a little more, and the average annual rainfall is a third greater than that before assumed, i.e., where it is 41in. Here the mean of three consecutive years of least rainfall would be about 36in., and deducting 12in. for evaporation, &c., the available annual depth is 24in. This yields, by means of a reservoir, a daily quantity the year round of 720,000 cubic feet. If one third be discharged into the stream there are left for supply 480,000 cubic feet per day, or 3,000,000 gallons.

Where there is this amount of rainfall there will probably be a greater number of wet days than where the amount is but 33in., and the number of days' supply the reservoir should hold would therefore be less. Let it be assumed that 150 days would be in this case the proper length of time during which the storage must be depended upon. This would indicate a reservoir capacity of 108,000,000 cubic feet. If the same proportions be followed as before, this quantity would be contained in a reservoir having a depth of 72ft. at the site of the embankment; but let the depth be taken at 4ft., and the height of the bank at 80ft. The top width of the other banks is assumed to be 20ft.; in this one let the top width be 24ft., or if the 20ft. be retained, let the quantity of earth equivalent to the extra 4ft. be added in benches on the outer slope. The embankment would then contain, after deducting the puddle wall, 174,000 cubic yards, and the estimate for this reservoir would be as follows:—

	Quantity.	Price.	
Clearing the seat of the embankment	21,600 sq. yd.	s. d. £	0 2 140
Excavation of the puddle trench	20,400 c. yd.	5 0	5,100
Clay puddle	32,400 "	2 6	4,050
Embankment	174,000 "	1 6	13,950
Road on top of embankment	1,200 sq. yd.	2 0	120
Covering the inner slope with stone	13,000 "	2 0	1,300
Soiling the outer slope	9,600 "	0 2	50
Excavation for culvert and valve tower	5,500 c. yd.	4 0	1,100
Ditto for brewash	6,000 "	1 0	300
Concrete in foundations	550 "	6 0	165
Ditto in brewash	3,230 "	7 0	1,120
Brickwork in culvert and valve tower	1,050 "	24 0	1,200
Gravel puddle	300 "	4 0	180
Stone sills, caps, coping, &c.	2,000 c. ft.	2 0	200
Valves, &c.			270
Footbridge			230
Gauge weir			200
			28,845
Contingencies			2,855
			31,700
Land and fencing			9,300
			£41,000

To this, for other expenses than those of works and land, let £1,000 be added, making £45,000. This, for a storage of 108,000,000 cubic feet, would be about £420 per million.

To complete the form in which we desire to put this question of water-storage combined with flood-regulation, let now 21,000,000 cubic feet of space be added to this reservoir, which is assumed to be of suitable capacity for an area of 3,000 acres and an average annual rainfall of 41in.; while at the same time it is assumed that one rainstorm in any district of a few square

miles amounts to 4in. in depth over an area of 2,000 acres only; and that, of this depth, three-fourths run directly off the ground, making 24,000,000 to be added to 108,000,000, or together requiring a space of 132,000,000 cubic feet. This would be impounded by an embankment 86ft. high, which would contain, after deducting the puddle wall, 214,000 cubic yards, and the whole cost of this reservoir, with the addition of the flood space above mentioned, would be £15,000 for works and lands, to which may be added £5,000, making £50,000. This reservoir would equalise and render useful the streams of 3,000 acres of ground, and the addition of the flood space would protect that area from any demand for contribution towards the funds of a river conservancy board. If the supply of water from the reservoir—viz., 3,000,000 gallons per day, pays for its construction and attendant expenses, the cost of this flood protection would be very small, being £5,000 for 3,000 acres.

SHOP WINDOWS.—III.

(Continued from page 554.)

THE manufacture of glass has made rapid strides since the abolition of the duty upon it. Prior to 1845 there was little enough inducement to try experiments in the development of new processes, as the duty was levied, not on the perfect glass that left the oven, but on the material that entered it, much of which was destroyed or rendered useless in the firing. Some thirty years ago the Bohemian glass was considered the "ne plus ultra" of vitreous art, and was the admiration of the connoisseurs of the day. Now it is almost out of date; and few—among, at any rate, the more æsthetic portion of the community—would care to see it about their houses. The removal of the duty gave a sudden impetus to the English glass-works, and science and ingenuity combined soon effected an entire transformation in its production and treatment. While the material itself remained expensive, the articles were heavy both in form and substance, and a large amount of labour was bestowed upon cutting, the only form of embellishment then practised. Now, nearly all glass-ware is made as light and delicate as is consistent with the necessary strength—sometimes, indeed, far less so, as housekeepers with careless servants know to their cost—and, when ornamented at all, is, usually, either moulded, engraved, or etched with hydrofluoric acid. Cut glass, however, is by no means defunct, and we should be sorry it should become so. While sacrificing one characteristic of the best glass, viz., its perfect transparency, cutting increases its brilliancy, and brings into play the prismatic refraction, which imparts to it an additional lustre. The best cut glass of the present day is perhaps that of Osler, of Birmingham, especially in its application to chandeliers; but there is a great tendency to overdo this treatment, and we not unfrequently come across glass-cutting run simply mad.

Much of the modern table-glass is extremely elegant, and wine-glasses may easily be selected the stems of which, with ordinary care, do not readily "unscrew." The plain specimens depend for their effect upon the purity of the material employed and the chaste outlines of their form, aided, perhaps, by artistic modelling, or applied work. When surface-decoration steps in, we no longer find it comprised in sprawling fern-leaves and idiotic scrolls; but each article receives a well-considered form of embellishment, whether it be a simple border neatly etched upon a tenpenny wine-glass, or the richly-engraved arabesques upon decanters at so many guineas a-piece. In this, as in many other branches of manu-

facture, the English are now "facile princeps," and we trust they may long continue so.

The revival of the old Venetian glass by Dr. Salvati, at his factory on the Lagoon, is noticeable, not only in itself, but for its influence upon British make. Salvati's glass best combines many of the beauties and many of the defects of its ancient prototype. Quaint in design, rich in the colouring of certain portions, and opalescent in others, unconventional (if we may use such a term for want of a better) in its texture, and bearing the unmistakable impress of individual handiwork; its quaintness, nevertheless, often merges into extravagance, and its details frequently outrage all propriety of treatment as shamelessly as the east iron and Dresden china of which we have already spoken.

The Venetian glass has had an unmistakable influence upon the modern English; but the latter, if wanting in the bold invention and artistic feeling that characterises most of the Murano products, is also free from their vagaries and defects.

We have not the space to enter into an exhaustive notice of stained glass, and we shall, therefore, add nothing to what we have already said about it in dealing with decorative materials. But plate-glass demands a word or two. We can by no means look upon this material as an unmixed blessing. True, it is a comfort to be able to look at our neighbours across the street, or at the hills across the valley, without the distortion created by the old crown, and, to a lesser extent, by the more modern sheet-glass. But plate-glass has had a most baneful influence, not only on shop-windows, but (in the form of the huge mirrors) on half the drawing-rooms in England. In fact, this very material gave rise to an almost interminable feud between two men no less cultivated than Sir Charles Barry and Prince Albert, the latter of whom conceived the astounding idea of lining the House of Lords with looking-glass! Fortunately, Sir Charles' artistic and independent spirit carried the day, and saved us from being the laughing-stock of Europe—though at an immense sacrifice to him of Court influence and legitimate emolument. The great development of stained glass has, however, somewhat moderated the excessive rage for plate; and we may, therefore, hope to see its use confined by degrees within more reasonable limits.

The jeweller's handiwork is one legitimately within our ken, and, like the silversmith's, it has not kept pace with many others in improved taste.

To speak generally, we may look in vain among the London shops for the exquisitely beautiful specimens of the goldsmith's art that greet us in Continental towns; and although as regards finish, our English work is probably superior to most of the foreign, it is, nevertheless, singularly unimaginative. At some of the first jewellers are occasionally to be seen very lovely articles, and we have lately observed some highly artistic settings of pearls, with topaz, onyx, or amethyst. But the brooches, bracelets, locketts, and scarf-pins of the usual types, though delicately worked, evince a sad poverty of invention, and are anything but worthy of our times. We are glad to note an increasing use of the last-named gem. Among the less costly jewels the amethyst is one of the largest and most beautiful, and its rich purple colour contrasts perfectly with dead gold. When thus set—especially if relieved by pearls or white enamel—it forms as lovely an ornament as we can call to mind.

The demonetisation of silver has thrown vast quantities of this metal into the market at a reduced value, and hence has grown up the present large manufacture of silver ornaments. These, as a rule, are far more elegant

than those of proportionate cost in gold, the Birmingham necklets in particular, with pierced or fretted links, and some of the bracelets, being particularly charming. Much of the chasing, too, though not always in the best taste, seems to receive more attention than that of articles in gold. How far this may be due to an antiquated, though still prevailing, notion that gold, from its greater intrinsic value, must necessarily be—without reference to its artistic treatment—a greater personal adornment than silver, we cannot say. But the fact remains, that in silver the average of ornaments are better treated than in gold.

We need hardly speak of diamonds, emeralds, and rubies, as it is on a very small scale only that they figure in shop-windows; but some of the best kinds of low-priced "jewellery" are articles which, really, are not jewellery at all. The Scotch treatment of parti-coloured pebbles (and, occasionally, of real gems) in a silver setting, is frequently most effective. The blues and reds of the Roman mosaics, with their minute tessere, often lend themselves most happily to the completion of a lady's toilette, and we have been particularly struck at Whitby by brooches of Florentine mosaic delicately mounted in jet. All these, like cameo brooches and pins (which are now almost invariably set with quiet, good taste), possess the twofold merit of comparative cheapness and considerable refinement, and indicate in the wearer a higher notion of the æsthetic than the more expensive and pretentious articles of plain gold. Of aluminium it should not be our cue to speak; but its introduction has had no beneficial influence on morality in dress. Cleverly as it is manipulated, and often difficult to distinguish from gold, it is simply a lie, and as such is as objectionable as the gold-plated shams and imitation jewels of the Palais Royale. Better far, for those of slender means, the brass or leaden ornaments that one sometimes sees abroad, than such deceitful rubbish! Still, with the ever-increasing love of display, and the demand for what is cheap and nasty, it is not likely that the manufacturers will cease to flood the market with what commands a sale.

However much we may extol the improvement in taste and design in most branches of manufacture, we regret to find a great falling off in make and quality, and this most notably in textile fabrics. Where shall we meet with the materials for a sheet such as we lately saw in use, marked 1827? Or where the fine and delicate napery that once passed from mother to daughter through successive generations? The good old English term of "spinster" has ceased to have a significance, and become the absurdest of anomalies. Instead of the ample equipment with the household linen, made from time to time, and as a marriage dowry, by the deft and delicate fingers of those who were in time to become the mothers of our future gentlemen—linen that was literally "laid up in lavender" when not in actual use—we find, in many a pretentious house, a beggarly complement of articles from the Tottenham Court-road, that, by a stroke of good luck, and the blessing of a careful washerwoman, are fortunate if they last a twelvemonth without renewal or repair! Carpets, upholstery materials, and those handled by the milliner and dressmaker, have all shared the same fate. This deterioration is, no doubt, mainly attributable to the increased demand for cheapness and variety. Within certain limits this demand is a natural and healthy one; and its satisfaction affords to many the means of possessing things that would have been impossible to them a generation ago. But we are decidedly of opinion that the proper limits have been exceeded; and we think it behoves our leading manufacturers to set an example of en-

deavouring to stem the tide of inferior production, before its effects become seriously disastrous to our commercial morality and reputation.

Though not strictly within the scope, perhaps, of a professional paper, there is one more matter on which a few brief and concluding remarks may not be quite out of place while upon a subject such as we have been dealing with—viz., the arrangement of wares in shop-windows for the purpose of display, or, as it is technically termed by tradesmen, "window-dressing." This is an art of which the principles seem very little understood, but which is equally important as regards the improvement of public taste, and the emolument of the vendors. In an article on "Shop-Fronts" we spoke, some time ago, of some of the evils attendant on the enormous shops now so common; but there exists yet another in the greatly increased difficulty of dressing these huge interminable windows. Every stage-manager knows the difference between preparing a spectacle for such boards as those of "Covent Garden" or "La Scala," and those of the "Prince of Wales's" or "The Court." The same thing applies to shop-windows. The larger they are the more difficult, and, therefore, the worse, is their dressing. We could name many of the smaller drapers or milliners, for instance, whose windows are always elegantly set out; but those of the largest drapery establishments are nearly all so many editions of chaos. This is not to be wondered at; for the principal, whatever be his own taste and skill, can hardly devote much of his personal attention to the tedious and laborious work of filling these acres of plate-glass. This task is consequently left to shopmen, who cannot be expected to possess the feeling for form and colour, the knowledge of analogy and contrast, and the experience in grouping and general arrangement, that are imperatively necessary for success in such a task. Hence we find in one establishment, walnut loobles supporting iron bedsteads or easy chairs; in another, expensive velvets festooned over coal-scuttles; in a third, Brittany butter and Brummagem hardware fraternising with a touching sympathy. If we turn to a large drapery house, we shall meet with mantles, bonnets, petticoats, and gloves, all elbowing each other in a hopeless confusion, that becomes still worse confounded by yards of lace and ribbon, and bales of silk poised upon each other like the structures that our children build with their box of bricks. Sunshades open, sunshades shut, sunshades topsy-turvy, and sunshades dangling from the gas brackets or stuck into their chimneys—each one in an attitude different from its brother (or perhaps we should say its sister)—distract the eye, and drive one nearly crazy. In some of the best-kept windows we may find a distinct and leading idea, carried out with ability and refinement. This breadth and unity of treatment is somewhat a speciality of Bond-street, where we notice a "tone" in the window-dressing, wholly distinct from, and much superior to, that of most other streets, at least in this country. Not long ago our attention was arrested here by some fifteen or twenty immaculate shirt-fronts, placed with mathematical precision between as many crumpled handkerchiefs of dark blue silk; and we have seen a most effective display of nothing more attractive in themselves than bilious-coloured yellow stockings that would have gladdened Malvolio's heart. A chemist's shop is not an establishment calculated to inspire one with a fierce enthusiasm; but, in trimly-arranged windows, a choice collection of black draughts becomes almost as appetising as the bundles of asparagus and baskets of strawberries, arranged with equal symmetry at the leading fruiterers'. The small articles dealt with in such busi-

nesses as the chemist's, the watchmaker's, the bookseller's, and the Italian warehouseman's should be placed together in such numbers, with such regularity, and of so similar an appearance as to form them into large groups; and a few only of such groups should be exhibited at once. By such means the same repose and breadth are attained, as in the display of a single inlaid cabinet or a couple of embroidered ball-dresses. Foremost in the arrangement of the goods displayed in their respective windows are, naturally, the best decorators, and some of these gentlemen's displays afford a gratuitous lesson in taste that is well worth learning.

A few words will suffice to sum up what we have said on window-dressing. The window should be no larger than is necessary, and should never be overcrowded. There should be one leading idea in each successive display, which should be rigorously adhered to. All the best work in the higher branches of art has been thus characterised. When Handel sat down to write a chorus, he knew what he wanted to do, and did it. It was the same with the best of Shakespeare's plays; it is the same now with Mr. Millais', or Mr. Poynter's portraits. Even the world-famed Yankee pill was true to these traditions, for it "attended strictly to business, and never went fooling about." When the articles to be exhibited are large, a very few should be placed in the window at the same time; when they are small, they should be grouped into masses with unflinching regularity. Harmonies of analogy are generally more suitable for the purpose in view than those of contrast; but when the latter are employed at all, they should be used boldly, though sparingly. Lastly, it should be borne in mind that to distract and tire the eye is to defeat the very first object of all shop-windows, and that a distinctly set intention, carried out with simplicity, uniformity, breadth of treatment, and repose, is the one great essential of effective display.* J. G. LIBRA.

CONVERSAZIONE OF THE ARCHITECTURAL ASSOCIATION.

THE 40th session of this Association was inaugurated on Friday evening by a conversation, held at 9, Conduit-street, W. The attendance of members and lady friends was very numerous, but the cloak-room and refreshment arrangements showed considerable improvement on previous years, and the inconveniences of a crowded assembly were minimised. The exhibitions of pictures and needlework usually occupying the walls of the lower galleries at this period of the year were absent, giving the committee better scope for the display of loan exhibits. These included in the east gallery, a large display of water-colour sketches from Norfolk and the Northern Counties, executed by Mr. R. Phené Spiers during a summer tour; others by Mr. F. A. Powell, from the neighbourhood of Laon and Troyes; rough cartoons for wall decoration and for stained glass, by Mr. H. Walter Lonsdale; elevations and sections of Famagosta Cathedral, Cyprus; and a well-arranged and choice collection of Eastern armour and faience, the results of a tour by Mr. Sydney Vacher; design for panel decoration, made by Mr. E. Moore, for Mr. P. Anson. Messrs. Liberty and Co. showed examples of Indian silk and embroidery for portière, Japanese cabinets, with fretwork and lacquered panels, executed by Mr. C. Bevan, and a Chinese cabinet, all containing specimens of Kishni and Satsuma ware; Messrs. Gillow and Co. lent cabinets in the Italian style; Messrs. Gregory and Co. some Turkoman curtains, arranged by Mr. W. P. Collins, from examples in Persian MSS.; the Artists' Furnishers' Alliance cabinets, and reproductions of door-furniture and other metalwork, by Dr. Dresser; and Messrs. Doulton

* We desire to correct a misstatement that we made in our last article respecting Mr. Balm's French paper-hangings. His London agent informs us that the prices of these goods have recently been reduced by something like 50 per cent., and that they are now the cheapest high-class papers to be found anywhere in the market.

and Co. had a stall of their Dou'lon ware and faience. In the west gallery the chief features of interest were the sketches executed during the recent A. A. excursion in Worcestershire, by Messrs. W. H. Lynn, R. H. A., Aston Webb, John Johnson, and Maurice B. Adams; and the photographs taken at the same time by Mr. J. L. Robinson. Some of these photos were mounted in a novel manner, introduced by Messrs. Millard and Robinson; the proofs are floated in a bath of gelatine, and then laid face downwards on the glass, the air being carefully excluded; the whole space at the back is then tinted with an even wash of any suitable coat of oil-colour. By this means the prints are rendered permanent. In those exhibited the margins were sage green, giving an opalescent effect.

At nine o'clock the meeting-room of the Institute was densely crowded, as Mr. Aston Webb was to inaugurate his duties as President for the session, by the

DISTRIBUTION OF PRIZES.

The proceedings commenced by the award, for the first time, of the Architectural Association travelling studentship, consisting of a silver medal and a cheque for £20, which was taken by Henry H. Kemp; second prize, bronze medal and two guineas, F. G. F. Hooper; third prize, bronze medal, W. A. Pite. The Essay Prize was taken by A. T. Ellison. The Architectural Union Medal and Prize had not, the President announced, been awarded, the only set of measured drawings not being considered up to the standard. In the Class of Design, W. Leverton took the first, G. W. Ward the second prize, and E. D. Pickford received hon. mention. In the Elementary Class of Design the first and second prizes were equally divided between W. G. Lander and C. Danch. In the Class of Construction W. A. Pole obtained the first, and W. J. Lander the second prize, and C. Danch hon. mention. In the Colour Class J. N. Nice took the prize. The premiated drawings were hung on the walls of this room. Immediately after the distribution, Mr. Webb delivered the

PRESIDENT'S ADDRESS.

He congratulated the members and guests on the fact that, since they last assembled in that room, the progress of the Association had been satisfactory in almost every way. The session would be memorable on account of the foundation of the first studentship attached to it. Their late President, Mr. Ernest C. Lee, announced the proposal on the occasion of the last *convocation*. The movement was heartily taken up by the members, nearly £700 being promised, and its success assured. Before the session was over, Mr. Lee had the satisfaction of awarding the first travelling studentship to Mr. H. H. Kemp, who had that evening received the medal, and the result of his trip might be seen on the walls, in a series of sketches which, he thought, had set a very high standard to future students. The classes had been well attended during the session, and the prizes keenly competed for, although the open prizes were but poorly supported. They had lost, during the year, a great friend to the Association in Mr. William Burges, A.R.A., who had left to young men an example of great thoroughness in work, strict integrity, and a high standard of professional honour. But a new session was before them, and they had now to consider how, with increasing numbers, they could best augment the usefulness of the Association, and meet the enlarged demands made upon it. Mr. J. D. Mathews, their treasurer, had suggested a course of lectures, so arranged in conjunction with the classes, as to assist those preparing for the compulsory examination of the Institute. The proposal had been met with the support of Professor Roger Smith, and would be carried out, the services of Messrs. Blashill and Tarver having been obtained. The lectures would be a very important departure from the system of mutual help and instruction on which the Association had hitherto been worked; but, like all other foundations, if the Association would continue its usefulness, it must conform to the altered conditions and requirements of the times. But the student must not think that the Association could provide him with all the education required in conjunction with his office work. He should still avail himself, in addition, of some of the many other opportunities for instruction open to archite-

tural students in London—viz., the Architectural School at the Academy, with Mr. R. Phené Spiers as master, and the valuable Academy lectures; the courses of lectures at University and King's Colleges; the South Kensington Museum and reading-room; the Architectural Museum; and the Institute library. The student was, indeed, never so well supplied with means of improvement as at present. Still, there was a lack of completeness and cohesion amongst these means of education, which somewhat detracted from their general usefulness. A strong head was needed to gather up the threads and work them into a comprehensive scheme, so as to systematise them into a complete plan of education. The Architectural Museum, for instance, containing, as it did, an invaluable collection of casts, languished sadly in Tufton-street, whereas, in a more accessible position, its usefulness might be largely increased. Some day, perhaps, they might see a united attempt made towards the foundation of an Architectural College, where their societies might be properly housed, and their students, assisted by the professors of the college, could pass through a course of systematic study, say, for two years, passing then to an architect's office, and finishing up with a one or two years' trip on the Continent previous to entering on the real business of life. But these were only dreams, and he feared, a long way from fulfilment. At the commencement of a new architectural year, members of the profession asked themselves what they were aiming at and working for, what development they had made, and how far they had advanced towards the attainment of a style distinctive of our own day. The search for a new style seemed like the old search for the philosopher's stone—hard to find, and doubtful if it could be found, while some would go so far as to think that, if found, it would not be liked. For the moment, the leading Academic styles were largely discarded in favour of a style with principles not yet formulated and capabilities not fully tested, and, therefore, not easily learnt or taught. The want of a certain directness of aim under these circumstances must be noticeable, together with a certain lack of enthusiasm, compared with even ten years ago. It was to be hoped that the increasing attention that had properly been paid to sanitary matters was not to be given at the expense of design. During the past fifty or sixty years, English architecture had been going through a course of archaeological studies, taken, curiously enough, in something like their original progression, with that progression accelerated a hundredfold. Some amongst his unprofessional hearers might, perhaps, remember when the influence of Stuart and Revett was still felt, and Grecian was thought to be the only architecture. He might remember how, since his youth, he had been hurried on, from Greek to Roman, or a freer Classic style, through all the turmoil of the various stages of the great Gothic revival; then introduced to a glimpse of the dainty conceits of Queen Anne, and even Georgian, and now finally found himself somewhat bewildered and out of breath, as he wondered whether, having been led to this point, he was going to be carried on still further, and brought face to face with a real Victorian style, or, whether, having come to the brink, he would turn back and begin the long round again. This was a question which the young men of the profession would have to answer, and on their diligence, enthusiasm, and imagination that answer would depend. They had now revived all the styles, without succeeding in doing more than revive them. They had hardly revived them or advanced them much beyond the point at which they were left by the originators. Indeed, the Italians were the only people who had ever succeeded in doing this. From the way in which the various styles had been revived, and in turn discarded, we seemed drawn to the conclusion that they were each brought to the highest perfection possible before being abandoned by the old workers. We had now reached the further stage, when all the previous epochs of architecture had been tried, and in some sense found wanting, and now, if ever, a departure must be made. If the departure should occur, it would depend for its life as much on the intelligent interest and the support of the general public, as on the energy of the members of the profession. In all arts subsidiary to architecture there was an increasing interest, and architects might justly claim a share in the

initiation of this. Since, and commencing with the Gothic revival, great attention had been paid to furniture, decoration, needlework, and even ladies' dresses, all of which had been designed by architects. So great an improvement had been made in these, that architects were now, he trusted, able to give less time to such matters and more to architecture proper—the real building in brick and stone. There were now certain well-known æsthetic villages not far from town, where people lived in “cotts,” and filled their gardens with sunflowers, where ladies dressed to suit the houses, and where anything but red brick and white-barred windows were absolutely tabooed. We could not all live in “cotts” even if we wished to, nor all be surrounded with the quaintness of these villages these villages furnished, but the improved taste of the public might assist in checking the miles of dreary stuccoed dwellings with which our suburbs were being burdened. Year by year an overwhelming stretch of Portland cement and stucco was laid upon us thicker and thicker, and we could not remove them, though they fortunately show, in most cases, a great desire to speedily dissolve themselves. Surely it was the fault of the public themselves if this class of building was allowed to still further increase. Let the speculating builder be given to understand that it was to his interest to supply something of better character, and he would find means to do so. These æsthetic villages showed that houses might be built of honest materials, and yet pay, and that palatial monstrosities, badly planned, badly built, and badly drained, were not a necessary evil of the 19th century. Great efforts had been made in recent years to improve the dwellings of the labouring class, but they hardly required improvement more than the suburban dwellings of the middle classes. Our churches had now been nearly all restored. Let architects now set to work to restore something like design in our residential streets, and, more fortunate than church restoration, it would probably be a long time before a society would be started to oppose it. Architects were powerless in the matter unless backed by public opinion, because their aid was not sought in the erection of the houses he condemned. Architecture, to be a living art amongst us, upon which architects can work with the full sympathy of the public and each other, must not be reserved for display only in public buildings, but must also be found in our smaller houses, so that, beginning with the lowest end of the scale, we could work upwards. They looked to such gatherings as the one held that evening, as one of the means by which the general interest in the architectural art might be extended. When this was accomplished, and a knowledge of architecture more widely diffused, the result would be seen in the fact that, not only great buildings, but also the smaller dwellings, would be designed in beauty and built in truth.

Professor T. ROGER SMITH expressed a hope that the numerous attendance that evening was a promise that the session, which would be a more than ordinarily important one, would be one of continued success. For himself, he should endeavour, so far as it lay in his power, to enable the Association and University College to be of mutual benefit and assistance to each other. The exhibited prize-drawings appeared to indicate that the classes of the Association had produced some excellent work during the past session, creditable alike to the prize-holders and to the Association, although it was a matter of surprise and regret to him to see that a considerable proportion of the successful students were not present to receive the awards in person. Those who had seen something of professional life, knew that two of the Darwinian phrases were justified by daily experience: that there was a very real struggle for existence, and that there was as certainly a survival of the fittest. While there was thus in the drawings on the walls a bright augury of future success to the students who had taken prizes, they by no means represented all the good effected in these classes. The steady work accomplished by others, who might last year or next year have taken the prizes, but had now been distanced, would not be without its reward. Although for a time, the mere prize was aimed at, in truth the real honour lay beyond, and existed in the mental efforts called forth by the competition, and the preparation made for actual business-life in the future.

Mr. T. CHATFIELD CLARKE thought that no one who heard that address could fail to see that the young men now growing up had opportunities for education and self-improvement, such as never previously existed, and that it would be a deplorable thing if these opportunities were not availed of to the fullest extent. The search for a new style, as the President had intimated, was not promising; it was singular that, in an age marked by the general diffusion of knowledge, by the advance of scientific discovery, and its utilisation, the spirit and genius of original design seemed to make absolutely no progress. Some of the lack of enthusiasm, to which reference had been made, must be due to the fact that the profession had recently lost several of its foremost workers, including Sir Gilbert Scott and Mr. E. M. Barry, two of the most polished and clever professional men of the day, and the latter a good all-round man, with great powers, both of planning and design.

Professor KERR remarked that the Association occupied a high and very important position in the profession—a position which he declared to be absolutely unique in the world. In no other profession, in no other country, was it possible for the actual students to form and organise a society possessing such power and influence in the profession, which had developed and conducted systematic instruction with the greatest possible success, a success which had been continued for 35 years, and which bid fair to go on for at least another 350 years. The draughtsmanship of the prize-drawings on the walls around them was of the very highest quality; indeed, the amount of masterly skill and draughtsmanship, which was displayed by so many young men was amazing, and there was a danger that buildings would be, and, indeed, now were, mere reproductions of drawings, instead of the converse being as it should be the case. No more useful body than the Association existed, and he was, therefore, very glad to see this year so large an assembly, and so many fresh faces amongst those entering upon a cultivated, a gentlemanly, and what was more important in these days, an honest profession.

During the evening several male-voice part-songs and glees were given in the Institute-room by the Artists' R.V. Musical Society, conducted by Mr. W. H. Thomas, and in the lower galleries Messrs. Coote and Tinney's band played a selection of operatic music.

RHIND LECTURES IN ARCHEOLOGY.

MR. JOSEPH ANDERSON delivered the fourth of the present course of Rhind Lectures in Archaeology, at Edinburgh on Friday last, when he dealt with "The Brochs, or Dry-Built Round Towers of Scotland." Mr. Anderson first gave a description of the Broch of Mousa in Shetland, which consists of a solitary tower of circular form, wide and lofty, constructed of undressed stones, laid upon each other without mortar or other binding material, so that the great mass of its un-cemented wall coheres simply by its own vertical pressure. The tower is placed on a small promontory, and stands about 20ft. back from the edge of the rocks, which slope irregularly to the tide-mark about 20ft. below. There are slight remains of an entrenchment on the sides which look landward; those facing the sea are protected by the natural features of the ground. The suggestion of solidity and strength, which is due to the bulk of the building rather than to the character of its masonry, is further intensified by the absence of external openings, the whole exterior surface being unbroken by a single aperture except the doorway. The wall of the structure is 15ft. thick, inclosing a court 20ft. in diameter. The wall rises to a height of 45ft. Opening from the court is a series of chambers on the ground-floor, constructed in the thickness of the wall, and rudely vaulted with overlapping masonry. Above these are successive ranges of level galleries, also in the thickness of the wall, each going round the tower, and placed so that the roof of the one below always forms the floor of the next above. These galleries are crossed successively by a stair, from which access to them is obtained by facing round and stepping off downwards across the vacant space forming the well of the stair. The three lower galleries only are lighted, and the windows are placed in vertical ranges, so close to each other as to be separated only by

their upper and lower lintels. These remarkable features, he showed, were not related to those of any variety of castle of historic times, but there were many similar structures in different parts of Scotland, among which he instanced and described the brochs at Glenelg, and that at Loch Duich. It was evident, he remarked, from an examination of these structures, that they all pointed more or less obviously to the presence of a double intention in the minds of the constructors of the brochs. The design of the whole structure, and the arrangements of all its separate parts, exhibited a careful and laborious adaptation of the means and material to the two main objects of defence and shelter. The clever constructive idea of turning the house outside in, as it were, placing its rooms within its walls, and turning all their windows towards the interior of the edifice, implied boldness of conception and fertility of resource. The door, securely fastened by its great bar, was too strong to be carried by a rush. Placed 4ft. or more within the passage, it could only be reached by two men at a time, and the narrowness of the passage prevented the use of long levers. But even if forced, and entrance gained to the interior court, the enemy would find himself, as it were, in the bottom of a well 30 to 40ft. in diameter, with walls 50ft. high, pierced on all sides by vertical ranges of windows, or loopholes, commanding every foot of the space below, and rising to the number of 20 or more immediately over the door which gives access to the galleries. In short, the concentration of effort towards this double object was never more strikingly exhibited than in these structures, rude though they were in construction. As regards the range or area of the brochs presenting these typical features, he referred to those on Cockburnlaw, in Berwickshire; at Torwood, Stirlingshire; and Coldoch, Perthshire; which were all the examples known on the mainland of Scotland south of the Caledonian valley. A few years ago they were grass-covered hillocks, indistinguishable from many others that are yet to be seen in various quarters of the same wide district of country. It was impossible to say how many of these unexamined mounds—which exist abundantly in the valleys of the Forth and Teith for instance—might be of similar character. But it was possible to say that where three have been found without being specially looked for, the probability was that more would be found when they were looked for. The case was far otherwise, however, with reference to the district of country that lies to the north of the Caledonian valley and the isles around the northern and western coasts. In such remote and frequently rugged and barren localities the remorseless activity of the agricultural improver had made but little progress in the removal of the ancient land-marks, and brochs and sepulchral cairns, stone circles, and standing monoliths, were still comparatively abundant, though every season was diminishing their number. Still, he estimated that as many as 300 brochs exist in the five northern counties. That meant that we had here the remains of a period of architectural activity which had no parallel in the early history of our country. Indeed, he questioned whether all the remains of the feudal period in Scotland, from the 12th century to the Reformation, would be found to equal in magnitude the extent of constructive architecture thus represented. Out of Scotland this type of building was totally unknown. In his last course of lectures, he showed that, as a nation, we were the sole possessors of the remains of a school of art exemplified in a series of monumental types which were so truly unique that no other nation possesses a single example. He had now demonstrated that we were also the sole possessors of the remains of a school of architecture which was as truly unique, which was even more pronounced in its features of absolute individuality, and of which no other nation possesses a single example. This was a fact in the general history of architecture which would not be found noticed in architectural books. The presence of this vast series of massive structures, so closely alike in their general features, implied a wide-spread concentration of thought and energy towards a common object which was found only in communities that have attained to a comparatively high condition of general culture and social organisation. Judged by their proper standard—the measure of their fitness for the purpose for

which they were plainly intended—they fulfilled the most exacting requirements of criticism. In order more fully to determine the nature of that purpose, the lecturer went on to describe brochs found in Orkney and Caithness which present other peculiar features, such as defensive works, wells, and drains, and even a water supply within their own inclosed area. The round towers of Ireland originated in the liability of the ecclesiastical communities to sudden danger of plunder and murder by roving bands of marauding Norsemen; and it was certainly a suggestive fact that in Scotland the area which was chiefly occupied by the brochs was an area which was peculiarly exposed to similar occurrences, over which there ebbed and flowed for centuries an irregular intermittent warfare, chiefly consisting of plundering forays by bands of marauding invaders. Against such danger to the persons of the people and the produce of their soil there could be no more effective system of defence provided than a multitude of "safes," which should be burglar-proof and big enough to contain the families, goods, and cattle of the joint proprietors; and that this was the idea of which the typical broch structure was the actual embodiment appeared to be fairly demonstrated from the character of its construction.

The fifth lecture was delivered on Monday, the subject being "The Brochs and their Contents." The lecturer observed in the outset that in 1852 the late Mr. A. H. Rhind, of Liberton, the founder of the Rhind Lectureship, made a systematic investigation of an ancient structure at Kettleburn, near Wick, in Caithness. It was a work of great magnitude, employing a number of men for upwards of three months. It was easy for them, with their superior knowledge of that class of buildings, to recognise the features of the structure as those of a broch, although it was not so considered by Mr. Rhind. The external appearance of the ruin was that of a mound somewhat more than 120ft. in diameter, and 10ft. high. It stood in a cultivated field; the plough had regularly passed over it for a quarter of a century, and a cottage had been built out of one of its sides. Though thus diminished and dilapidated, there remained enough of its structure underneath its surface to show clearly what were its general features. Where fully cleared from the ruin of its upper portion the lower part of the building showed a circular construction, consisting of a wall 15ft. thick surrounding a central area of 30ft. diameter. The doorway, passing straight through the wall, was flanked by a guard-chamber on either side. Remains of two oblong chambers, constructed in the thickness of the wall, were also found some distance apart. The roofs of all the chambers were gone; but the lintels remained on the passages leading into them. There was a well with steps leading down to it in the central area. It was 9ft. deep, and, being covered for the support of a partition wall which passed over it, was full of good spring-water when discovered. The area inclosed within the circular wall of the broch was subdivided into irregular shaped spaces by walls built across it in various directions, and abutting on the main wall. The area outside the tower, for a distance of 25ft. from its external wall, was covered by the ruins of similar irregular constructions. The whole was surrounded at that distance from the central tower by a wall 3ft. thick, of whose height little more than the foundations remained. After describing the objects, manufactured and unmanufactured, of bronze, iron, stone, and bone, found within the broch, the lecturer said that, so far as the evidence went, there was no reason for attributing to the people who had inhabited the broch an exceptionally low condition of culture or civilisation. They had seen that the type of defensive dwelling with which they found those people associated was one which possessed remarkable features of constructive merit and originality of design. Their diet was not less varied in kind and quality of nutriment than that of modern times; they possessed iron and bronze; and their manufactured implements showed that they were neither destitute of technical skill nor deficient in artistic taste. He proceeded next to give an account of the broch of Kintradwell, some miles north of Brora, excavated by the Rev. Dr. Joass. It was situated on a natural terrace close to the edge of the declivity which marked the old sea margin of the east coast of Sutherlandshire,

Previous to its excavation it was a rounded grass-covered knoll. Within this mound, formed by the debris of the structure, the basement of the broch was found entire to the height of about 14ft. The circular wall, 18ft. in thickness, inclosed a central space 31ft. in diameter. The doorway was 7ft. high, with inclined instead of perpendicular sides, so that the width was 3½ft. at the bottom and 3ft. at the top. The entrance passage went straight through the wall, and was provided with cheeks for two doors—the first at 6ft. within the outer face of the wall, and the second 8ft. farther in. Between the two doors a guard chamber opened on the right of the passage. It was circular in form on the ground plan, 7ft. in diameter and 11ft. high, being roofed in the usual way by overlapping stones. On one side of the area was a well 7ft. deep, with steps leading down to a point 3ft. from the bottom. A stone cup, presumably the common drinking-cup of the establishment, lay near the steps of the well. Having pointed out some constructive features in which this broch differed from others already described, he said a little to the north-west of the principal group of outbuildings was a shallow open cavity lined with flat stones set on edge, and containing the fragments of a human skeleton and an iron dagger blade. In one of the outbuildings also there were found a human skeleton and an iron spear head. Portions of eight other human skeletons were found in and about the ruins, mostly at a depth of from 2 to 2½ft. under the turf which covered the mound, but not in such circumstances as would necessarily imply that they belonged to the period of the occupation of the broch. It was rather suggested, by the frequency with which such remains had been met with in other cases, that burials were occasionally made in these mounds long after they had become grass-grown hillocks. The relics in this mound also included a variety of manufactured articles in stone and bone, bronze and iron, the stone objects forming a very considerable and striking group, and including upwards of fifty querns or hand-mill stones. Having next given an account of another broch in Dunrobin Park, also excavated by the Rev. Dr. Joass, he said the most interesting objects in metal found in it were two plates of brass, each a little more than 1in. in thickness—the one oblong, rectangular, 11in. in length and 7½in. in breadth; the other nearly semi-circular, and about 7½in. in radius. Both were found near the floor of the interior area of the broch. They were hammer-marked with blows of the pin end of the hammer in lines across the surface. That they were brass and not bronze was certified by the analysis made of the one now in the museum by Dr. Stevenson Macadam. The composition was found to be 82 parts of copper to 16 of zinc, with one part of tin and a trace of lead. This fact was important, because while the alloy of copper and tin which constituted bronze had been in use for an indefinitely remote prehistoric period, the alloy of copper and zinc which constituted brass was not found earlier than the period of the Roman Empire. Mr. Anderson next gave an account of the broch of Yerros, which he had excavated in 1866 and 1867, and which was situated in the south-east of the loch of the same name, about five miles south of Wick; and of the brochs of Old Stirkoke, Bowermaddon, and Dunbeath. These examples, he said, sufficed to convey a general idea of the nature and contents of the brochs of Sutherland and Caithness, and to show how closely they resembled one another, alike in the style of their construction, the nature of their arrangements, and the general character of their contained relics. He then proceeded to notice briefly a few of those which had been excavated in Orkney and Shetland, and which all exhibited the same typical structure. That the people, he observed in conclusion, who occupied these extraordinary strongholds, were the people of the soil, and not strangers effecting a settlement, was plain from the general character of the relics of their domestic life. The typical forms and relations of these relics were those of the Celtic era and of post-Roman times. No group of objects in its general *façade* entirely comparable to the group which was characteristic of the brochs existed either on the continent of Europe or anywhere out of Scotland, but the typical forms of which the group was composed had special relations with those which characterised the general group of relics assignable to the early Celtic or Iron-age culture

of Scotland, England, and Ireland. This unique series of objects formed a unique type of structure, illustrating a phase in the early culture and civilisation of our country which but a few years ago was absolutely unknown, and was now only beginning to be disclosed. This unique series already formed a body of scientific material of exceptional interest and suggestiveness, if the National Museum could afford the space necessary to allow it to tell its own story in the most effective way. And as these lectures had continuously disclosed series after series of similarly unique groups, it was obvious that if they also could be made to speak to the public eye the lesson thus taught would be plainly this—that Scotland had an archaeology which could only be disclosed by her own remains.

ART EPOCHS.

PROFESSOR BROWN commenced the work of the Fine Art Class of the University of Edinburgh, on Tuesday, with an introductory lecture. At the outset Professor Brown said: I cannot address you to-day without a word of deep regret for the loss which all who are in any way connected with art in Scotland have sustained by the death of the distinguished artist who has so lately passed from amongst us. The loss of Mr. William Brodie is both a public and a personal one. Of the public loss those will speak with whom in his busy life he was brought into official connection; but no one who ever saw him engaged on his public duties will fail to know what a secretary the Academy has lost in him, and what a wise adviser has left his place vacant at its council board. Nor will his place in art be easily filled. He had a rare gift in portraiture, and held a position second to none in these islands in a branch of art in which some of the greatest artists of the world have won their triumphs. His monumental works, which were neither few nor unimportant, showed that modern sculpture has no need to turn to genre in search of a field for its efforts; but he will be remembered, perhaps, by the largest number of his admirers for his especially national gift in realising in his marble statuettes the pathos and the humour of some of the finest creations of Sir Walter Scott. All whose privilege it was to know Mr. Brodie in private life will miss in him the kindest of friends and the most prudent of counsellors. To myself personally the loss is peculiarly heavy. I can never fully express the gratitude I feel for his reception of me when I came as a stranger to Edinburgh, or my sense of what I have been deprived of now that his helping hand can be no more stretched out to me. When I took leave of him last spring, I looked forward for many years to the enjoyment of his genial friendship and the assistance of his advice—advice made of especial value by his shrewd mother-wit, his large experience, and, more than all, his earnest and noble character. But the ill-health from which he was then suffering changed rapidly to mortal disease, and my only connection with him now is to add my word of respect and affection to the many which will be spoken about his grave, my tribute to the memory of one who united in a happy way, peculiarly his own, the double qualities of a good and gifted man.

Proceeding with his lecture, Professor Brown said that among the distinct epochs of artistic activity of which the historian of art had to give an account, there were two which were distinguished above the rest by the number and excellence of the works produced in them. These were the epochs of Classical art and of that Mediæval and Christian art, which, though it flourished on both sides of the Alps, found its most perfect development among the Italian cities in the thirteenth and following centuries. The special character of these two art epochs was imparted to them mainly through the close relation which existed between the activity of the artist and the general life of the community in which he worked. For art was in these times, as it were, the natural speech of the community, and everything which was of interest to it was recorded in some way or another in an artistic form. Hence a general demand for works of art in every variety of shape and for every purpose of public and private life—a demand which led to their production in an abundance of which, in the case of Greece at least, it was difficult to form any adequate idea. Hence, too, the creation of a body of artistic craftsmen more

numerous and skilful than had ever at other periods been consecrated to the service of the arts, craftsmen handing down their skill from generation to generation, till the technical excellence of their work reached a point unattainable by modern imitators. But not only in technical excellence, but to a still greater extent in the higher artistic qualities, the art of these two epochs owed its acknowledged pre-eminence to its close connection with the national life. Going on to compare the art of Greek and Mediæval times with that of some other epochs, in order to see more clearly wherein its special characteristics consisted, the lecturer said that with us art belonged rather to the few, and pretended to no close connection with the interests of the people. It did not follow from this, however, that art was necessarily of less importance in the present day. On the contrary, the inartistic character of most of our modern surroundings might make art all the more valuable an element in our lives; but it did follow that art imported, as it were, deliberately from without into the circle of our interests, no longer possessed that naïve simplicity which was the peculiar charm of the early productions of Greece and Italy. There, where the whole community participated in the activity of the arts, art came so naturally to the people that they would never be called upon to give any special thought to it. It was mixed up so closely with daily life that occasion never arose for reflection or discussion upon it. Anything like theorising upon art, or even art criticism, was unknown in the palmy days of Greece and Italy, and a philosophy of art was an invention of quite a recent era. Hence it followed that the ancient artist worked in an entirely different artistic atmosphere to that which surrounded the modern—one much less charged with reflection upon art, and so in proportion more favourable to artistic production. For though, on the one hand, the artist of more simple times was not of so much importance as a personage as he was in the modern world, he had the advantage of being able to work in perfect freedom, unwatched and uncriticised. Having pointed out that, as a condition of securing this quiet and freedom for his work, the ancient was content to sink his own personality as creative artist in that of craftsman, Professor Brown went on to remark that a popular modern artist might well afford to forego a portion of his personal display for the sake of working under the same conditions as the Greek. The artist himself was, indeed, so far as the artistic gift was concerned, the same in every age, but there were times when he lacked the stimulus which at other epochs called forth his noblest powers. Such a time was the present. Though the artist of to-day might invest his poetic creation, his scene of rustic character, or his landscape, with as true an artistic charm and as pure a grace of line or colour as any Greek sculptor, his youth or maiden, or Mediæval frescoist his Madonna, yet his efforts were circumscribed by the absence of those great demands to which Athenian and Florentine were so ready to respond. Through the limited number of works of a public character, which in this country at least gave employment to the artist, he was deprived of the most valuable of all means of education and of the highest stimulus to his powers. The place of this stimulus they often saw supplied in a somewhat feeble form by criticism. Critics sometimes told the modern artist that his forms lacked power, his style grandeur, the effect of his whole work simplicity. And the critics might be right, and yet the fault might not lie wholly with the artist. There was many an artist of to-day who could cry with the Italian frescoist of old, that, now that he had learned the manner of his craft, he would fain cover the whole circuit of his city walls with stories, but no great work ever came in prospect to quicken the generous fire of his genius. After next briefly comparing the art of Greek and Mediæval times with that of Egypt and Assyria, the lecturer pointed out that the former occupied a place in history midway between the art which in Egypt and Assyria was purely ceremonial, without any life or independence of its own, and that which in modern times was purely secular, and produced for the satisfaction of private taste. On the one side, as based upon religion, as consecrated to the service of the State, it was charged with meaning, and appealed not only to the artistic judgment, but to the heart and conscience of the citizens; on the other side, as the work of men born and bred

in the midst of shapes of beauty, and themselves modelling and painting as naturally as if there were nothing else in life to do, it possessed in all its forms that purely artistic charm, that grace of spontaneity and naturalness which was the unmistakable stamp of the born artist. The lecturer concluded with some remarks on the study of the remains of ancient art.

DR. ZERFFI ON PREHISTORIC ART.

ON Wednesday, at the Crystal Palace, Dr. G. G. Zerffi, F.R.Hist.S. and F.R.S.L., delivered the first of two courses of 12 lectures each on "The History of the Art Development of Humanity." The lecture was a general introduction to the subject, and the immediate topic was "Prehistoric Art." The lecturer started by saying that he should treat the subject scientifically, meaning by the latter term anything capable of being defined analytically or technically. The first part of the lecture was devoted to the explanation of certain diagrams of the frontal angle in the human face. The facial angle of the black races was about 83, of the yellow 85, and of the white 92. It was the brain faculty they had to work upon, and with a small brain it was impossible to get a true work of art. The savage race might produce beautiful things, but none of them were true works of art. The black man might imitate, but never originate. The yellow races had attained a higher development, but were now stationary; the patterns of the Chinese and Japanese were the same as those of 3,000 years ago. The white races, on the contrary, were progressive. There was, in fact, no limit to the degree in which the white brain might be cultivated, though that limit, as regards the black race, was very marked indeed. Taking humanity altogether there was real progress. The earlier inhabitants of the earth had developed into families, tribes, and nations; each might be traced to the three different facial angles. The lecturer then described the habitations of prehistoric man. The black race, those with a receding facial angle, could not go beyond a mere tripod of three sticks, with a skin or grass covering, and an entrance always low. The yellow or square-headed man made a square house, with curtains, and to keep off snow and rain learned to place a conical roof on it. The white man brought his reasoning power to bear upon the problem, and made his house with square walls, conical roof, and, in addition, windows for light and a proper door for admission. Further on still, man became conscious of his beauty, and tried to ornament himself, first by tattooing his body, and then by arraying himself in such gorgeous apparel as he could get hold of. The clothes of barbaric races were nothing but the substitute for the tattooing in which New Zealanders and others indulged. The bright garments of the Eastern nations and of Hungarians and Poles were only the modern survival of the same idea. As for the art of prehistoric man, its earliest instance was found in the incised representation of a mammoth on an ivory blade, a picture of which was shown in the room, and the artist of which, the lecturer said, might well claim to be a prehistoric Michael Angelo. A striking account was then given of the Cave of Aurignac, in France, where had been discovered in close juxtaposition the bones of antediluvian animals, and weapons and utensils, which proved that prehistoric man not only killed his prey, but cooked his food. A necklace of stones was shown, the symmetry of which would not disgrace a modern jeweller. The lecturer next remarked upon the great similarity between the huts of the Laplander and the ancient tombs; and remarked that this was owing to the idea of a future state possessed by these people, the dead being regarded as still living, though in another sphere. In the course of a description of Stonehenge, he remarked that it was undoubtedly an astronomical temple, an observation which elicited the assent of many in the company. In an eloquent peroration the lecturer concluded by asserting that the progress of art was the history of the progress of the human race. A spoon was as good plain as ornamented, a rude rudder would steer a ship as well as a carved one, yet both were ornamented. Beauty and virtue were in truth the same. Beauty was virtue in form; virtue was beauty in action. It

was from such a standpoint that men would lose their little petty animosities, and without this no genuine estimate could be formed of the progress of the race.

NEW BOOKS ON ARCHITECTURE AND CONSTRUCTION.

WORKS on the theory of art and architecture are not very popular in this country, and it is not often we have to review a work of nearly 500 pages devoted solely to metaphysical disquisitions. Mr. Leopold Eidlitz, architect, in a new work on "The Nature and Function of Art, more especially of Architecture,"* attempts to inquire into the causes of the present condition of architecture, and to define the nature and function of art in general, and of architecture in particular, with the object of showing how architecture may become again a living and creative art. Mr. Eidlitz is not the first who has pointed out that architecture is a dead language, that the architect's education is too much confined to historic eras, and runs on the forms of the past. Years ago these views were advanced in these pages on somewhat the same grounds. No one can dispute the illogical consequence of accepting the completed forms of art as its basis, in other words, of taking styles as the groundwork of art. Few architects can venture to deny also the assertion that architecture has ceased to be a living art. It would be vain to attempt to give the reader any idea of the arguments the author here unfolds. It is sufficient to quote a few sentences. The author says: "That art deals with ideas is universally admitted; but it seems desirable to know exactly how the idea is finally expressed in matter, how it assumes a physical form. The exact definition of this process may lead to a better understanding of the nature of beauty, and also of the nature and function of art." Again: "If architecture is to be a living and creative art, the study of styles must be directed to the art principles manifested in the relation of their forms to contemporary ideas and knowledge of construction, to the end that new forms, based upon modern ideas and the present development of construction, may supersede the forms of the past." We pass over several of the earlier chapters on common sense and taste, the aim of architecture, definition of architecture, views on proportion, &c., which contain many sensible ideas, but which are painfully verbose, to other chapters touching on more practical views of the subject. The chapter on definition of architecture is not lacking in philosophical reasoning, but the author leads the reader into a maze of useless analogies to show how an idea can be expressed in a structure. It is a kind of Will-o'-the-Wisp hunt, and the whole 16 pages might have been condensed into a couple. Another unnecessarily long chapter on "Ideas" follows, which seems to enter into a variety of speculations, but from which the reader can draw few practical suggestions. Monuments form the subject of another chapter. "Every expression of thought in durable form is a monument," and the gist of the author's reasoning is apparently to show that the art of designing a monument is to give the structure a form which will correspond with the acts performed within its walls, and the human groups accommodated. The monumental form should be dictated by mechanical and other laws in the same manner as a natural organism is developed by certain environments. Discussing form and construction, the author begins by asserting the fundamental value of statical mechanics. Methods of construction are defined to be geometrical demonstrations in matter of mechanical ideas, and are for that reason not works of fine art. Fine art means representation, and not demonstration. The author of a demonstration of an idea is not an artist. The author very justly observes that many architects design the outer form of their buildings as if it had no relation to the interior. Sham construction is preferred to the real. Mr. Fergusson is quoted on this subject, and the author's elaborate argument may be summed up in the simple proposition that form should be controlled by statical laws in regard to the material, and that, in short, iron columns ought not to be

imitations of stone and wood. We have not space nor inclination to follow the author into the subject of proportion. The remarks are in the main sound generalisations which few would care to question. The practice of lining brickwork in Northern Italian buildings is reprobated, and in the main we agree with the view that portions of the brickwork should find expression, and not be totally concealed by marble slabs. Terra-cotta is briefly referred to, and the author condemns the employment of iron when used to imitate stone or marble. We do not enter into the other chapters dealing with style, ornament, and colour decoration, analysis, criticism, &c.; our only object has been to show the general drift of the author's speculations.

"The Science of Building"† is the title of a treatise which has been well received by students of the profession. Mr. E. Wyndham Tarn, M.A., architect, is the author of the book, the second edition of which lies on our table. We noticed the appearance of this useful guide at the time of its publication, and we need now merely refer to the enlargement it has undergone. The preface informs us the whole of the work has undergone a thorough revision, and that much has been rewritten, while a considerable amount of new matter has been added. Amongst the additions that have been made we find, the practical application of that useful proposition, the triangle of forces, to the bracket, a piece of construction which has not been so generally referred to in these textbooks as its importance demands. In the section on "Stability of structures" the author refers to "corbelling out" walls, and shows the danger of allowing builders to make chimney breasts extend a considerable length of the wall when corbelled out above a certain height. A new chapter explains the geometrical means of determining the thrust of an arch, which may be usefully employed as an approximate method. A similar method was described in the *BUILDING NEWS*. Gothic vaults, cupolas, and some remarks on the construction of spires are usefully introduced, showing the conditions of the stability of these structures, their thrust, &c. The chapter on the chemical composition of stones has been enlarged; and the author has added some useful facts bearing on the nature of iron and the mode of finding the safe load on a beam. We find also a new chapter upon the method of protecting buildings from lightning, and several useful tables, which will make this new edition a valuable handbook to the student who is desirous of qualifying himself for the architectural examinations. As a repertoire of the scientific principles of construction in which the architect is concerned, Mr. Tarn's little book is unsurpassed. The same author's work on "Practical Geometry,"‡ intended for the architect, engineer, and surveyor's use, has also reached a second edition. We find few changes in the work with the exception of appendices, treating on diagrams of strains, as a practical application of geometry to constructive purposes, and on isometrical projection. As one of the best textbooks on "Practical Geometry," applicable to the architect's wants, we can again highly recommend it to the student.

"Tramways, their Construction and Working,"§ is a new edition, or rather a supplementary volume, by Mr. D. Kinnear Clark, M.Inst.C.E., of a work we have already noticed. The author's original work was a very useful treatise on the subject of tramway construction, and the present volume is the result of experience during the last four years. We must here content ourselves with a very general glance at the new work. Mr. Clark continues his account of expenditure by referring to the North Metropolitan Tramway Company, which, he says, follows the best model for the yearly or half-yearly statements of accounts, on the system prescribed by the Regulation of Railways Act, 1868. Some very instructive tables are furnished, giving the total length of streets and roads traversed by tramways in the United Kingdom, the capital, expenditure, and the rate per mile. The cost, receipts, expenses, and working stock of tramways for the last few years form another useful table, of much prac-

* The Science of Building. By E. WYNDHAM TARN, M.A. London: Crosby Lockwood and Co.

† Practical Geometry. By E. WYNDHAM TARN, M.A. London: Crosby Lockwood and Co.

‡ Tramways: their Construction and Working. By D. KINNEAR CLARK, M.Inst.C.E. London: Crosby Lockwood and Co.

* The Nature and Function of Art, more especially of Architecture. By LEOPOLD EIDLITZ, architect. London: Sampson Low, Marston, Searle, and Rivington.

tical interest to promoters and others. The chronological summary of tramways is a capital index of progress made, and the various systems of construction known as Kincaid's, Wilson's, the Aldred-Spielmann system, Trusswell's, Vignoles', Deacon's, Shaw's, and others, are fully described and illustrated, with sections and details. Speaking of horse-power, Mr. Clark says: "That horse-power will eventually be superseded by mechanical power is a foregone conclusion." The direct steam-power tramway-engine is pronounced more economical than the compressed-air system. The work contains detailed particulars, with engravings, of all the principal steam cars and locomotives, including France's hot water and Beaumont's compressed-air locomotives; and we can fully accord to Mr. Clark's new volume the merit of digesting in a practical manner the results of the last few years' experience in this important branch of engineering.

HENDERSON'S ARCHITECTS' AND ENGINEERS' SCALE.

MR. ANKETELL M. HENDERSON, C.E., of the firm of Henderson and Smart, architects, Melbourne, Victoria, has invented a new scale, the object of which is to secure rapidity and accuracy in drawing. At a recent meeting of the Royal Society of Victoria, the scale was described by the inventor, as designed to meet the needs of the architect more than those of the engineer. The scale has been used in the office of the inventor for some time, and its good points tested and developed. To understand Mr. Henderson's new scale fully, a diagram of its application is necessary; we may, however, describe it in general terms from the description and engravings he has sent us. With ordinary scales, the setting out of a dimension consists in placing the zero of the scale opposite the starting-point, and a pencil or pricker is used to mark off the required distance. This operation requires the eye to be perpendicularly over the zero, and the head and eye have to be moved to mark off. Mr. Henderson's scale obviates this operation and the chances of error. It consists of a steel point fixed to the edge of scale at the zero and the end of scale. By simply moving the scale till the required distance is opposite the starting-point, and raising the back of the scale, the steel point marks the distance on the paper and all movements of the eye and head is avoided. From the diagrams we have before us, we find important differences in the division of the scale. In the usual architect's scale the zeros are at each end; in this instrument they are placed 10 feet from the ends, by which means rapid working from centre lines is facilitated—a decided advantage in preparing scaled drawings. The upper side of the scale shows the centre portion divided into 40, and the under side into 60 parts. The author, in speaking of the use of the scale, refers to the value of setting out joists, rafters, studs, &c., to the proper centres. This operation can be performed by a scale on the back. Each of the larger dimensions on the scale is 16in., and the smaller 8in. It is often necessary in drawings to lay down series of odd and fractional dimensions, such as stair-treads 11in., 10½in., 9¾in., &c.; courses of brick, 4 courses to 13½in., or 13in.; patterns of tiles running 6½in., 9¾in., &c.; centres of palisading 3½in., 5in., &c. Such divisional work is performed by an arrangement called a "reducing arc" on each side of the instrument, by which means, dimensions from 12in. to 5in., running 1-16in., may be set off on the front of the scale, and from 8in. to 5in., in 1-16in., on the back. "This is done by setting the scale so that the zero point and the required dimension are on the line to be divided, and then marking off with a pencil from the scale, or still more rapidly, by drawing a line along the scale on the paper, and using the toothed ends for registering the divisions"; calculations are avoided, and time saved. The scale also shows the number of risers of any fractional number, such as 6½in., necessary to go from one floor to the next, and the number of treads of any width can be rapidly found. On the upper side of scale is a diagram of radiating lines, by which the widths and gutters falling 1½in. in 10ft., and on slopes of 20°, 30°, 40°, &c., may be instantly obtained opposite the respective lengths of gutters; and another useful feature of the scale under notice is that stock dimen-

sions, those constantly occurring in practice and plan drawing, are given on one edge. Thus fireplace openings, 3ft.; doorways, 3ft. 3in.; fireplace jambs, 13½in., 18in., and 22½in., their projections and the width of hearth-stones being also indicated. Who has not wished the sizes of door-panels marked off, so that they may be rapidly drawn, the heights of bottom, lock, and top rails? These are shown on one edge of the scale. The sizes of flues required in setting out chimney stacks, instead of laborious sums of addition, are marked, and the dimensions are so arranged that the positions of fireplaces, &c., can be ticked off in their central positions. On the whole, from a careful study of the scale shown, we have every confidence in recommending it to the notice of the architectural and engineering professions. The architect and draughtsman, from the very nature of their work, require facility and expedition in laying off constantly recurring dimensions, and those who prepare plans and sections will find Mr. Henderson's instrument a great help in lessening the amount of purely mechanical labour involved in work of this kind. Accuracy also in the setting out of series of divisions, such as joists, stair risers, &c., is essential, sometimes of incalculable moment to the quantity surveyor, who also will find the scale an acquisition.

LIME AS A PRESERVATIVE.

LIME, it is well known, preserves ironwork; and Wren, in his "Parentalia," mentions the freshness of iron cramps which had been bedded in mortar for 400 years. It is usual to limewash iron mains, tanks, and other articles to prevent rust; and bricklayers are in the habit of smearing their trowels with mortar. In the demolition of old buildings the ends of joists, ceiling-laths, quarters, plates, and bond timber which have been bedded in lime-mortar, are usually found in a sound condition, in spite of their having been bedded all round. Higgins, in his well-known treatise on "Calcareous Cements," now rather an antiquated work, speaks of the value of lime-water or water freed from "acidulous gas." Something of this protection is rendered to wood and iron which are covered with lime. It is well known that an alkaline solution prevents corrosion of iron; and Mallet, in his work on "The Action of Air and Water upon Iron," proposed limewater to replace bilgewater, and thus prevent the internal corrosion in iron ships. Lime has a powerful affinity for oxygen, and to this cause may be attributed its preservative effects upon iron and other materials.

It would be interesting to record the many evidences of the value of lime in arresting decay. As long ago as 1769 a Mr. Jackson, a chemist, obtained permission to prepare timber for the shipyards, by immersing it in a solution of salt water, lime, muriate of soda, &c.; another practical experimentalist suggested slaked lime, thinned with a solution of glue, for mopping the timbers of a ship. The preservation of timber has been attempted by surrounding it with pounded lime, and several attempts have been made to preserve timber by the use of lime. Mr. Britton, in his work on "Dry Rot," mentions a number of cases where lime has been of service. He says "quicklime with damp has been found to accelerate putrefaction in consequence of its extracting carbon; but when dry and in such large quantities as to absorb all moisture from the wood, the wood is preserved and the sap hardened." "Vessels long in the lime trade have afforded proof of this fact, also examples in plastering laths which are generally found sound where they have been dry." The joists and sleepers of basement floors are rendered less subject to decay by a coating of limewash; and this might be renewed at intervals. The same writer adds, "it does not appear practicable to use limewater to any extent for preserving timber, because water holds in solution only about 1-500th part of lime, which quantity would be too inconsiderable, it, however, renders timber more durable, but at the same time very hard and difficult to be worked." These facts are instructive, they show, at least, that lime in a sufficient quantity kept dry is a valuable preservative agent, and some practical chemist might earn a deserved repute if he could prepare a lime solution that would be capable of rendering so substantial a service to all builders. Such a solution would be at

least sufficiently remunerative to make it worth while to try a few experiments in this direction. It is stated on good authority that the white ant in India costs the Government £100,000 a year for repairing woodwork, bridges, &c., caused by its depredations. Concrete basements have been found to resist the encroachments of the ant. Dr. Darwin proposed a process of timber preservation some years ago, in which an absorption of limewater was effected, and after that had dried, a weak solution of sulphuric acid, so as to form sulphate of lime in the pores of the wood. The growth of dry-rot or fungus on timber has been prevented by limewater, and many instances have been mentioned of its value.

The cleansing and sanitary virtues of lime are more generally known. The painter uses limewater to kill the grease upon his work instead of turpentine; and soot stains on the outside of flues have been removed by the agency of thick warm limewash. The value of lime white as a wash for walls, as a purifier of the air in sheds, stables, and other buildings, is unquestionable, though all limewashed roof-timbers have rather a rough and penurious look. As a preservative coating to the joists of floors and other timbers not exposed to damp, it seems worthy of a more extended trial.

INSTITUTION OF CIVIL ENGINEERS.

THE council of this institution have just issued the annual list of subjects on which they invite original communications. To those papers which shall be approved premiums arising out of special funds, bequeathed for the purpose, will be awarded. These comprise the Telford Fund, now producing £260 annually; the Manby Donation, about £10; the Miller Fund (for students), £160, out of which is established a scholarship of £40 per annum, tenable for three years; the Howard Bequest, about £16, which is accumulated for five years, a prize being then awarded to "the author of a treatise on the uses and properties of iron, or to the inventor of some new and valuable process relating thereto." The next award will be made in 1882. Amongst the proposed subjects are:—"The Adoption of a Standard Test-piece for Bars and Plates;" "The Mechanical and other Properties of Iron and Steel;" "The Behaviour of Iron and Steel under ordinary Loads, and up to the Limit of Elasticity;" "The Methods of Protecting Metal-work exposed to Corrosion;" "Modern Bridge-building in Germany;" "The Action of High Winds on Lofty and Exposed Structures;" "Determining the Discharge of Rivers;" "River Improvement;" "River Conservancy;" "Mechanical Power on Tramways;" "The Quantity of Water yielded by the Chalk Formation;" "The Analysis of Water for Potable Purposes;" "The Design and Construction of Covered Service-Reservoirs for Town Water-Supply;" "The Sewering of Towns on the Separate System;" "Drilling and Riveting Machinery for Girder Work;" "The different systems of Lifts in use in Warehouses and in Dwellings;" "The Distribution of Heat over large areas from a central source of supply;" "On proportioning Mains for the distribution of Water and of Gas."

THE ARCHITECTURAL ASSOCIATION "BROWN-BOOK."

THE annual report of the Architectural Association by the committee, just published in the "Brown Book," is a record of continued prosperity. The library is largely used and now contains, with recent additions, 1,100 volumes; the Institute library has been opened to members of the association under the age of 23 years. The entrance fee to the association has, by a new rule, been raised to one guinea. Admission to the associateship of the Institute being now attainable only by passing an examination, the arrangements of the classes have been varied with a view to making them specially useful to members preparing for that examination. The meetings of the classes generally have been rearranged; an entirely new class for the study of professional practice has been started; and courses of lectures, dealing especially with design and construction, and connected with the classes, have been arranged to be given by Messrs. E. J. Tarver and T. Blashill. The

appeal made by Mr. E. C. Lee, as president, to raise a fund for endowing a travelling studentship, resulted in the collection of nearly £700. The money will be invested in the names of Messrs. Cole A. Adams, E. C. Lee, and Aston Webb, as trustees, and the studentship will be of the value of £20, with additional prizes. During the past year the following honours were taken by members of the Association: Royal Institute of British Architects—Soane Medallion, R. T. Conder, and hon. mention in same competition, Mr. J. Lansdell; Tite Prize—R. W. Collier; Grissell Prize, 2nd—J. H. Curry and A. B. Pite, aeq.; Royal Academy—Travelling Studentship, W. J. N. Millard; Measured Drawings—Silver Medals, E. J. M. Allen and E. G. Hardy. The balance-sheet for session 1880-81, also published in this book, shows totals on the debit side of £196 11s. 10d. for the past, and £168 10s. 6d. for the current session, the principal items being members' subscriptions, £125 for past and £291 17s. 6d. current; entrance fees, £61 19s.; rent of offices, £18 17s. past and £80 current; and prize fund donations, £18 1s. The credit side shows £39 11s. 6d. for past and £512 16s. 6d. for current session, including rent of premises, £155; stationery, printing, and advertisements, £118 9s. 2d.; library grant, £10. The balance in treasurer's hands has increased during the year from £51 13s. 10d. to £112 14s. 4d., and after providing £40 for prizes and sundries, the balance of assets over liabilities in favour of the association is £953 13s. 10d.

The complete syllabus for the current session is as follows:—

- Nov. 11, 1881. Address from the President (Mr. Aston Webb).
- Nov. 25. "The New Examination and What it Involves," Prof. T. Roger Smith.
- Dec. 8. "Barnacles," Mr. Cole A. Adams.
- Jan. 6, 1882. "A Chat with the Younger Members on the Writing of Specifications," Mr. Ewan Christian.
- Jan. 20. "Architectural Inconsistencies," Mr. Philip E. Massey.
- Feb. 8. "The Treatment of Sculpture with Architecture," Mr. Hugh Stannus.
- Feb. 17. "Physical Science in Relation to Architecture," Mr. J. Slater, B.A.
- March 3. "Ideal Dwelling Houses," Mr. E. Ingress Bell.
- March 17. Members' Soirée. Members only admitted.
- March 31. "Sundry Working Drawings," Mr. J. P. Seddon.
- April 21. "Some Thoughts on the Principles of Design and Style in Church Architecture," Mr. B. E. Ferrey.
- May 5. "Coloured Decorations," Mr. G. Aitchison, A.R.A.
- May 19. "Markets," Mr. John Hebb. Nomination of officers.
- June 2. "The Influence of Ritual on Church Architecture," Mr. E. Eldon Deane. Election of officers.

A course of nine lectures on "The History of Architecture," will be given by Mr. E. J. Tarrver, in connection with the Class of Design, on Friday evenings at 6.30 p.m.; and a course of eight lectures on "Construction," by Mr. T. Blashill, in connection with the Classes of Construction on the same evenings, and at the same hour. The list of members published at the end of the volume shows a total of 691 resident in London, and 172 resident elsewhere, making together 863 names on the books. A striking illustration of the comparatively youthful period at which it is possible to rise to the chair of the Association, and of the continued interest shown in the Association by the senior members of the profession, is afforded in the fact that no fewer than nineteen members in the present list are distinguished by the prefix of an asterisk, denoting that they have served the presidential office.

A new and very useful feature of the "Brown-Book" is an appendix furnishing particulars of some of the other opportunities for carrying on special studies now afforded to architectural students. It supplies information as to the Architectural Examination, the Academy school, and the mode of obtaining admission as a student, the courses of lectures at King's and University Colleges, and the classes of the Royal Architectural Museum, the National Art Training School, and some particulars as to the Artists' Rifle Volunteer Corps, in which Companies D and E are enrolled from members of the architectural profession.

THE LATE MR. WILLIAM BRODIE, R.S.A.

MR. WILLIAM BRODIE, R.S.A., died on Sunday in Edinburgh. The deceased gentleman was a native of Banff, and in early life showed a taste for fine arts, painting, and sculpture, which he prosecuted in Aberdeen and

afterwards in Edinburgh. He, however, felt a greater aptitude for sculpture than for the sister art of painting, and studied in Rome. Returning to Edinburgh, he, in the course of a long and successful career, has, perhaps, executed more busts in portraiture than any other artist in the same line. A number of statues by him are placed in different towns in Scotland, among them being that of Dr. Graham Professor of Chemistry, in Glasgow, which is in bronze; the Prince Consort statue, at Perth, in freestone; the statue of Sir James Y. Simpson, at Edinburgh, in bronze; the statue of Sir David Brewster, in the quadrangle of Edinburgh University, in marble; the statue of Lord Cockburn, in Parliament-house, Edinburgh, in marble; and many of the statuettes in the niches of the Scott monument. In 1851, Brodie was elected an Associate of the Royal Scottish Academy; in 1859 he attained full rank as an Academician; and in 1876, on the retirement of Mr. J. D. Peddie, R.S.A., he was elected secretary to the academical body. As far as his work permitted, he kept himself up in literature, enjoying books of all kinds. He also studied architectural decoration, and turned his knowledge to good account in designs for monumental erections, usually in combination with sculpture, but not invariably so.

COST OF SITES UNDER THE ARTISANS' DWELLINGS ACT.

A FEW facts connected with the working of the Artisans' Dwellings Act, 1875, as reported by the committee of the Charity Organisation, may be of interest. From that part of the report of the Dwellings Committee dealing with the action taken under the Acts of 1875 and 1879, as given in the last return, dated January, 1881, we learn that in the City, where the Commissioners of Sewers constitute the local authority, two official representations have been made. Four areas, or 126,390 square feet, have been cleared for artisans' dwellings. The tenders received are at the rate of 3d. per foot, and the Home Secretary was applied to as to whether the ground-floor and basements can be utilised for shops and thus prevent a serious loss to the ratepayers. The report of the select committee, which we gave in outline (p. 547 ante), is to the effect "that with the view of lessening the expense of carrying out the Act of 1875, the confirming authority might well consent to the basement and ground-floor of any building being let as shops or workshops." From the facts stated it appears the net result in the City is that the Act has not yet been carried out in any instance, but that in about a third of the area represented it may be adopted with modifications. A table follows, showing an analysis of the return of the Metropolitan Board of Works, from which it appears that little, or almost nothing, has been done. In seven different cases of official representations, the areas are still under consideration or otherwise disposed of. We find 682 houses and 5 areas have arrived at this stage; in another instance 319 houses are regarded as too limited in size for the application of the Act; other houses are certified not unhealthy, or the cases have been withdrawn or otherwise not dealt with. No action has been taken with regard to 1,295 houses occupying 39½ acres and 5 areas, action has been taken regarding 1,402 houses, and areas comprising 945 houses and 6 acres have been sold and dealt with.

In the provinces we find the Act has made slow progress. In Birmingham an area of 93 acres, at an estimated cost of £1,310,000, is being dealt with. In Brighton, Dover, Exeter, Hastings, Salford, and Sheffield, the Act is under consideration; and we hear that in 77 towns no steps have been taken, and in no town have the proceedings under the Act been completed. At Liverpool, Norwich, Nottingham, Swansea, Walsall, and Wolverhampton, the Act has been in operation; the areas have been cleared or purchased. From the table given, the estimated nett cost per square foot is 5s. at Swansea, 7s. 6d. at Nottingham, and 6s. 2d. at Liverpool. The returns of the Metropolitan Board of Works show the cost of the areas to be at the rate of £2 17s. 5d. the square foot, after sale to the Peabody trustees, and of a part for commercial purposes. It is important to observe that had the land acquired been sold for commercial purposes only, the Metropolitan Board of Works would have acquired the areas

for street improvements, &c., at a cost of 13s. 10d. per foot. But the advantages purchased at the higher rate include the demolition of unhealthy dwellings, the opening out of proper roadways, open spaces round dwellings, and the erection of habitable houses. It is well asked whether it is worth while to incur this cost per foot for new dwellings on part of the cleared sites, when demolition and roadways can be purchased at a cost to the rates of 13s. 10d. per foot. Mr. Selway, in the Minutes of Evidence, estimated that on the various sites of the Peabody Dwellings, the prices sold at is equivalent to making each family a present of £250 out of the rates of the Metropolis. The fact simply told is that buying under the Act and selling for these dwellings necessitates a great loss, which can only be met by a less expensive rate of compensation to owners and lessees. The report shows further that rents have been raised by owners for the purpose of increasing the value of their property; the formalities in conducting compensations are long and expensive, and large sums of money have to be given for the trade and connection of low public-houses. Again, it is stated that by systematic distribution, economy of space and higher buildings, one-half more people might be housed. To acquire central positions at high rates, and erect artisans' dwellings on them, must incur loss. Dwelling associations ought to purchase land at such a rate as will enable them to make at least four per cent., and from the tables furnished it is clear that associations have purchased at cheaper rates without municipal intervention.

CHIPS.

An inquiry was held at Dover on Saturday before Mr. Stephen H. Perry, C.E., Local Government Board Inspector, with reference to an application from the Dover town council for sanction to borrow £9,500 for waterworks extension. It transpired that the town council had entered into a contract for the work before obtaining sanction from the Local Government Board, and the inspector said this could not be allowed to occur again. Considerable opposition was offered to the proposal by townspeople.

New Wesleyan Sunday-school buildings were opened in Wells City on Tuesday week. The schools adjoin the chapel and are built of local stone, with Doubling stone dressings. The chief room is 50ft. by 36ft., and the open-timber roof and seating are of varnished pitch-pine.

The town council of Guildford last week sealed the revised plan and specification for the superstructure of the proposed new bridge, as prepared by Mr. C. H. Sparkes, C.E.

The parish-church of Salhouse, Norfolk, which had long been in a disgraceful state of disrepair, has just been retored by Mr. John Oldrid Scott, from plans prepared by the late Sir Gilbert Scott. The reopening services took place on Tuesday last.

The Congregational Chapel at Ebley, Gloucestershire, was reopened on Thursday week, after rebuilding, and the erection of new organ. It now seats 600 persons. The architect was Mr. J. Thomas, of London, and the builders were Messrs English and Sons, of Stroud. The cost has been £3,215.

New board-schools at Hebburn, near Newcastle-on-Tyne, were opened on Monday week. They accommodate 800 children, and have been built by Mr. John Smith, contractor, of Jarrow, from the designs and under the superintendence of Mr. J. H. Morton, architect, of South Shields.

The town council of Accrington have decided to apply to Parliament, in the ensuing session, for powers to construct about 7½ miles of tramways, extensive intercepting and outfall sewers, precipitation works, a branch canal about a mile in length, and new store yard, with stabling sheds and railway sidings. The plans are being prepared by the borough engineer and surveyor, Mr. E. Knowles.

The late Mr. William Ward, who died on the 26th of October, has bequeathed the sum of £100 as a legacy to the Builders' Clerks' Benevolent Institution. Mr. Ward was the uncle of Mr. Thomas Peto Ward, the founder of this excellent charity, and the above bequest is the first that has been made to its funds.

A petition was filed in the Sheffield Bankruptcy Court on Saturday on behalf of James Joseph Donellan, builder and contractor, with liabilities estimated at £6,500. Mr. S. Lockwood Levick has been appointed receiver.

CONTENTS.

The Marylebone Fever Dens	581
Hanover Gallery Exhibition of Paintings	582
The Water Question.—XX.	583
Shop-Windows.—III.	584
Conversations of the Architectural Association	585
Rhind Lectures in Archeology	587
Art Epochs	588
Dr. Zerrin on Prehistoric Art	589
New Books on Architecture and Construction	589
Henderson's Architects and Engineers' Scale	590
Line as a Preservative	590
Institution of Civil Engineers	590
The Architectural Association "Brown Book"	590
Tale late Mr. William Brodie, R.S.A.	591
Cost of Sites under the Artisans' Dwellings Act	591
Our Lithographic Illustrations	592
The Royal Courts of Justice	592
Schools of Art	592
The Disposal of Refuse in the City of London	595
The Basilica of Nola	595
The Recent Turners' Exhibition	596
"Building News" Designing Club, 1881-1882	596
Building Intelligence	596
Archaeological	597
To Correspondents	598
Correspondence	598
Intercommunication	598
Legal Intelligence	599
Water Supply and Sanitary Matters	599
Stained Glass	599
Statues, Memorials, &c.	599
Our Office Table	599
Meetings for the Ensuing Week	599
Trade News	599
Tenders	599

ILLUSTRATIONS.

STATUES OF THE DOMESTIC VIRTUES.—THE "LOTHIANS."
HAMSTEAD.—CONGREGATIONAL CHURCH, NEW BARNET.
—LODGE, ELY GRANGE, FRANT.

OUR LITHOGRAPHIC ILLUSTRATIONS.

ARTISTS' HOMES, NO. 16: "THE LOTHIANS,"
HAMSTEAD.

THIS house, situated at the Swiss Cottage end of Fitzjohn's Avenue, is from the designs of Messrs. Wm. Wallace and Flockharts. The walling is of red Suffolk brick, with Beer stone dressings, the roof covered with Whitland Abbey slates. The staircase is of wainscot; hall and vestibule floors laid with mosaic. As is to be expected in an artist's house, the studio is the principal feature in this plan. The room is one of the largest that has been built in London, having a clear floor space of 50ft. by 30ft. The builders were Messrs. S. Dowling and Son, of Notting-hill.

CONGREGATIONAL CHURCH, NEW BARNET, HERTS.

THE plan of this church consists of nave and aisles of the usual relative proportions, but there is only a single granite column on each side forming any appreciable obstruction to sight. From these spring two very wide pointed arches, covering the whole space occupied by the seats, and abutting on strong clustered shafts towards each corner of the building. These again carry small arches, the space inclosed by them being used as an organ-chamber and invalids' seats on each side of the pulpit, and towards the entrance end as part of a wide and spacious lobby stretching across the building. This is divided from the seated portion of the building by a glazed screen formed of a series of folding doors, which, when occasion requires, can be thrown open and the whole of the lobby used for extra sittings. At one end of the lobby (opposite the tower) is a cloak-room with conveniences attached, for the use of the congregation. As the ground slopes rapidly to the back, a large amount of space is available under the vestries, &c., and is used as an infants' classroom, with gallery for 80, and three good classrooms for about 25 scholars each, with the usual conveniences, heating-chamber, scullery, &c. The building is erected in stock bricks, faced externally with Kentish rag in courses, with Bath stone dressings, and internally with Beart's white bricks for plain surfaces, and mouldings, &c., in Bath stone. The spire reaches a height of 150ft. The buildings were very satisfactorily carried out by Messrs. L. H. and R. Roberts, of Islington, from the designs of Mr. John Salaman, of 1, Farnival's Inn, E.C.

STATUES OF DOMESTIC VIRTUES.

THESE statues have been designed and carved by Mr. John Roddis, of Birmingham, for the recently erected offices of the Scottish Provident Institution in that town. The building itself

is in the French Renaissance style, and was designed by Messrs. Osborn and Reading. The statues stand in niches, and are a little over life-size. It will be seen that the sculptor's aim has been to impart as much variety as possible in costume and general treatment.

THE ROYAL COURTS OF JUSTICE.

MR. W. ARMSTRONG concludes an illustrated description of the New Law Courts in the last number of the *Magazine of Art* with the following criticism:—

We have to offer in all humility a few criticisms upon what we conceive to be its architectural merits and demerits. To begin with the latter, it seems to us that Mr. Street's creation lays itself fairly open to the charge which has more than once been brought against it—of a perverse disregard of balance and symmetry in its masses. With the single exception of that part of the Strand elevation which is included between the two octagonal stair towers, there is not an instance of symmetrical repetition on a large scale in the whole exterior. On the other hand, there are many instances of what looks like carelessness, but is, in fact, studious—almost malicious—disregard of symmetry; and these are terribly destructive of architectural effect. Perhaps the most provoking of them is to be found on the Carey-street front, where the apex of the carved label over the central doorway cuts the sill of the great window above it into two very unequal parts. Similar failures of coincidence occur here and there throughout the building, and help to call attention to the lack of any governing artistic motive in the general design. There are six towers all different, though all of very squat proportions; there are eight facades, counting those in the great, or eastern, quadrangle, and they are all, with the doubtful exception of that which faces Clement's Inn, broken up into so many parts and into such unsymmetrical masses, that no one of them is much more expressive than if it were made up of half a dozen buildings by as many different architects.

Such want of coherence was appropriate enough in the great Mediaeval buildings upon which Mr. Street has modelled his art. They were usually the work of several generations, and as they received successively the impress of many directing minds, their irregularity was a natural growth, and was as true in expression as it was picturesque. In these days of what may be called Romantic architecture it is too often forgotten that a picturesque *ensemble* is in its very nature irreconcilable with a great artistic conception. The latter cannot exist without unity, symmetry—in a word, without individuality; but the qualities which make a building picturesque are identical with those which deprive it of individual expression. A picturesque thing is one which lends itself to pictorial treatment; that is, one which, being without any inseparable unique expression of its own, can be clothed in the personality of the painter, etcher, or other artist who may treat it. In this way our new Palace of Justice is more picturesque, perhaps, than any other modern building of equal importance. It would not be a hopeless task to make a good picture of it, because, by careful selection of the point of view, by combining the light and shadows, by repressing a little here and accentuating a little there, it could be turned, by the utterance of some painters' individuality, into a synthetic work at last. And we must admit that Mr. Street's analytical method has its compensations. In these courts of justice there is none of the thoughtless repetition of detail which disfigures so many great buildings. The sections of every door or window moulding, the designs for each carved capital, string-course, label, or dripstone, for each stair balustrade and stone chimney-piece, for every detail of groining or oak framing, have been the objects of his separate and individual attention. In this respect his work contrasts very greatly with that of many other architects. He appears to have a perfect horror of monotony, and to aim at making his building look as if its decorative details had been left to a crowd of separate and independent designers. Many of these details, however, are very beautiful. We may give, as an instance, the balustrades round the galleries in the central hall. These are Venetian rather

than English in design, and are carried out in a warm grey Derbyshire marble from Henton Wood, a large quantity of which is used for similar purposes in the building. One of these galleries—that at the northern end of the hall—seems to have been suggested to Mr. Street by a curious balcony or canopy which occurs in the Church of St. Peter, at Maid's Morton, in Buckinghamshire. The balcony in question is over the west door of the church. It is supported by two brackets, which are similar in form and detail to the pendentives of such fan-vaults as the roof of St. George's at Windsor, or King's College Chapel at Cambridge. These brackets rest upon engaged shafts, and the space enclosed by the whole is filled up by the doorway. Mr. Street's gallery is a repetition of this arrangement, with the exception that it is supported by three brackets instead of two, that there are two doorways between them, and that the details are, of course, Edwardian, while those of the Buckinghamshire church are Perpendicular. The way in which the gallery at the south end is supported is, on the other hand, clumsy in the extreme; it rests upon two huge and heavy stone corbels, which, in their turn, are each supported by a comparatively slender shaft of English marble, which appears quite unequal to the work which it has to do; but the minor details of the building are generally both beautiful and appropriate; and although the work, as a whole, must be denied the glory which belongs to a great artistic conception, it certainly deserves that which should be given to the effects of a severe taste and of an extraordinary power of work.

It is at present intended to lay out, as a garden, the space which intervenes between the western facade of the Royal Courts, and Clement's Inn; but it is certain that before many years have passed over us further court accommodation will be required, and an opportunity, which we sincerely hope may not be thrown away, will then be given of adding to the monumental effect of the Strand front by repeating its eastern wing.

SCHOOLS OF ART.

GATESHEAD.—The annual meeting for the distribution of prizes and certificates at the classes in this town took place on Wednesday week. The report stated that there were on the Barncliffe class-books 107 students, and that at the May examinations 84 were examined and obtained 17 Queen's prizes, including a bronze medal and 84 certificates. At the North Eastern Railway Institute classes there were 34 students, who had obtained seven Queen's prizes and 30 certificates. At the Prior-street classes, with 45 students, two Queen's prizes and 17 certificates had been gained; and at the Alexandra-road schools there were 108 students, against 57 last session: 43 Queen's prizes and 171 certificates were obtained at the examinations.

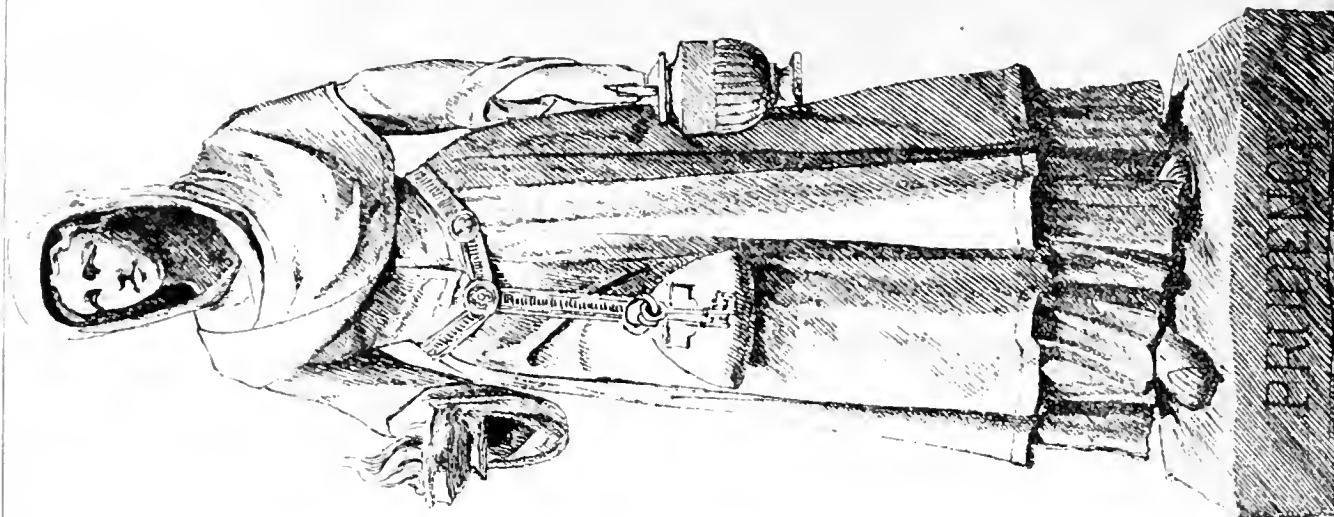
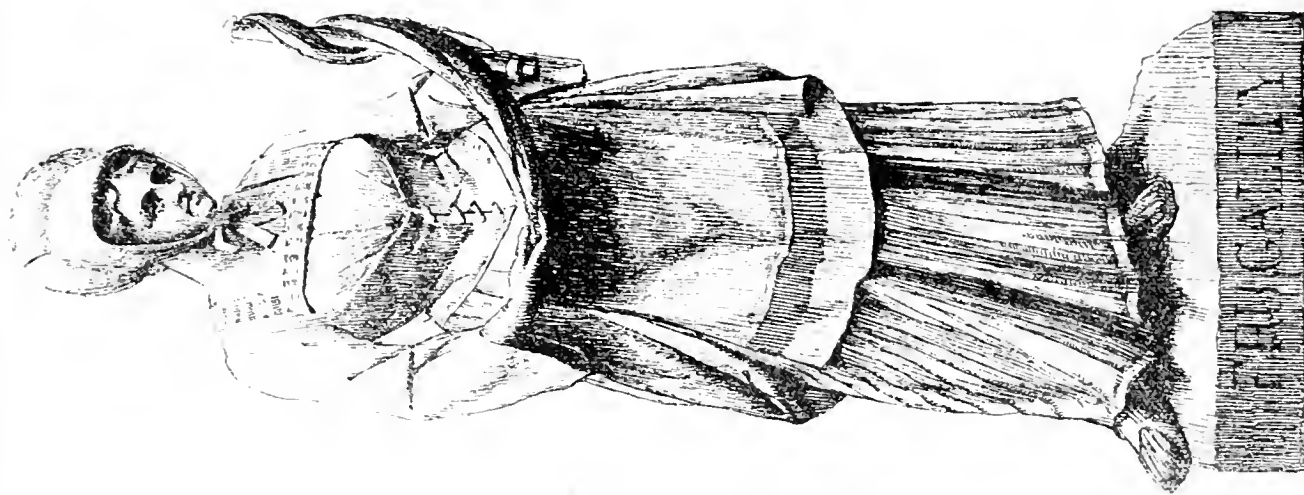
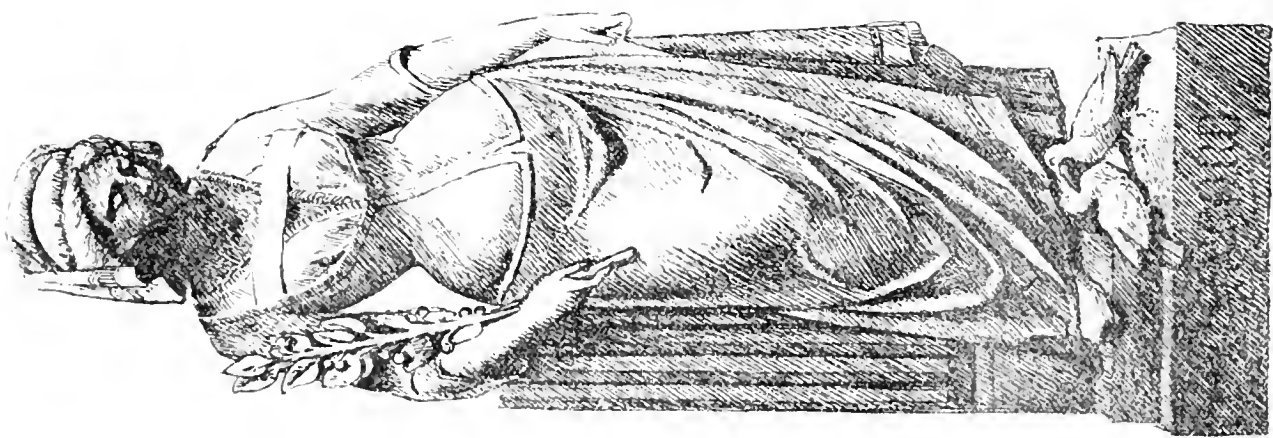
CHIPS.

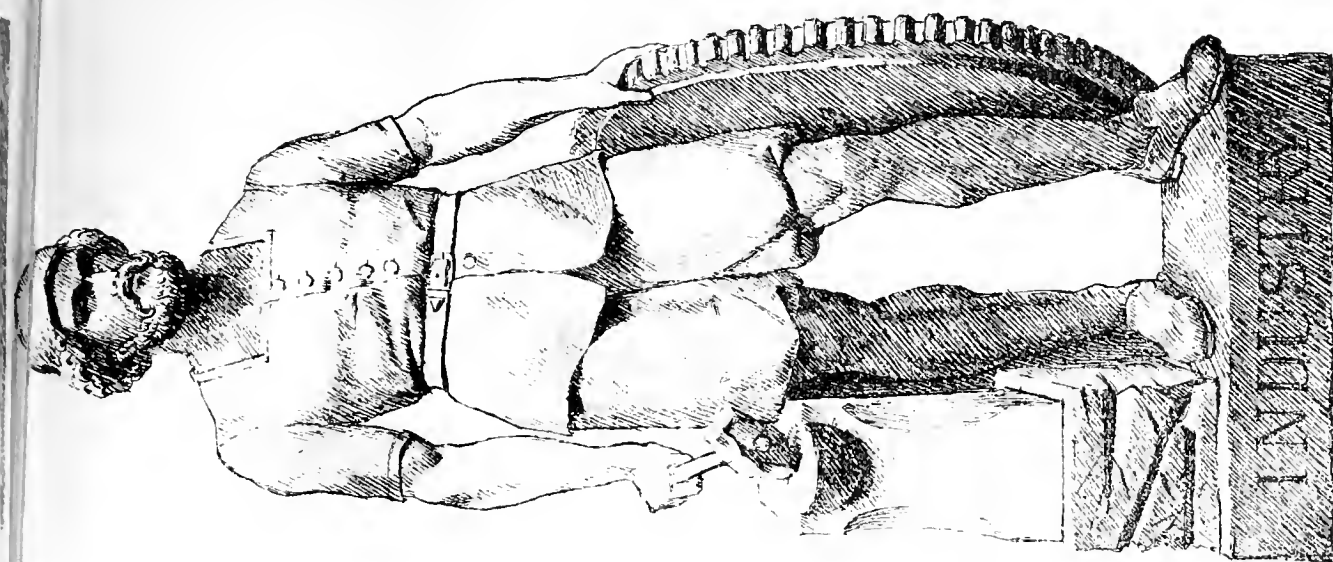
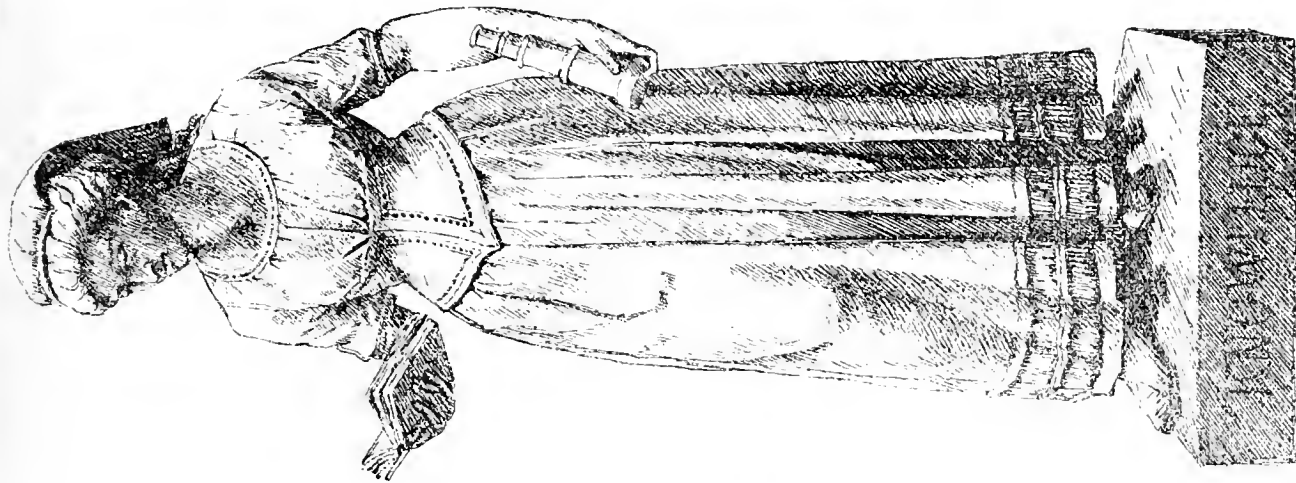
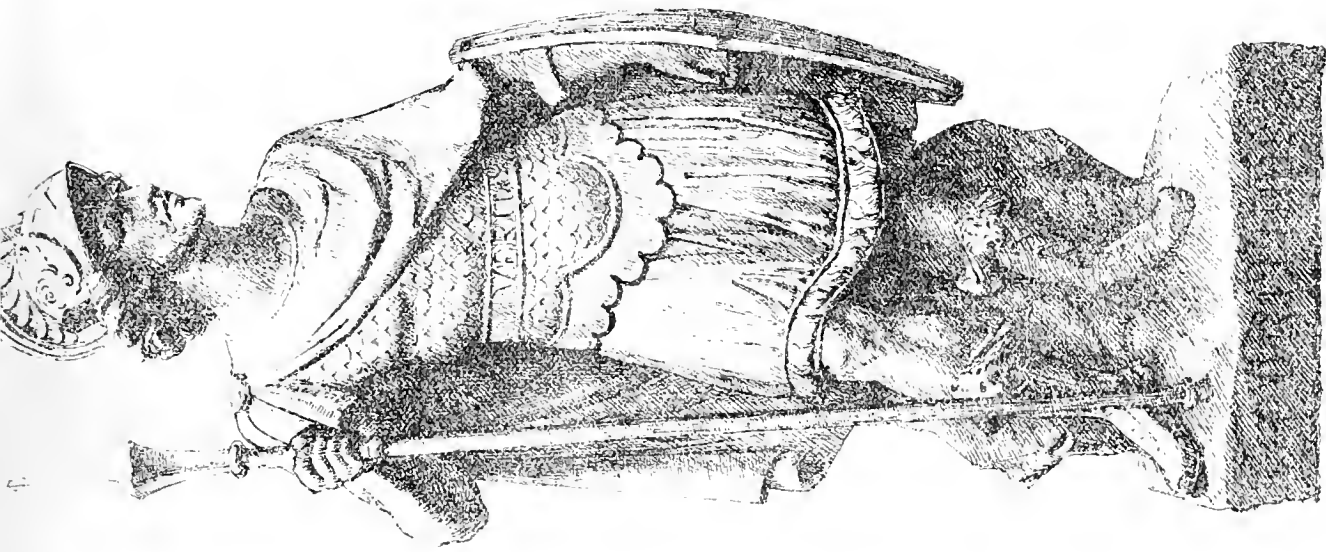
The City Commissioners of Sewers have voted the following sums, equal to half a year's salary, to officers who have been engaged in carrying out the Artisans' Dwellings Acts:—to the engineer, £1,000; to the solicitor, £750; to the medical officer of health, £250; to the principal clerk, £100; to the first assistant clerk, £50.

The local board of Diss, Norfolk, is about to be sewered from plans by Mr. Thomas Reed, C.E., of Normanton, Yorks. The sewage will be conveyed about a mile in earthenware pipes, varying from 12in. to 21in. in diameter, and having been carried under the river Waveney in an iron pipe, will be received in a tank and settling-chamber, and disposed on the land.

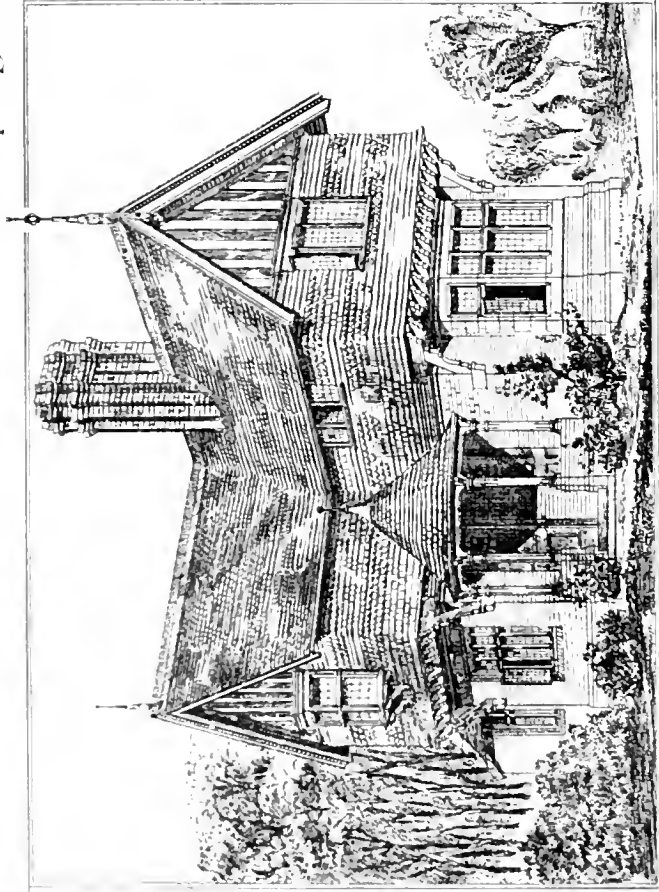
A memorial stained-glass window to the late Dr. Copeman has been placed in St. Luke's Chapel, an ovate projection from the south-east angle of Norwich Cathedral. The subjects are treated in medallion style, and are three acts of healing performed by our Saviour. Messrs. Clayton and Bell, of Regent-street, London, have executed the work.

There is, it is reported, to be another effort made next Session to obtain a Bill for the construction of a new railway from London to Brighton. The plans are prepared, and show that the route will be by way of the Metropolitan District Line to Chelsea, and thence across the river to Shoreham and Brighton direct.





THE DOMESTIC VIRTUES: FIGURES FROM THE SCOTTISH PROVIDENT INSTITUTION, BIRMINGHAM.
JOHN BODDIS, SCULPTOR.

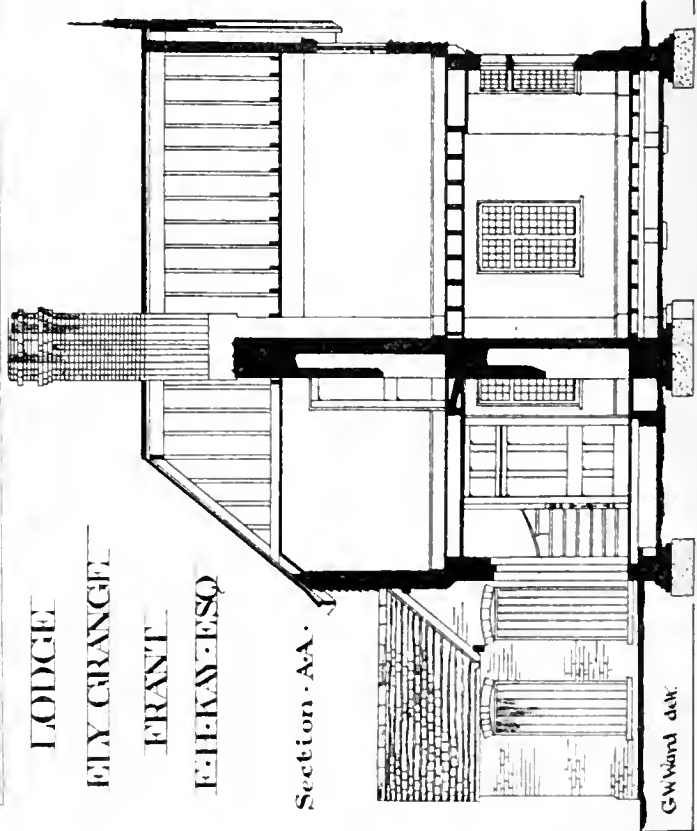


LODGE

FLY GRANGE

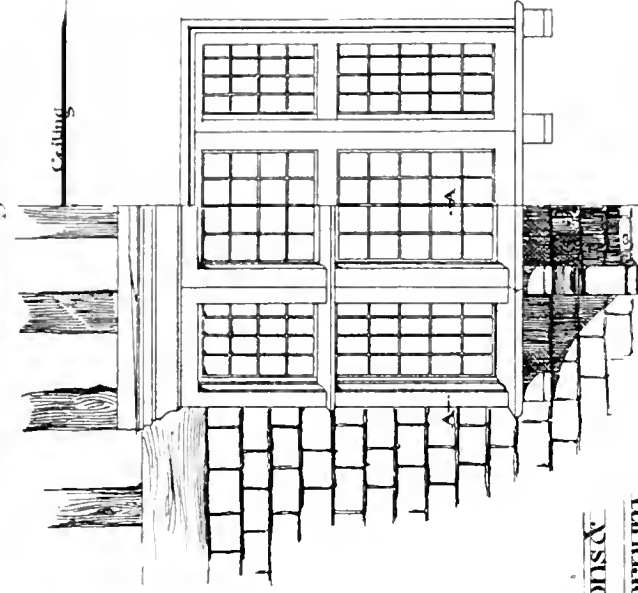
FRONT

SECTION A-A

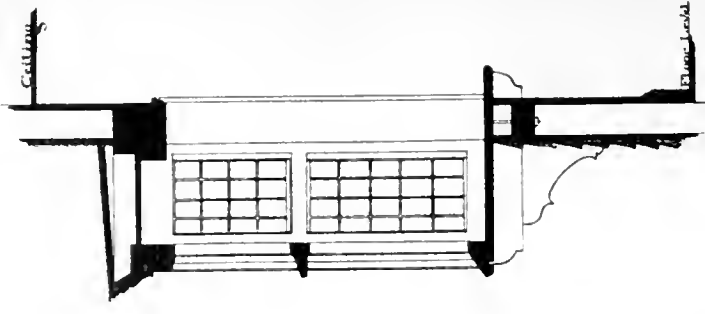


G.W. Ward del.

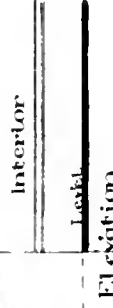
Detail of Projecting Window



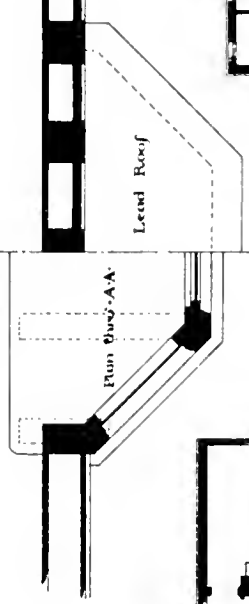
Ed. Salomons &
R. Selden Worrum
Architects



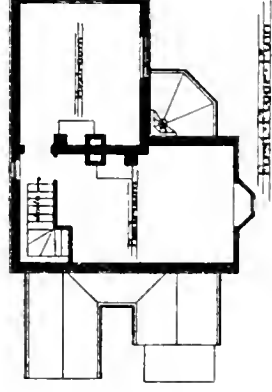
Section



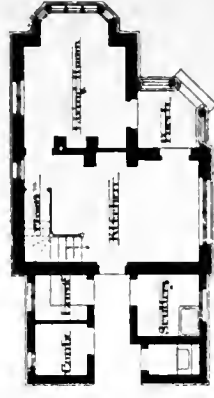
Elevation



Plan

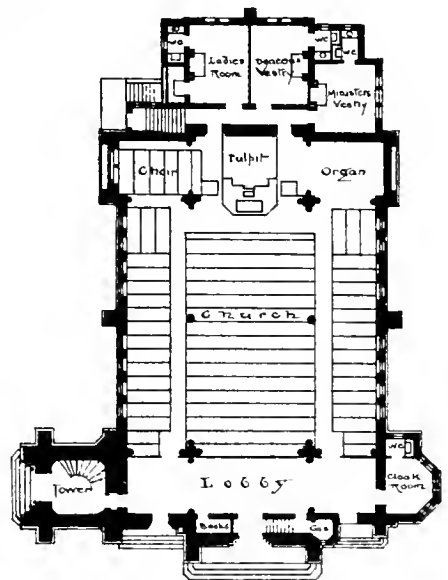


First Floor Plan



Ground Plan

Scale of Feet 0 10 20 30 40 50 60 70 80 90 100



GROUND PLAN.

Scale 32 feet to 1 inch.

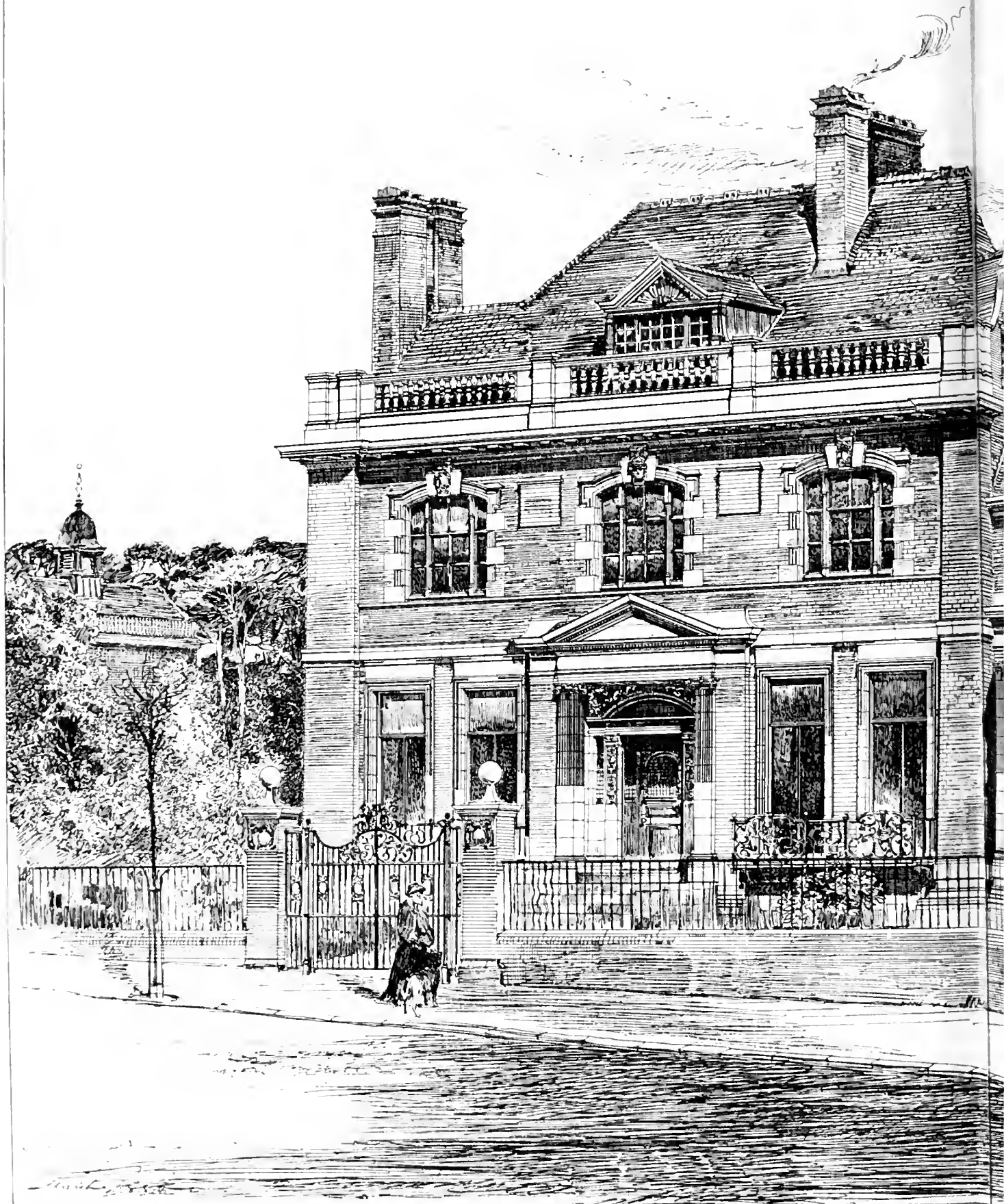


: Congl: Ch: New Barnet: Herts: :

John Sulman: Architect: A.R.I.B.A.
16 Furnival's Inn: Holborn: London

Photo Lithographed & Printed by James Akerman, 6, Queen Square, W.C.

ARTISTS' HOMES N^o 16 "THE LOTHIANS" HAMPSTEAD N.W.
THE RESIDENCE AND STUDIO OF JOHN PETTIE ESQ^{RE} R.A.
Messrs W. WALLACE AND W. FLOCKHART Architects.



THE DISPOSAL OF REFUSE IN THE CITY OF LONDON.

A REPORT on the disposal of refuse from the City, with special reference to effecting it by the apparatus of Messrs. Manlove, Alliott, Fryer, and Co., engineers, of Nottingham, was presented to a Committee of the City Commissioners of Sewers on the 11th inst., by Col. Haywood, their surveyor. The refuse may be broadly divided into five classes:—(1) house refuse; (2) trade refuse; (3) market refuse (animal and vegetable); (4) street sweepings; and (5) condemned meat. All except the last class of refuse are now carted to Lett's Wharf, on the south side of Waterloo-bridge. There, the house and some of the trade refuse is forked over and sorted; leather, iron, glass, crockery, and certain other materials, are separated from the ashes, and sold to various dealers, the ashes and breeze are sifted and sold to brickmakers. All these materials are, with the exception of a trifling quantity of vegetable refuse, generally dry. Their removal from the wharf is made daily. The street-sweepings and the animal and vegetable refuse removed from the markets and from the premises of large traders are got rid of together; the market refuse is at once mixed with the sweepings when they are dry, or nearly so, and shot from the carts into barges which are always lying at the wharf ready to receive them. Barges leave with this material daily. The street-sweepings, when in large quantities and in a state of slop, are not at all times shot into the barges, but are thrown down on to the wharf and mixed with straw and dry materials; the water rapidly drains away from them, and the residue is then mixed with street-sweepings, stable manure, or other drier matters having manurial value, is cast into the barges and taken away by agriculturists, who purchase it. No materials liable to decompose or be offensive are removed from the wharf through the public streets; old iron, tin, lead, glass, leather, paper, and a few other hard materials alone are carted away, and of these not more than a load or two leave the wharf daily. All materials are, as a rule sold, and with some gain: under exigencies some may have to be given away, and on very exceptional occasions the Commission may even have paid for getting rid of portion of them. On the wharf is a chimney shaft, 120ft. high, attached to a furnace, in which are burnt baskets, matting, shavings, dry leaves, and various kinds of refuse worth nothing for sale, and injurious to the sale of the street-sweepings and market refuse if mixed with them. No registers of the weights of materials received at the wharf has been kept, but the numbers of loads brought into the yard have been recorded under the general heads of Dust and Sweepings, the first including all trade and house refuse, and latter all street sweepings and slop, a load roughly representing a ton of material. Last year, 1880, there were dealt with 31,161 loads of "dust," and 30,078 tons of sweepings, in all, 61,239 tons, and the quantity increases annually. The average of receipts and costs for the four years, 1877-80 has been: Receipts, by sale of manure, £1,919 4s. 10d., and of ashes and selected material, £3,587 0s. 4d.; total, £5,506 5s. 2d.; expenditure in sorting, sifting, and removal, was £3,811 18s. 3d., leaving a balance to credit of £2,194 6s. 11d. per annum. This does not, however, include the cost of collection in the City, or of cartage to the wharf. The wharf premises have been in use for a dozen years past, and were reconstructed in 1876, since which time no complaints have been made of smoke, of effluvia, or nuisance arising from them. Passing on to consider the apparatus suggested to be used for refuse disposal, Col. Haywood remarks that these consist of a destructor, a carboniser, a carcass-crusher, and a Firman dryer, which he inspected in operation at Leeds, Farnworth, and Warrington. The destructor is a furnace of special construction, into which the dust, ashes, and other refuse are thrown just as they are collected, without separating or sorting the materials. All is consumed in the furnace, which, in the first case, is lighted by cinders and materials selected from the refuse itself. The furnace is assumed to be continuously in operation, and great heat is necessary for its success; it leaves a residuum consisting of clinkers, which are sold for road-making or ground up into mortar. The carboniser consists of a furnace attached to a close iron chamber,

round which the heat circulates. In this chamber vegetable refuse is reduced to a charcoal, and the fumes given off are mingled with the products of combustion and destroyed. The carcass crusher is a modification of the ordinary bone crusher, used by artificial manure manufacturers, and consists of two pairs of toothed cylinders revolving with different velocities at some distance apart from each other. By its agency large masses of flesh and bone can be reduced to sizes suitable for being operated upon by the Firman dryer, which is an apparatus for reducing, by heat, to a dry, or nearly dry, condition, the previously-prepared meat and bones; the residuum comes out in the form of a coarse powder, somewhat resembling the manure made at Paris and other cities on the Continent from human excreta, commercially known as "poudrette," and is said to be very valuable as manure. It has been suggested by the medical officer of health for the City that a large establishment should be made at Golden-lane, to which house, trade, and market refuse, as well as condemned meat, should be carted and dealt with by a system combining destructor, carboniser, carcass crushers, and Firman dryers. This would involve the sacrifice of a large rent of the area for commercial uses, and would also necessitate the maintenance of two stations, Golden-lane and Lett's Wharf, a division of site and work not tending towards economy, in the opinion of the City engineer. Farther than this, the use of such a site, placed in the heart of a community, is not, he thinks, desirable. The apparatus would be efficient for the purpose, but he does not think the processes would be financially successful. Should the Committee think a fundamental alteration in the mode of disposal is needed, the City engineer recommends that experimental works should be erected at Lett's wharf on an area of some 6,700 square feet. On this could be erected a destructor of ten cells, capable of dealing with 10 tons of refuse per 24 hours, or more than half the City output, mortar mills, carcass crushers, and Firman dryers. Messrs. Manlove, Alliott, Fryer, and Co. tender to supply these as per plan and specification given with the report, for £6,605, to which would have to be added structural alterations at the wharf, estimated at £2,700. The Commissioners of Sewers have adopted the recommendation of this report.

THE BASILICA OF NOLA.

ONE of the earliest Christian churches, of the plan and decoration of which we have any precise account, is that built at Nola, about the year 490, by Paulinus, a wealthy Roman patrician, of which Lady Margaret Daville contributes a description to the *Antiquary*. Nola, said to have been founded by a colony of Greeks, was a town of some repute in Roman annals. Under its strongly-fortified walls the victorious career of Hannibal was checked by the Consul Marcellus. The birth-place of Augustus, it was there that the curtain fell on the long drama in which the dying emperor claimed, not unduly, the merit of having played his part well. But at the latter end of the fourth century Nola's title of honour was as the place of death and burial, not of Augustus, but of Felix, a Christian martyr and bishop, over whose tomb a small church had been erected in very early times. This church, however, no longer sufficed for the rapidly-increasing Christian community, and Paulinus, who, having renounced all personal use of his great possessions, had ample means at his disposal, undertook to build another.

The building of the church of Nola occupied three years, at least; and in the letters written by Paulinus during that period to his friend Septimius Severus, the general design and decoration are minutely described. Other details have been gleaned from his poems and miscellaneous writings.

The plan was that of a basilica with an apse, or, as it was then more frequently termed, a bema; two rows of columns divided the main portion into a centre and two side aisles. Into the outer walls of the aisles were built little chapels or cellæ, destined for special purposes: some probably for private prayer, others as places of burial for the dead, who, according to the custom of the time, lay in the House of God, awaiting the resurrection. The altar was at the junction of apse and nave. The outer façade had three doors, and the building was turned,

not as was usually the case, eastwards, but to the tomb of St. Felix. A ruined church which filled up the space between the basilicas, was pulled down, and openings made in the wall of the older one, corresponding to the three doors of the newer, so that a full view could be had from the one church into the other. They were connected by a vestibule, in the centre of which a fountain threw up its crystal waters, while the walls were covered with inscriptions in mosaic. A distich over the entrance gave the salutation of peace to all who entered the sanctuary with pure hearts. On each of the side doors of the basilica of Paulinus was painted a cross, wreathed with flowers, on which doves nestled; over one an inscription, which was as follows:—

"See, in the atrium of Christ, this crowned cross; it is the symbol of the rewards which await our labours: take up the cross, all ye who would bear away the crown."

Underneath was written:—

"By the virtue of thy cross make us die to the world, and the world be dead to us. May death to sin give our souls life; of us too, O Christ, thou wilt make thy beloved doves, if peace dwell in our purified souls."

The inscription over the centre door ran thus:—

"As Christ our peace has filled up the gulf which divided the two nations, and breaking down with His cross the wall which separated them, of the two has made one; so see we here, after the destruction of the older building (it will be remembered that a former church had been removed): the two basilicas are joined and united. Here, too, a fountain lends its waters to those who would wash their hands before they enter. In the double sanctuary of Felix the people adore Christ. Paul, the bishop, rules them by his word."

The great door of the new basilica was also surmounted by an inscription, telling that it was consecrated by Paul the Bishop to the blessed celebrations; it is characteristic of Paulinus that each time the foundation of the basilica was alluded to, the name written on the marble was not his own.

Over the arches which formed the outer court of the basilica, Paulinus had built rooms for the use of pilgrims. Beyond, to the right, was a larger atrium, which he called the *area interior*; it was surrounded on the four sides by pillars, and open to the sky. In the centre rose a beautiful fountain, and at the corners four smaller ones richly sculptured: to supply them, piping had been constructed outside. This outer court is frequently alluded to by Paulinus in his poems; he delights in telling how the pilgrims, resting between their devotions, used to pace the cloisters, sheltered alike from the summer heats or the winter storms, then leaning against the balustrades which linked the columns, watched the sparkling waters break forth with joyful and pleasant sound.

The internal decorations of the basilica were no less carefully executed. The choir was formed by a triple apse (*trichora*), of which the central portion was considerably the largest of the two side recesses, called by Paulinus *secretaria*; one served as a receptacle for the sacred vessels and sacerdotal vestments; in the other were deposited the liturgical books and Sacred Scriptures. It was likewise used as a place for private prayer and meditation. The sanctuary was paved and its walls incrustured with precious marbles. Above glowed a lustrous mosaic, which, by symbols familiar to the Early Church, recalled to the worshippers the principal mysteries of the faith—the Trinity, the Incarnation, the Atonement; a hand issuing from a cloud symbolised the Eternal Father saying, "This is my beloved Son, in whom I am well pleased." Beneath were the mystic Dove, and the Lamb of God bearing the cross on which he was immolated. The cross was red, surmounted by a crown of light, signifying the royalty of Christ, who by the shedding of his blood had conquered the world. On each side of the cross were grouped doves, representing the twelve Apostles. The feet of the Lamb rested on a rock, from which issued four streams of living water—the four Evangelists. A long inscription (for in those days, when men's eyes were not wearied by printing, the architect was sure of readers) made the meaning of it all familiar to the people. Standing somewhat forward at the entrance of the nave was the altar, covered with rich veils. Over it was suspended a cross, enriched with precious stones and goldsmith's

work, and bearing and monogram of Christ; while from the roof hang lamps of silver and of crystal. The walls of the basilica were covered with pictures of sacred subjects, principally taken from the Old Testament; some, illustrating the deliverance of the Israelites from Egypt, had, to those but recently themselves liberated from a yet more terrible bondage, a special interest. What value these mosaics may have had as works of art we have no means of judging; only from the circumstance of their being alluded to by Panlinus as done *in raro more*, it is likely they were of the best work procurable at the time, and that, had they been preserved, they might now serve as connecting links between the rough, unskilful symbolism of the Catacombs and of San Clemente, and the majestic, awe-inspiring forms that look down on us from the darkening gold of the domes of Ravenna. But no trace of fifth-century work remains at Nola. Its cathedral has been rebuilt again and again; and even the keen eye of the Cavaliere Rossi has only succeeded in discovering, built here and there into the modern masonry, some fragmentary inscriptions, which, alike from their evident antiquity, and from the spirit of love and charity which they breathe, may be accepted as coming to us straight from the hands of Panlinus of Nola.

THE RECENT TURNERS' EXHIBITION.

IN our recent notice of the Turners' Exhibition, we spoke in praise of the objects submitted by Mr. J. S. Coulson, of Thirsk, to which the first prize was awarded. A correspondent of the *English Mechanic and World of Science*, who is evidently familiar with Mr. Coulson and his workshop, sends to that journal a photograph of one of the pairs of vases. He says:—

It will be remembered that Mr. Coulson gained the second prize last year, on that occasion also with a pair of vases somewhat similar to those exhibited this year. The latter are superior to the former in being more chaste in design, and more carefully executed. The material used is laburnum inlaid with purple-wood, and the surfaces of the vases, which are exactly alike, are perfectly smooth, and are French-polished. It may seem surprising to some that specimens of turning so simple in design, and so free from complications, should gain the first prize; but it should be remembered that skill in turning is not so much shown in the production in ivory and hard wood of highly elaborate



work, done more by scraping than by cutting, as in the successful execution of simpler designs in the softer woods. The specimens submitted by Mr. Coulson furnish us with almost perfect examples of this, the highest branch of wood-turning. I say "almost" perfect, because one scarcely likes to fix a limit to human skill; but it may be safely said that anyone who sets himself to produce better work, will have a very hard nut to crack. Mr. Coulson is a joiner, cabinet-maker, and wood-turner by trade. His workshop is situated up a narrow passage, in one of the leading streets of Thirsk, and is so choked up with wood, and a miscellaneous collection of things in general, that it is with difficulty one can move

about in it. Mr. Coulson is at all times willing to show his lathes and specimens of work to those who are interested in such matters; but if anyone expects to see a hundred-guinea lathe by Holtzapffel, with appliances costing as much again, he will be disappointed.

BUILDING NEWS DESIGNING CLUB, 1881-1882.

NUMEROUS requests having been made to us to reopen the Designing Club, we publish to-day the first list of subjects with the rules of competition.

RULES OF COMPETITION.

1. Drawings to be sent in 28 days after the publication of the list of subjects.
2. Usually two subjects will be given every month, from which a competitor may choose.
3. The drawings to be executed in firm black lines on white drawing-paper, in sheets of the absolute size of 22in. by 11in., with no washes or tinting in colour whatever. Outline to be the first consideration; but drawings may be slightly shaded with shadows executed wholly in line. Sectional parts to be shown in ruled "hatching," or blocked in. The scale to be used will be given with each subject.
4. Drawings to be forwarded unmounted, by post, care being taken to roll the short way of the drawing, as packages over 18in. long are not transmissible through the post.
5. On entering the class (which may be done at any time) each competitor is required to furnish his name and address, which must be written legibly on the back of each drawing, as a guarantee of good faith, the *nom de plume* the author intends to adopt being boldly marked on the front of each separate drawing.
6. Prizes of £10 10s., £5 5s., and £3 3s. will be awarded to the best series of designs, such series not to consist of less than twelve subjects. Our decision to be final.
7. Before awarding the prizes any contributor will be expected to furnish proof, if necessary, as to his age, and the time during which he has been engaged in professional pursuits, though no candidate need be strictly an architectural student.
8. We reserve the right of arranging the drawings for publication in any manner we deem necessary.
9. A critical notice of the designs sent in of each series will be given in an early issue following the receipt of the drawings.

LIST OF SUBJECTS.

- A. A pair of model cottages for labourers, suited for a rural site. A living-room, scullery, and three bedrooms, with necessary conveniences. Economy of arrangement and style will be considered of the first importance. Drawings to comprise plans, section, and two elevations to an eighth of an inch scale, and details to half an inch to the foot.
- B. The treatment of a small staircase and entrance-hall to a villa. Hall to be 15ft. by 8ft. and 10ft. high in clear; a window to be provided on one side. Drawings to be made to fin. to the foot.

The directors of the Felixstowe Railway Company signed on Saturday a contract with Messrs. Lake and Co. for the construction of a deep-water tidal basin at Felixstowe, with an entrance 100ft. wide into Harwich Harbour, and with a depth of 23ft. at low water. The contract includes the making of a railway upon each side of the basin in connection with the main line, and also the erection of warehouses. The contract price is £50,000.

The paltry deal seats which have so long disfigured the nave of Durham Cathedral are being removed, and good oak seats, from designs by Mr. C. H. Fowler, F.S.A., are taking their place. New oak book-stands are also being placed in the choir, adding greatly to the convenience of those engaged in the services. The work was placed in the hands of Mr. Grabon, of North-road, Durham, and Mr. Roddis, of Birmingham, has executed the carving.

The Barton-on-Irwell Conservative Club, which is situated in Monton-road, Eccles, was opened on Tuesday. The building occupies an area of about 3,000 superficial yards. The total cost has been about £1,000. The club has been erected, from plans furnished by Mr. H. Lord, John Dalton-street, Manchester, by Mr. W. Brown, of Salford.

Building Intelligence.

COLCHESTER.—The repair of the Church of St. Martin, Colchester, is now about to be commenced. This beautiful and interesting church has in the course of years been reduced to a state bordering on ruin. It was inspected by the Royal Archaeological Institute on the occasion of their visit to Colchester in 1876; and at the suggestion of the late Sir G. G. Scott, the chancel ceiling was stripped, and the fine 14th-century curved-rib roof exposed to view. The present reparation is, for lack of funds, confined to the works most urgently required to preserve the fabric from the destructive effects of the weather, and includes the removal of ceilings, and the opening and repair of roofs. The works are under the direction of Mr. Edward J. Dampier, of Colchester, the contract being taken by Messrs. Gardner and Son, of Coggeshall.

DUBLIN.—The new South City Markets, Dublin, were opened on Wednesday week. The architects are Messrs. W. and R. Mawson. The building contract was given to Mr. Thomas Hall Thorpe, of Leeds. The space actually occupied by the building is about 1½ acres, but the site acquired by the Company for the markets, a portion of which has been used to widen the four surrounding streets, covers 2½ acres. The principal facade in South Great George's-street partakes of the Gothic style, with an intermixture of Flemish ornamentation. It has a frontage here of fully 300ft. The entire block occupies a square, with four entrances. The slating on the roof covers an extent of 2 acres, glass 1½ acres, plaster-work 8 acres, painting work 6 acres, wood partitions 1½ acres, wood skirting 4 miles, wood architrave moulding 4 miles, and plaster cornices 3½ mil s. There are 41 iron columns in the market-hall.

EBBERSTON.—The parish-church of Ebberston, Yorks, was reopened on Tuesday week, after restoration begun in 1869, under the superintendence of Mr. Ewan Christinn, and carried on throughout according to his plans. The tower has been carefully restored, much of the walls of the nave and chancel rebuilt, the former rough roof of oak and fir, with lath-and-plaster ceiling, has been replaced by an open roof of pitch-pine, the pillars, arches, and other stonework carefully cleared of plaster and colour, washed and repaired where necessary; the chancel arch entirely renewed, new stone windows inserted, the old damp floors removed and solid wooden ones laid down with proper ventilation, the whole church reseated with open pews, new pulpit, prayer-desk, altar-table, and choir-stalls, the floor of the chancel being laid with encaustic tiles, the decayed porch removed and replaced by a new one of Norman style. The restoration has been carried out by Messrs. Metcalf and Mr. F. Thorp.

EDINBURGH.—North Merchiston Established Church, Edinburgh, has made rapid progress during the past six months; the side aisles are roofed, and the main gables are almost completed. The church will accommodate 1,000 without galleries. It is in the Gothic style of the 13th century. The plan consists of a nave and side-aisles, with a small transept for organ at the east end of the north aisle, adjoining which is the vestry. The principal entrance is at the other end under the tower, the base of which forms the porch, while to the west of this is placed a session house, a hall for prayer-meetings, &c., a commodious beadle's house, &c., so that the total length of the buildings is 197ft. The width of the church inside is 62ft. 6in., and the height from floor to top of ridge is 66ft. The tower is nearly 30ft. square, and rises to a height of 134ft. 6in. above the road. The architect of the building is Mr. Honeyman, of Glasgow.

HALIFAX.—To St. Augustine's Church, Hanson-lane, the nave and transepts of which were erected from the designs of Mr. Coad, of London, a chancel has just been added from plans by and under the superintendence of Mr. C. F. L. Horsfall, of Halifax. The recent addition, which is to be opened to-day (Friday), is apsidal in form and 40ft. in length; the three faces of apse are each occupied by a two-light window 22ft. high with cusped circular head. The internal walls are lined with ashlar masonry, the floor is laid with encaustic tiles, and the

roof, choir-stalls, kneeling-desk, credence table, screens to organ-chapel, and vestry are of pitch pine. The reredos is of Caen stone, with black marble shafts dividing into panels; the central space is occupied by the *Angus Dei*. The window above in centre of apse is filled with stained glass, the subjects being the Crucifixion and the Resurrection. A new pulpit, of Caen stone, with rich marble steps and octagonal in form, has been placed against the north-west angle of chancel arch. The organ chapel measures 22ft. by 16ft. Messrs. Drake and Riley have been the masons, and Mr. John Mansley has been the joiner. A vicarage house is being built next the church, and the only portion of the scheme remaining to be carried out is the tower and spire.

MIRFIELD.—On Tue-day the new church of St. Paul, which has been erected at Easthorpe, Mirfield, was consecrated. The foundation-stone was laid in January last, and its erection proceeded very rapidly, under Messrs. Milner and Son, the contractors. The architect is Mr. W. S. Barber, of Halifax. The walls are faced with polished local ashlar. The columns of the arcades are Dalbeattie granite monoliths placed upon octagonal stone bases. There are seven bays to form the nave, and a wide chancel. The building really forms a parallelogram. There is a small tower, but it is carried to no great height. It is surmounted by a gabled roof, upon which is a wrought iron cross. The style is 14th century. The cost has been defrayed by Mr. E. B. W. Balme, of Cote Wall; Mrs. Hague, of Crow Nest, Dewsbury, and Mr. Charles Wheatley, of Sands House, Mirfield.

PAIGNTON.—The old churchyard having for some years past been dangerously overcrowded, it became absolutely necessary that a new burial-ground should be formed. After careful inquiry, the local board purchased two acres of land for £100, in a convenient position. The main portion of the cemetery is a parallelogram, and the paths have been formed square with the sides, by which means much space is saved in laying out the grave-spaces. The boundary-walls on two sides are 6ft. high, and consists of red-rock rubble-wall, coped with limestone "Scotch" coping. On the other two sides, which adjoin roads, the walls are 3ft. high, of tooled limestone, square-tuck pointed, and coped with chamfered Portland stone, having 4ft. high ornamental railing fixed in it. The entrance-way has a pair of handsome iron gates, hung to nicely-worked stone pillars. The contractor for the railing and gates was Mr. R. Waycott, the cost being £230 (painting, extra £20). The contractor for the masonry was Mr. Evans, and the cost £335. The plans of the two chapels were prepared by Mr. W. G. Coudry, architect, Paignton. The chapels have been erected by Messrs. Webber and Wallace, the cost of both, under one roof, being only £428. They are plain, but substantial, the walling being hammer-faced, square-pointed red rock, with quoins and window-dressings of white brick. The whole of the woodwork is of pitch-pine, the seats and other interior work being slightly stained and varnished.

PLYMOUTH.—The foundation-stone has just been laid of four blocks of dwellings which are now being erected by the Plymouth Workmen's Dwellings Company, Limited, on an exceptionally open site adjoining the manufacturing end of the town. The buildings, which are to be 4 stories high and on a somewhat new principle, will contain accommodation for 96 families in 256 rooms, exclusive of washhouses (with drying areas attached), pantries, coal-bunks, and cupboards, w.c.'s, and urinals. Each landing will contain provision also for drawing water, and for the removal of dust (in shoots) and dirty water. The w.c.'s are separate for the sexes. The buildings will be constructed in a most substantial manner. Great attention has been paid to the sanitary arrangements. The contractor is Mr. Philip Blowey, of Buckland Monachorum, and the architects Messrs. Hine and Odgers, of Plymouth. It is anticipated that the new dwellings will be quite as successful financially as those recently erected in Lower-street from the designs of the same architects, and which pay a clear 5 per cent. after making due allowance for voids, &c. The rent charged for each dwelling (including use of washhouse and all domestic conveniences) is only 2s. 2d. per week, except where two bedrooms are attached instead of one, in which case the rental is 3s. 3d. per week.

RATBY.—The parish church of Ratby, in the diocese of Peterborough, was reopened by the Bishop on the 25th Oct., after having undergone a partial restoration under the superintendence of Mr. Nicholas Joyce, A.R.I.B.A., of Stafford. The work carried out includes the following:—The whole of the roofs have been renewed and covered with local (Swythland) slates. The nave and aisle have been fitted up with new benches of pitch-pine, and the chancel with stalls of oak. A new vestry, with chamber for heating apparatus underneath, has been constructed on the north side of the chancel. The old brick porches have been removed, and a new porch of stone built on the north side. The nave arcade has been restored, and the decayed stonework in the walls, as well as the windows, doorways, plinths, and string-courses have been cut out and replaced with new stone. In the floor of the church were a large number of memorial slabs. These have been replaced in the positions they formerly occupied in the passages, the spaces between the slabs being made up with the new slate paving. The pulpit is of Caen-stone on a shaft of red stone. It is circular in plan, and has a richly carved capping. In front are figures in low relief of St. Philip and St. James the Less. A well-executed stained-glass window, by Mr. Francis A. Oldaker, of Epsom, has been placed in the south aisle as a memorial to the Geary family. The committee have already expended over £3,000. The restoration of the south aisle and the west tower remain to be done. The contractor is Mr. James Stanford, of Ashby-de-la-Zouch. The hot-water apparatus is the work of Messenger and Co., of Loughborough, and Thos. Brawn and Son, of Birmingham, have executed the ironwork.

ST. EWE, CORNWALL.—The parish-church of this village, situated some five miles south of St. Anstell, has been restored, from the designs of Mr. J. Piers St. Aubyn, architect, of the Temple, London. The edifice consists of nave, south aisle, chancel, north transept, two fine porches, and a western tower and spire. The latter is an interesting feature, spires being extremely rare in Cornwall. St. Ewe is also celebrated for its fine old oak Perpendicular rood-screen. This is one of the very few remaining in the county, and is by far the handsomest example existing in that far-off western land. The altar-plate, presented to the church by one Jacob Robins, of Tregenna, so long ago as 1695, is massive and of good design. During the progress of the restoration, several highly interesting archaeological remains were discovered. They have been carefully preserved to the church by Rural Dean the Rev. A. Lawrence, vicar. Most of the windows are new, well wrought in Wild Duck stone, and filled with painted subjects. The glass is by Messrs. Heaton, Butler, and Baynes, of London, and by Messrs. Fouracre and Watson, of Plymouth. The old carved waggon-headed oak roofs in the south aisle and north transept and porches have been restored. Those covering the nave and chancel are new. The chancel floor and the approaches and avenues are laid with encaustic tiles. The benches are of pitch-pine; so is the parclose screen and the stalls. The rood screen has been re-fixed on a new sill, in its original place between the nave and chancel; it has also been lengthened several bays, the new work being of the precise character as the old. The coats of whitewash and of varnish have been removed, and the various coats of arms have been renovated. This screen is groined on both sides, and hence has a famous wide rood-loft over the cornices. Its restoration was undertaken by Mr. Harry Hems, of Exeter. The contractor for the general works was Mr. W. May, builder, of Pool, near Camborne. The cost of restoration has been £2,500.

SWINDON.—The cemetery here is now complete. The site is eleven acres in extent. The buildings consist of chapel, care-taker's lodge, and mortuary, and are built of local stone, with Bath stone dressings. The chapel is in the 13th-century style, and will accommodate 100; it has an apsidal end and a bell-turret; the roof is covered with Bangor slates and bands of green. The fittings are of pitch-pine; the tiles are from Minton, Hollins, and Co. The carving has been executed by Mr. Chapman, of Bath. The work has been carried out from the designs, and under the superintendence of Mr. W. H. Read, architect, of Swindon, whose plans were selected in a limited competition. The con-

tractors are Messrs. Phillips and Powell, and G. Wiltshire, jointly, and Mr. Gilling has acted as clerk of works. The total cost is about £10,000.

WINSFORD.—Winsford Weaver Navigation Church, which was erected less than 40 years ago (Mr. Edmund Sharpe, of Lancaster, being the architect) has had to be taken down in consequence of the serious subsidence which has taken place in the salt districts of Cheshire, and the River Weaver Trustees have instructed Mr. Richard Beckett, of Hartford, to re-erect the same forthwith. The structure will be built on the same foundations as before, using the old roof, seats, and fittings; but the walls are now to be built on the half-timber principle, of strong timbers filled in with brickwork on lifting beams, so making provision for lifting in case of any future subsidence. Mr. Beckett has recently lifted the Town Bridge a height of 4½ ft., under the direction of Mr. Stanhope Bull, the county surveyor. The town hall (with five shops, a corn warehouse attached, &c.), was also lifted by the same contractor, about two years and a half ago, a height of 8½ ft.

ARCHÆOLOGICAL.

ANTIQUITIES AT ROYSTON.—The Cambridge Antiquarian Society visited Royston on Tuesday week. The Cave was seen under the guidance of Professor Hughes, who remarked upon its position at the junction of four parishes, and called attention to the rudely-cut figures and other carvings on the wall, which he attributed to the 11th or 12th centuries. It might have been a hermitage or prison. The Rev. S. S. Lewis said the cave was at the junction of two Roman roads, the Icknield-way and Ermen-street; the figures on the walls represented the high altar, St. Catherine, St. Christopher, St. Lawrence, St. John, and St. Thomas of Canterbury. A hermit of Royston existed in Edward VI.'s time; but there was no intimation that he lived in this cave; the only bones found in it were those of domestic animals. The priory church was next visited, Mr. W. M. Fawcett, M.A., explaining its leading features, and expressing his regret that the fine chancel-screen, described in Cusson's "History of Hertfordshire," had been removed in modern times. Mr. Bendall said the screen was cut up and reformed into the present pulpit and reading desk; the original font was turned out by the late vicar, and was bought from the stonemason's by a farmer who used it as a trough under a pump. It had eventually been purchased by a neighbour, Mr. Phillips, to place in his garden.

BRISTOL.—An interesting archaeological discovery has been made on the premises of Mr. H. Boxall, 19, Mary-le-Port-street, Bristol, during some alterations. A fine freestone mantelpiece, ornately sculptured, and bearing a shield charged with the arms borne by George Harrington, Mayor of Bristol in 1617, having been exhumed from a thick covering of mortar. It is being carefully restored under the supervision of Messrs. J. W. Trew and Sons, architects, of 56, Broad-street. Harrington's residence, whilst mayor, was in Corn-street. Mr. J. F. Nichols, City Librarian, points out that this coat, which in the Mayors' Calendar is ascribed to the above Mayor, is there tintured incorrectly, colour upon colour, thus Gules on a chevron sable, three tuns, or, between six garbs (wheatheaves) placed in pairs salterwise, two one and one, or. Of course, the stonework shows no tincture, and the ordinary and devices are as above. The curious thing in connection with these arms is that they occur twice in the same street—viz., on the fronts of Nos. 38 and 40, below the first-floor windows. This raises a question as to whether these were not the arms of the Brewers' Company of Bristol, and were born by Harrington with a difference for his own coat, he being a brewer, just as Robert Aldworth bore for his coat the arms of the Merchant Venturers with a difference.

A stained-glass window has been placed in the south side of choir at Painswick parish-church. The subject is the Adoration of the Magi. Messrs. Hardman and Co., of Birmingham, were the artists.

The first ordinary meeting of the session of the Surveyors' Institution will be held on Monday evening, at 8 p.m., when the president, Mr. Edward Ryde, will open the session with an address.

"To a practical man with a taste for mechanics, and the bumps of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion.—*The Brightonian*. Price Two-pence of all newsmen, or post free 2d.—31, Tavistock street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.
Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and SIXPENCE for every eighth word after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 3fr. 80c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.
Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL., Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—J. K. and Son.—V. and Co.—J. W.—B. and S.—W. T. and Son.—W. B. S. and S.—B. S. and H.—G. B. and L.—D. and C. O. E.—L. F. Co.—H. C. and Co.—J. M.—S. and Co.

H. H. B. (The material is dextrin or "British gum." It is made by subjecting starch to a heat of 600°)—S. WILTSHIRE. (Write to B. T. Batsford, 52, High Holborn.)

Correspondence.

THE DUBLIN MUSEUM COMPETITION.

To the Editor of the BUILDING NEWS.

SIR,—Dublin Museum competitors should ask the Treasury to require from each member of the committee of selection, before acting, a statement that he has not seen any design, nor been canvassed, directly or indirectly.—I am, &c., FAIR PLAY.

PARC GWYLLT ASYLUM, GLAMORGAN.

SIR,—The statement contained in your issue of last week being calculated to mislead, and likely to injure us professionally, we must ask your insertion of the inclosed resolution of the committee, which puts the matter in its proper light.

On August 11th, 1881, meeting of committee resolved—

That Messrs Giles and Gough be requested to prepare a plan of each floor of proposed Asylum for 700 patients to 1 16th scale, together with sketch elevation, for submission to Quarter Sessions and Lunacy Commissioners, for the sum of £350 in event of work not proceeding to merge into usual commission as works proceed.

On Sept. 9th, when the sketches were submitted, resolved—

That the plans be approved and be submitted to the Court of Quarter Sessions.

We are, &c.,

JOHN GILES & GOUGH.

28, Craven-street, Charing-cross, Nov. 2.

WATER-TRAPS AND SIPHONS.

SIR,—I fear I must enlarge the historical data somewhat which Mr. Davies gives at page 492, where he says Mr. Jennings was one of the first to use a ball inside a trap, his first patent being dated 1871. Now, permit me to state that long before this, viz., in 1834, Mr. Rawlinson, C.E., invented a ball-trap. Then in 1863 Mr. Fenwick brought out another one, while in 1866 Mr. Williams, an American, invented a ball-trap, in which the ball lay in the outer limb of the siphon trap, below the water, just as does the ball in the trap invented by Mr. Davies (as he candidly tells us on page 575) ten years after. In the ball-trap (Fig 101, page 459) invented by me, the ball is placed above the water, in which respect it differs from both Williams' and Davies' traps. I make little account of this trap myself, and have repeatedly pointed out that these ball-traps, supposing they were "perfect" *per se*, were useless for doing any good in case of a leak in the pipe beyond the trap. To protect the inmates properly, the waste-pipe I pointed out had to be protected. This confession and information does not, of course, please quacks who have perfect cure-alls to sell.

In regard to Mr. Davies thinking "Mr. Buchan is not a careful reader," because I stated on page 545 that the ball in Jennings' "perfect" trap would only be a "sham sentinel" if a hole got into the water trap or into the metal above it—I have re-examined the drawing (Fig. 103, page 492), and repeat what I said.—I am, &c.,

W. P. BUCHAN.

[We have no further space to spare for this discussion.—Ed.]

PRACTICAL EXPERIMENTS WITH CLOSET-TRAPS.

SIR,—Mr. Emptage has, I think, scarcely paid sufficient attention to my diagrams, by which I endeavoured to show the result of practical experiments on traps. If he will refer to 5, Fig. 3, he will see that without any pipe at all upon the outlet, the momentum is precisely the same as if there were 100ft. of pipe.

With regard to the 2in. ventilator that he has suggested, I must say that his idea is the same as Mr. Ernest Turner and Mr. Rogers Field. These gentlemen had a 1 1/2in. hole cut in the top of one of Beard and Dent's "O"-traps, when they of course found the result the same. Now, referring to Mr. Emptage's remark as to the efficacy of the T-trap under a valve-closet, allow me to tell him that Mr. J. Clark (Beard and Dent's foreman) has asserted, in presence of others beside myself, that they never fix a T-trap under a valve-closet.

But to clear up this matter finally, we have fixed a valve-closet over one of Beard and Dent's half O-traps, when the trap momentum out every time a basin of water was discharged. We did this with a 1 1/2in. air pipe, also with trap open at the top, and again without ventilation excepting at the soil-pipe. In all these cases the result proved to be precisely the same.

In reply to "W. N. O." I think the first three paragraphs are answered in the above letter, and with regard to the Eclipse trap, I must acknowledge that I overestimated its capacities; but on finding by the test in what points it failed, I hastened to explain it to my readers.—I am, &c.,

P. J. DAVIES, II.M.A.S.P.

THE BIRKENHEAD v. THE GLASGOW TOWN-HALL COMPETITION.

SIR,—There is one feature in the Birkenhead conditions that is at least suggestive. Although modelled on the Glasgow conditions, those for Birkenhead differ in this: that the guinea charged for conditions is a deposit, not a payment. Considering the work involved in the preparation of the drawings is infinitely less in the Birkenhead than the Glasgow competition, the large-heartedness of the English municipal body contrasts favourably with the niggardliness of the wealthy Scotch corporation.—I am, &c.,

A SCOT.

The annual distribution of prizes and certificates to the students in the science and art classes at Ashford, Kent, took place on Thursday week. The report was of a highly encouraging character.

The Town Council of Scarborough at their last meeting accepted tenders amounting to £9,216 16s. 10d. for constructing new sewers and carrying out improvements to causeways from the plans of the borough surveyor, whose estimate for the work had been £7,000.

At a special meeting of the City of Wells Town Council held on Wednesday week it was decided to carry out works of sewerage disposal, as recommended in the report of Mr. Ellis, C.E., in which a process of deodorisation, filtration, and precipitation will be adopted. The estimated cost is £3,865 for works and plant, and £1,500 for purchase of land.

Entercommunication.

QUESTIONS.

[6746].—**Architect's Account.**—Can an architect be compelled to supply a client at the termination of a contract, with a complete detailed bill of extras and omissions containing the builder's prices, or is an abstract or summary all that the owner can legally claim?—MAX-CUSIAK.

[6747].—**Thatched Churches.**—Do any old churches with thatched roofs still remain in England?—G. C.

[6748].—**Palace for Guicowar of Baroda.**—Will some one give the leading dimensions, or supply the scale for the plan of above, as given in the BUILDING NEWS of the 28th October, 1881?—INDIA.

[6749].—**Commonplace Book.**—I am about to enter an architect's office, and wish to keep a commonplace book. Being rather at a loss how to set about it, would some of your readers oblige by giving a few hints?—L. E. K.

[6750].—**Removing Oil Stains from Paper.**—I have just had some books and drawings stained by the oil from a lamp accidentally overturned, and shall be thankful if any correspondent can inform me of means by which the stains can be removed.—NEWTON ABBOT.

[6751].—**English Buildings Previous to the Conquest.**—Can any of your readers refer me to a list other than the one in Rickman) of buildings, more particularly churches, which were erected previous to the Conquest, and of which remains are still left?—F. P.

[6752].—**Zinc Roofs.**—I have a flat about 24ft. by 18ft. that I intend covering with zinc. The fall will be in one direction, from a wall to the eaves. Can any one inform me where I can obtain the best quality zinc for the purpose, as to best way of laying it, length of time it would last, and best way to secure the zinc at eaves and verges. Any information on the subject will be very acceptable.—ZINC.

[6753].—**French Casements.**—I am about to fix in a library somewhat exposed casement windows opening down to the floor. The sill I thought of having in oak, the other portions pitch-pine. Can any reader inform me if the wood I propose for the sill is a good one to stand for that purpose? Also, I shall be glad of a sketch or section of a good casement of the description named, to be water tight and of good appearance, showing sill, bottom rail, and the transom with top rail; also meeting stiles, mullions, &c. Some of the casements open inwards and others out. Also where the best description of fastenings may be obtained for the casements in question.—READER.

[6754].—**Chimney Shaft.**—I shall feel obliged if a contributor to your "Intercommunication" column would inform me where I could see in course of erection a chimney shaft, about two hundred feet high.—W. HICEST.

[6755].—**Oak.**—1. What is the difference between brown and white English oak, and to what purpose is each kind put? 2. Is it a fact that the importations of foreign oak have been doubled during the last seven years, and much to the depreciation of English oak? 3. In what part of the metropolis is most English oak used, and from where is it principally supplied?—YONGE OAK.

[6756].—**Pointing.**—Would some practical reader kindly inform me what is the best to use for pointing the joints of outside walls of a mansion which is built of limestone?—M. N. O.

[6757].—**Road Surveyor, &c.**—Will some kind reader of this valuable paper advise me a would-be road surveyor and sanitary inspector as to the best work on this subject I could get to read up from, also price of same, and oblige.—SARCA.

[6758].—**Measuring Brickwork.**—What is the custom in and around London when measuring for labour only and for labour and materials? Is it usual in the first case to make no deductions for openings, such as for doors and windows, and in the second case to deduct only half the openings? I have heard of it being done in the Eastern counties, but should like to know if it is correct and general.—M. A. J.

[6759].—**Notice to Quit.**—Will any subscriber answer me the following? About five weeks ago, wishing to leave my house I determined to give the landlord a month's notice, but he, not having given his address, I was obliged to wait until he called for the rent, which was not until the 11th of October, or eleven days later than usual. I then informed him of my intention of leaving, to which he agreed, and told me to try and let the house (also raised the rent). I did not succeed in doing so. At the end of the month I left the house, and wrote him to that effect, to which he replied that he required a month's notice from the 1st, thus claiming another month's rent. Am I legally bound to do so, or was not the notice I gave him, the raising the rent, and authorising me to try and find a tenant a sufficient acknowledgment of the notice being sufficient?—F. W. H.

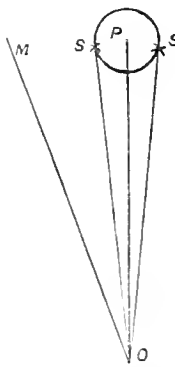
REPLIES.

[6678].—**O-Traps.**—I notice in your issue of Sept. 13rd, amongst intercommunications under the above heading, a description of a trap given by "Inquirer," of which he seeks further particulars. The one he refers to was patented about 12 months ago; it possesses the essential points necessary for a good trap, and I fully endorse the opinion in respect to it expressed by "Practical" in your issue of Oct. 7th. I am intimately acquainted with Mr. Pullen's patent O trap; it is well made, and is a great improvement upon both the manner and form in which these traps were previously made. I also am thoroughly conversant with Mr. Davies' scale for making O traps, one of the great defects in the manufacture of these was the rule of thumb principle upon which they were generally constructed. The O-Interceptor, as "Inquirer" names it, might be described as having two chambers formed by the

diaphragm, which assists to make the seal, the one chamber being the size only of the dip-pipe and corresponding exactly to that half of the eclipse trap as shown Figs. 75 and 76 in the BUILDING NEWS for the week ending Sept. 16th. The other chamber is rather more than double the width, and has the channel of the trap carried right across it, the contents being emptied on both its sides. The channel is sometimes carried at one of the sides, the contents in that case running over the other side, the outlet being taken preferably in a straight line from the bottom of the trap. It is self-cleansing, and retains its water-seal, especially against waiving out by strong currents, however induced. The remarks in the latter part of "Practical's" communication, I think, were well timed, and I am strengthened in this opinion by Mr. Davies' rejoinder to Mr. Buchan in your paper for Oct. 28th. I do not think that he should have assumed such a tone, as it is apparent, even to those who do not know them (I happen to know both gentlemen well), that there is a latent interest in whatever either has written. I am expressing the opinions of several with whom I have conversed upon the matter, in regretting this exhibition of personal feeling, as there is no doubt great good will proceed from the opinions and experience of the several correspondents who have taken part in the controversy, especially from the able and practical articles written by Mr. Davies. At the same time one cannot help taking exception to the invidious references and comparisons that occur in respect to traps of his own design or make; for instance, he refers to the oval lip-trap, Fig. 97, as being similar to one of his, Fig. 95. Again, Sept. 30th, he advances the plea of its being all-sufficient to state that Pollen's new and improved \square trap is made after his seal; and again, in treating of ball-traps, after first describing those of his own design, I cannot help but express an opinion (not mine alone) that he has not done justice to the Bower-Trap, Fig. 102. He refers to the bottom piece C being made of glass militating much against the efficacy of the trap under certain conditions, which he gives. Now Mr. Davies must, or should know, that the depending cup C is more generally made of lead, and most certainly would not be recommended fitted with glass cup to be used under the conditions he names. There are at least two special features of this trap patented, and which cannot be infringed: (1st) The use of the floating ball as adapted in this case, and which he admits would be required in his No. 95 trap to make it equally as efficient. Can he adopt this part of the patent? He further proves the utility of the floating-ball by directing the overflow pipe to be taken into the inlet-pipe, because, however charged with sewer-gas the contents of the cup might be, the ball being securely seated against the dip or inlet-pipe, prevents the passage of any of these gases through the fixture; another advantage of the ball-seal is that the trap is not so liable to have its water-seal broken by evaporation. (2nd) The depending cup, when taken off, holding all the contents of the trap, is a desideratum in the case of the cup and screw. This could not be done, and very frequently it would be impossible to place a vessel underneath to catch it. I may say that I am not in any way interested in the Bower-Trap—rather otherwise.—J. W. HOLLAND.

[6385.]—Variation of the Compass.—Every now and then the subject of the variation of the compass is called attention to by some of the readers of the BUILDING NEWS, and, so far as I am aware, no entirely satisfactory solution of the problem has yet appeared in its columns. In this paper I shall explain three of the methods usually employed to find the variation, and I hope in such a manner as to be easily understood without much help from the science of physical astronomy. Some of our almanacs give the variation from year to year at Greenwich, which may serve the purpose of those who live near that place, but the variation not only varies from year to year, but is also different at different places at the same time, thus making the given Greenwich variation of little practical value to the community at large. The first method I shall notice is that of finding the true south from the sun; it may be stated in a rule thus:—Find the time when the sun will be due south, and observe its centre at that time. At Greenwich the sun is due south at 12 o'clock Greenwich time, on, say, four days every year, for all other days his southing at that place may be found by adding or subtracting the "equation of time" from 12 o'clock. The equation of time may be got from an almanac under some such heading as "clock fast," "clock slow," "clock before the sun," &c. The time of southing at Greenwich is next corrected for the longitude of the place where the observation is made. This correction is in proportion as 15 deg. is to the longitude, so is one hour to the correction, to be added when the longitude is west, and subtracted when it is east from Greenwich. Thus, at a place 7° 15' west longitude, the sun will be south at 29 minutes past 12, when the sun and the clock are together. The semidiameter of the sun should be noted previous to the observation, so that the edge of the sun's disc may be taken and the semidiameter added or subtracted to get the centre. The greatest objection to this method is the difficulty of getting Greenwich time in out-of-the-way places with sufficient accuracy for the purpose. Near places connected to Greenwich by telegraph the difficulty is not so great; but when it is considered that four seconds of time will cause an error of 9" in the result, even time sent by telegraph (unless with instruments specially constructed for the purpose), will be looked on with suspicion for this purpose. The error likely to occur from incorrect time in observing the sun is greatly diminished when a star near the North Pole is observed instead of the sun. Thus an error of four minutes in time would give an error of 1° if applied to the sun, but if applied to the Pole star the error from this cause could not exceed one minute. This proves that the second or stellar method, if carefully performed, is less likely to give any appreciable error than the first or solar method. This second rule is:—Find the time that any star at or near the North Pole will be north or south, and observe it at that time. The time when any star, the right ascension of which is known, is due south is found thus:—In most almanacs is a column headed "Sidereal time at noon" or "Sun's right ascension at noon." Subtract the time given in this column opposite at day of the month from the star's right ascension (if the star's right ascension be less than the sidereal time add 24 hours to it) and further diminish the result by 10 seconds for every hour of the result. This will give the time

from midnight that the star will be south at Greenwich. This must be corrected for longitude as in the first method, with the sun at the rate of one hour for every 15 deg. east or west, but no correction is required for the equation of time. The time when any star will be due north is 11h. 58min. after it is due south. The right ascension of the Pole star may be taken as 1h. 15min. 15sec., and its distance from the Pole 1° 19' 23". Both of these are subject to a slight variation from year to year, but for practical purposes this may be disregarded. From what has been stated, it will be seen that the Pole Star is 1° 19' 23" from the Pole when due east or west, and that it will be due east or west 5 hours 59min. before or after it is due south. This gives an opportunity for observing it at every six hours end. The sidereal time at noon can be approximately found thus:—At midnight between 21st and 22nd March in each year, it is 0 hours 0min. 0sec., and increases 3min. 56sec. every 24 hours, so that on coming to the same date the following year it will be 24 hours or 0 hours—then if 3min. 56sec. be multiplied by the number of days between March 21st and the date of observation and 1min. 28sec. added, it will give the sidereal time at noon for that date. The longitude of the place can be got from a large scale map. Both of these methods of finding the variation are open to the objection that they require the use of some data which may not always be accessible to the observer, such as the Greenwich mean time. But I will now give a plan of solving this problem, which does not require the use of any data whatever, a solution which is not affected by data, time, nor place on the earth's surface, but it is only practicable when any fixed star can be twice seen at an interval of 11 hours and 56 minutes from the same place, and, of course, can only be accomplished during the long winter nights, and when the evenings and mornings are clear. Select a star about the same height from the horizon as the Pole star, or the Pole star itself, find its azimuth bearing from the magnetic meridian (or any other fixed point), and note the time of observation. 11 hours 56 minutes afterwards repeat the observation on the same star, then half the difference in azimuth it has changed its position will be its distance from the northern meridian. This added or subtracted from its magnetic azimuth will give the variation of the compass. In the annexed diagram, let O be the place of the observer, O M



the magnetic meridian, P the North Pole, and at six o'clock let the star, S, be observed 25° east of M, the magnetic pole. At 5.56 next morning the same star is seen at S, 15° east of the magnetic pole; it having moved 10° in azimuth during the interval, will then be $\frac{10}{2} = 5^\circ$ from the true north; this added to 15° or subtracted from 25° gives the variation of the compass. Although I have advised a star near the Pole to be selected as less likely to be affected by refraction, the method may be applied to any star, and will give the variation exactly when the star is equidistant from the horizon at both observations; in other cases there is a slight error caused by the difference of atmospheric refraction. This error is so slight that it may be disregarded with impunity under ordinary circumstances, and the nearer the star is to the horizon it is the easier observed with the compass. A star's place in the heavens can be calculated when the star is invisible to the eye.—J. MCW.

[6712.]—Breaking Weight of Cast-Iron Stanchions.—"Inexperienced" omits one of the most important in his dimensions of stanchions, that is the height, for on this depends the question whether the column or stanchion will be broken by crushing or bending or both combined. For a height of five diameters and less it will have a tendency to break by crushing only, above eight diameters by crushing and bending combined, and above about sixty diameters by bending only. The height should not exceed twenty-five diameters. In a series of tables given in a paper read by Mr. R. Moreland, jun., M.I.C.E., at the Architectural Association on "Iron Construction," H stanchions of equal measurements each way bore a breaking load in tons per square inch, for 16 diameters high 2½, 20 diameters 17½, and 25 diameters 13½ tons. This may help "Inexperienced" in what he requires. The diameter would be the smallest dimension of section; in the case given by him, 5in., the safe load would be one-tenth of this. If both dimensions were equal one-sixth might be allowed. This paper can be found in BUILDING NEWS, Jan. 16, 1874. See my answer to No. 6560 on "Beating Loads" in BUILDING NEWS, July 22 of this year. I see no formula in Hurst applying to the case in point, but "Inexperienced" and others cannot expect anything easier for the purpose than the formulae given in that and similar works.—H. McLACHLAN.

[6713.]—Shoring.—What is generally required in shoring is to relieve the weight from some damaged portion of a wall that it may be repaired, to support the wall above when the lower portion is removed as in putting in a shop-front or a bay-window, to prevent a wall buckling or falling outwards, to stay the openings and sometimes to support the floors and roofs so that less weight may be thrown on the wall. "W. G. M." will learn most by studying shoring of buildings when in pro-

gress. He can read "A chapter on Posts and Shores," BUILDING NEWS, Aug. 24, 1877; "The Mechanics of Shoring," BUILDING NEWS, Sept. 14, 1877, and a paper by Mr. J. P. Seddon read at the Royal Institute of British Architects "On the Shoring of Grosvenor Church," reported in the BUILDING NEWS of Feb. 7, 1873. The best is to be found in M. V. Le Duc's "Dictionnaire de l'Architecture," on the word "Etai." It is well illustrated.—H. McLACHLAN.

[6715.]—Varnishing Exterior Woodwork.—In what way is paint "more or less a sham"? I have always considered a sham to be an imitation or pretence, and cannot see anything of a sham in a plain coat of paint, though it may become such when used in graining, marbling, &c. In my opinion for exterior woodwork there is nothing like a plain coat of oil-paint of a good colour which will not readily show dirt, for instance oak-brown or bronze-green; no one would ever take either of these to be imitations of oak or bronze. Also if light-coloured woods are varnished, it is necessary first to stain them, even though in a slight degree, and I consider this is far more of a sham than a coat of paint, as it makes a commoner description of wood to appear to be of a better kind. Varnish may be used if preferred and the objections made apply also to paint. Look at coach-builder's varnish on carriages and see how much more free from blistering it is than paint. Certainly this is of the best description, but I believe others of a cheaper description might be obtained to equal it. Ask the opinion of a manufacturer as to the most suitable kinds. Those made of the harder gums would be found to be less likely to blister and more durable than the others as far as I know. It should be remembered that paint for exterior work is never less than three coats thick, whilst varnish is generally not more than one, to obtain durable work more should be added. If superior woods are used, as oak, teak or pitch-pine, I should prefer varnish or dead polish, but if deal paint; pitch-pine is not very suitable for exterior work. Varnishing and painting should be left till September; it has then a longer time to harden before being exposed to the summer sun which causes the blistering whilst the work is soft. If left till later in the year, it is slow in drying, there being more moisture in the air.—H. McLACHLAN.

[6716.]—Examination Question, Roof.—"Student" will have to study construction more than he has done at present. The problem of compound iron and wood construction is a very common one, the ends of timber scantlings are received into cast-iron sockets or shoes with holes for the passage of the tie-rods, the latter being screwed up tight by means of nuts; when the main tie-rod runs horizontally across, like a tie-beam, it is flattened out in the centre and a hole made for the king-rod to pass through, the nut being fastened on beneath.

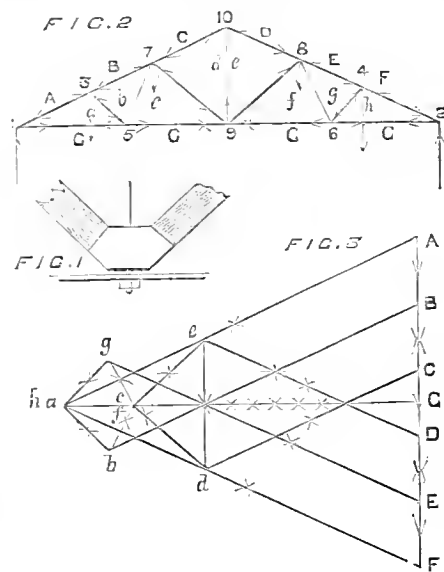


Fig. 1 is sketch of joint at foot of king-rod. The joint at head is similar. The proper way to determine the size of the different members is to find the strains on them, either by the graphic method referred to in other answers or by calculation. I have shown annexed a diagram Fig. 2, scale 16ft. to an inch; Fig. 3, 1in. to a ton, of the strains with roof worked out by the graphic method, and have supposed loads of 1 ton each acting at joints 3, 4, 7, 8 and 10, with reactions of 2½ tons each at 1 and 2. There are of course additional strains and reactions at 1 and 2, but as they act directly on the walls, may for the purpose under consideration be neglected. Compressible strains are represented by thick lines and tensile by thin. The strains in the several members are as follows:—A, compressible, about 6 tons; B, compressible, about 5½ tons; C, compressible, about 3½ tons; tie-rod between G and C, tensile, about 5½ tons; between G and C, about 4½ tons tensile; king-rod, tensile about 2 tons; tie between b and c, about 1 ton; strut between c and d, compressible, about 1½ tons, and strut between a and b about 1 ton. Whether the strain is compressible or tensile is shown by the triangle or polygon of forces for the joint under consideration, the arrow-heads following round all the sides in the same direction when the joint is in equilibrium, and since the direction of one of these must be known, the others will follow in due course; and if such triangle or polygon be supposed to be applied to the joint under consideration, those arrow-heads which point towards the joint would show that the pieces are under a compressible strain, and if from, under a tensile. I have numbered the joints as they should be taken in due course; first, No. 1, draw G A = 2½ tons on scale, parallel to wall with arrow-head

pointing upwards showing the reaction of the wall, from A draw Aa parallel to piece between A and a, and from G draw Gg parallel to tie-rod between G and g, meeting the last in a, G A a is the triangle of forces for joint 1; and since G A points upwards, A a points obliquely downwards towards the joint, the raft A a is therefore subject to a compressive strain, following in the same direction as the tie-rod from the joint showing the tie-rod is subject to a tensile strain. In the same manner with the other joints, finishing with joint 10, the polygon for which is C D E F G H I J K L M N O P Q R S T U V W X Y Z A, which is a closed polygon, and forms two triangles, Joint 9, I would mention is more regular, being G d e f, the line G being equal and over G d, acting in opposite directions and neutralising each other. The line A F represents the scale of external loads and reactions which of course neutralise each other. The lines representing the strains of the pieces in the external framing are drawn from this, and for the miter braces, &c., from the ends of the former to which they are adjacent. The diagram of strains is lettered so that the strains of the pieces represented therein lie between the same letters as in the diagram of the roof above; and all lines are drawn parallel to the pieces the strain of which they represent. It will also be noticed that each line in the lower diagram will be read twice and in opposite directions, showing it is in equilibrium. The line or part thereof is traversed eight times to represent the tie-rod, G a, G h, G i and G j. I cannot go further into this but if "Student" will study the books referred to in answer 6728 he will without doubt understand the whole. I give to finish the dimensions of pieces required:—Rafters 2in. by 11in. large struts 1in. by 3in., small struts 3in. by 2in., tie-rod 1in. diameter, king-rod 1in. diameter, remaining ties 1in. diameter. The question did not however require all this to be worked out, a rule of thumb answer evidently only was required. —HUGH MACLACHLAN.

[6733].—Asbestos.—If "A Subscriber" wishes to return a room, I should not recommend an asbestos fire. One was used where I was articulated; it had to give way to hot water, owing to the untold complaint of a working in the room. Mr. Trevor also in his answer owns that "the heat generated in insufficient to make a good draught in the flue." It certainly is cleanly, and in the appearance of a fire is only required, I know of nothing better for the purpose. There is usually more than three times the quantity of pumice-stone than asbestos used, it being as serviceable and much cheaper. —H. MACLACHLAN.

[6731].—Old Crosses in West Cornwall.—Mr. Henry Hens, in his interesting communication, does not really answer the inquiry for information, as I suppose, in reference to purpose and origin of Cornish crosses. I am not aware of anything having been written on the subject. This much is clear. There are three descriptions of crosses in Cornwall—namely, the tall churchyard and wayside crosses on steps, which in no way differ from others in various parts of England, and a third sort, which I have only seen in Cornwall. This is a short cross, about 5ft. high, with no step, with generally a rounded top, which is carved a Maltese cross. These abound. Their date, I think, is early 14th century. There are two theories as to their use. One is that they marked the boundary of ecclesiastical property. The other, which I think the correct one, is that they were guides to pilgrims visiting the holy wells. Two things must be remembered of Cornwall in the olden time. A great part of the country, it being hilly, was uncultivated and sparsely inhabited, consequently there would be few roads. The other, the partiality which the people showed for sacred wells and springs. Of course, in a hilly country there are a great number of these, and they so dominated in the impressionable minds of the Keltic as to be made objects of worship, which continued into Christian times, and was made useful by the priesthood. Now, when from some reason—a fictitious miracle, perhaps—a spring or well became famous, it was necessary over the open country to guide people to it, and this I think is the origin and use of the crosses referred to—guide marks. Some years ago, when visiting my friend Mr. Venning, and who, no doubt, would be glad to see Mr. Hens, he showed me in the neighbourhood of his house at St. Clether, about a dozen of these crosses, several of them being on his farm. In confirmation of the theory of being guide-posts, I found them without exception on the side of present roads, these roads, of course, being formed on the old tracks in more modern times, and they led to a ruined chapel built over a well on Mr. Venning's farm. The nearest two or three crosses appeared to be exceptions to the rule of marking a road, as road there was none. On my mentioning the matter, however, to my friend, he informed me that these crosses did really mark an old road, but that the road in modern times had been diverted for the convenience of his farm. Three miles from Luaneston, at Holywell, is one of these crosses with its well. —M.

[6732].—Dow-draught in Chimneys.—When a chimney acts as the air-conductor into a room, it shows that air inlets are wanted. Provide these by vertical pipes, sherringham ventilators or other openings and I believe that the majority of cases of dow-draught would be cured. Such a method does not of course prevent the wind blowing down the chimney or other little matters which cause chimneys to smoke. Chimneys should never act as fresh air inlets, though they may sometimes serve the purpose of foul-air outlets; proper ventilation also acts favourably on the health of those using the room. Improved stoves will cure smoky chimneys at times but the patent Manchester grate is only one of many. "W. B." can refer for further information to an answer of mine on "Smoky Chimneys" in August or the end of July last. —H. MACLACHLAN.

[6734].—Rain-Water.—I would advise "J. R." to have the tank examined. Possibly some mortar has been left in by the workmen engaged in building it, the lime when it dissolved by the rain water would account for the hardness. A tank-lime or chalk is easily acted on if any has been about got into the tank. Good cement would not be dissolved, but if any has broken away and the contents have been mixed up with common mortar, the water would reach it. —H. MACLACHLAN.

[6735].—Rain-Water Separator.—The invention which "B. S." inquires about is Buck's Patent Percolator, an apparatus for rejecting the bad and storing the pure water from a roof. It is self-acting, and prevents the first portion of the rainfall, which washes down the

impurities of the roof, from passing into the storage tank by directing the water into a waste pipe or separate tank for a time. Afterwards, when a certain quantity has passed through, the percolator vents over and turns the pure water into the storage tank. Having tested the apparatus thoroughly for two years, and finding the results most satisfactory, I have, within the last fortnight, purchased the patent, and have arranged for its manufacture at the Percolator Works, Hachinore, Surrey. —CHAS. GAY ROBERTS.

[6731].—Rain Water.—The machine referred to by "B. S." is very likely that known as a Buck's Patent Percolator. It was described in "The Gatherer" in *Cassell's Magazine* for January, 1880. I am not able to give the address, but perhaps the above will assist in finding more particulars. —A. R. F. TREV.

[6733].—Working and Detail Drawings.—There is a book on "Working Drawings and Practical Designs in Modern Building and Architecture," edited by R. Scott Burn, the price of which is £1 15s., and may be obtained at Mr. Batsford's, 52, High Holborn, W.C. There is also another book on "Drawings for Builders and Students," by George Payne, published by Crosby Lockwood and Co., price 7s. 6d., giving practical rules on drawings for the operative builder and young student in architecture. —FRED J. FREEMAN.

[6733].—Working and Detail Drawings.—The only works I know with working drawings are the series published by Messrs. Laxton some years ago, now difficult to obtain. The subject may be learned from Nicholson's works. Rolson's "Carpenter, Joiner, Mason, and Plasterer's Guide," both works out of print. Perhaps the best elementary treatise is "Journeyman Plasterer" can get it that published by Cassell and Co., and which appeared in the "Technical Educator." The series I mean were intended to instruct artificers in their trades, and, I believe, most of the trades are published at a very moderate price. —G. H. G.

[6740].—Concrete Houses.—With good cement and a suitable aggregate, concrete walls can be built one-fourth less in thickness than is needed if of brickwork, and with better results. To construct floors and staircases of concrete is necessarily more difficult than to build plain walls, and would require in respect for explanation than could possibly be permitted in the Intercommunication Column of the BUILDING NEWS. There are several patented methods and processes for floor construction; but in an ordinary way the latter can be easily accomplished with Portland cement and coke cinders, or brick debris, with a small amount of practical experience and at a moderate cost. As an instance of the extraordinary strength of concrete, I give one of a series of experiments made with concrete composed of one part of Portland cement and four parts of broken brick ballast gauged to an inch mesh, the concrete being well beaten in place, and covered with water for seven days. The size of floor was 17ft. 6in. by 16ft. 6in., the actual dimensions in clear of sustaining walls 14ft. 6in. by 13ft. 6in., and the thickness 6in. uniformly throughout. At the end of 21 days a party of 80 men marched on to it at quick time and double time, then jumped, but no fracture taking place, it was loaded with bricks till 10 tons was accumulated, when it broke suddenly without any warning. The result of this experiment will give your correspondent some idea of the thickness needed for his floors and the proportions of his materials. Concrete made from any calcined material will withstand heat as well or better than ordinary bricks, but for flues the circular fire-day flue-pipes are certainly preferable.

For party floors there is a patented glue made by Eberhard and Co., 8, Edward-street, Hampstead-road, which is, I believe, very efficacious in causing the wood to adhere to the concrete. Wood bricks can be built in the walls for fixing the joinery thereto, but the concrete fixing bricks made by Mr. Lascelles, of Bunhill-row, are far preferable for that purpose. The cost of concrete depends largely upon circumstances, but may be said to range from one-half to three-fourths or more that of brickwork. For further information on each of these points see "Concrete, its Use in Building," published by Spott and Co.—THOMAS POTTER.

[6740].—Concrete Houses, having concrete floors, stairs and roofs (as well as walls) have been built in considerable numbers during fourteen years past, and some are now in course of erection by the undersigned, who will have much pleasure in showing them and in giving fullest information upon all the points mentioned in the question. As to give anything like a complete reply would occupy much more space than the usual limits of "Intercommunication," and could not be so complete as verbal information, combined with ocular demonstration. I shall be glad to give the latter if "Dulce et Decorum" will communicate with me. —CHARLES DRAKE, Railway Wharf, Battersea Park.

[6740].—Concrete Houses.—Let "Dulce et Decorum" apply to any of the concrete manufacturers and builders advertised in the BUILDING NEWS, who will furnish him with every particular. There is no reason why the floors and staircases should not be built of concrete, the former require iron joints at intervals and we can recommend the Bennett's stem. Stairs of concrete, 3in. to 4in. thick, have been laid on light iron joists or wooden joists. Staircases are constructed every day of this material, and there is no material that surpasses it for strength, durability, or fireproof qualities. Walls of ordinary houses may be about a third thicker than those of brickwork. The stairs are best cast and put together like stone ones. Concrete stands into heat well. Wood blocks or wedges are necessary for fixing. —G. H. G.

[6743].—Liability of Yearly Tenant.—There is no implied covenant on the part of the tenant that he will put building in repair. There ought to have been an agreement to make repairs compulsory on the tenant, if such was intended. But even when there is no agreement I believe a tenant can be made to keep the fences in repair. The tenant of rural lands is supposed to use the buildings in a tenant-like manner, and I turn in a husband like manner. —G. H. G.

[6741].—Measuring Hay-Ricks.—Consult any work on measurement of solids, such as Baker's treatise, Lockwood and Co.'s or Nesbit's "Measurement." The rules for measuring are precisely the same as those for calculating the contents of solids. Circular ricks have to be measured in two parts—1st, for the frustum of cone or

the lower part of rick, and 2nd, the cone or roof. Square or rectangular ricks are measured as follows:—The lower part is taken as a prismoid, and the upper as a triangular prism, the rules for which may be found in any book on mathematics. —G. H. G.

[6741].—Measuring Hay-Ricks.—The best method of measuring hay-stacks is to take the length of side half way between ground and eaves from out to out, and allow from 6in. to 6in., according as the exterior presents either a neat or loose appearance. Then take the opposite side adding the two together and dividing by 2 to get the average; proceed, the same with the ends. The height is taken about one third way up the roof, either at the ends or side by putting the tape on a rod or stick. Measure to ground and allow 6in. for steddle or the debris on which the rick rests. To ascertain the cubical contents, find the number of feet per truss, say, 6ft. to 7ft. close, 7ft. to 8ft. medium, and 8ft. to 9ft. loose. Multiply the average of sides and ends together, and that by the height. Divide that total by the number of feet per truss, according as you think the stack either close or coarse, and that remainder by 36 to bring it to loads, and 40 to bring it to tons. —T. WILLIAMS, Farnham.

[6741].—Measuring Hay-Ricks.—In reply to "Karyaka," I beg to offer some hints on the measurement and weight of above. The weight of a hay stack varies with the density of hay, from 1 to 2 cwt. per cubic yard. A rick of hay seldom weighs above 5 stones (of 22lb. avoirdupois each) per cubic yard. A hay-stack of a moderate size, when newly made, may, in ordinary cases, weigh about 6 stones, and after it has stood for some time, about 7 stones per cubic yard. A large stack may weigh about 8 stones, and, when the hay is old, about 9 or 10 stones per cubic yard. The weight of any hay-stack may be estimated pretty accurately as follows:—Cut out from that part of the stack where you judge the hay to be of a medium density, a part from the top to the bottom, extending to the centre of the stack, and, having weighed it, say, as the content of the vacancy, to the content of the whole stack, so is the weight of the part cut out to the weight of the stack. Thus, for example, if from a hay stack which measures 350 cubic yards, a piece measuring 12 cubic yards being cut out, is found to weigh 18cwt. 14lb., the weight of the stack may be estimated to be about 25 tons 18cwt. for 12 : 350 :: 18cwt. 14lb. : 25 tons 18cwt. 3qrs. 12lb. No. 1. To measure a hay-stack when the body resembles a cylinder, add one-third of the perpendicular height of the top above the horizontal section, passing through the eaves, in feet, to the height from the ground to the eaves, in feet, for the mean height, which multiply continually by the square of the girt in feet, and by .00294; then will the last product be the content of the rick in cubic yards. Example:—How many cubic yards and stones of hay are there in a rick which measures 18ft. from the ground to the eaves, 9ft. above the eaves, and 5ft. in circumference, allowing 7 stns of 22lb. avoirdupois each to the cubic yard! $(18 + 3) \times 57 \times 22 \times .00294 = 201.1$ cubic yards $201.1 \times 7 = 1407.7$ stones. No. 2. When the body of the stack resembles a conic frustum, add together the square of the girt at the bottom in feet, the square of the girt at the eaves in feet, and the product of these two girts. Multiply the sum by the perpendicular height of the eaves from the ground in feet. To the product add that of the square of the girt at the eaves, multiplied by the perpendicular height of the top above the horizontal section passing through the eaves. Then multiply the sum by .00294; and the product will be the content of the stack in cubic yards. Example:—How many cubic yards are there in a hay-stack of which the perpendicular height from the ground to the eaves measures 11ft., the perpendicular height of the top above the horizontal section passing through the eaves 10ft., the girt at the bottom 33ft., and at the eaves 60ft. ?

$$\frac{(33^2 + 60^2 + 60 \times 33) \times 11}{60^2 \times 10} = 73350$$

$$\frac{(18 + 3) \times 57 \times 22 \times .00294}{109350} = 201.1$$

$$\times .00294 = 107.41 \text{ cubic yards.}$$

—FRED J. FREEMAN.

CHIPS.

A branch lending library of the South London free library and art gallery was opened at the Horns Institute, Bermondsey-square, on Tuesday, by a fine art exhibition.

The partnership between Messrs. Whitmore and Kennard, architects and surveyors, of Devonshire-square, Bishopsgate-street, E.C., has been dissolved.

The corner-stone of the first villa in Walton Naze Park, East Essex, was laid on Monday by Lady Johnson, of St. Osyth Priory. The estate has been acquired from Sir John H. Johnson on a 999 years lease, by Mr. Philip Breanor, architect, of London, who proposes, in consultation with Dr. B. W. Richardson, to form "a true Hygeiaopolis." The villas will be built on the cliff summit, and will be Gothic and Swiss, and the undercliff is to be laid out as gardens, and made accessible by winding roads and stairs. The scheme also includes as future operations, the formation of docks in Walton creek, a railway line connecting with the Great Eastern Railway system both at Walton and Harwich, and the reclamation of waste land to the north of the estate.

Zion Baptist Chapel in Adelaide-square, Windsor, was opened on Tuesday week. Built of white brick, it is furnished with moveable seats for 100 persons; Mr. E. Knapp was the contractor.

The river Wear Commissioners, at their meeting on Wednesday week, decided to build a new north pier at the entrance to Sunderland Harbour, in accordance with a report made by Sir John Coode, C.E. The estimated cost is £145,000.

LEGAL INTELLIGENCE.

BREACH OF BY-LAWS.—At Hammersmith last week Joseph Stapleton, a builder, of Devonshire-road, Chiswick, and James Baker, appeared to answer summonses for disobeying the by-laws of the Improvement Commissioners of that parish. Mr. Poland, instructed by Mr. Finnis, clerk to the Commissioners, appeared to support the summonses; Mr. Grain for the defendant Stapleton. It appeared that the defendant Baker occupied a house in a row which had been built by Stapleton and a partner in Chiswick-fields-lane in accordance with plans allowed by the Commissioners, leaving an open space of 200 square feet behind each, as required by the bye-laws. After the occupation of the house by Baker alterations were made by the erection of a bakehouse and oven at the rear without the consent in writing of the Commissioners, thus reducing the area of the open space. Mr. Poland said it was an important matter to the parish, as it affected all the open spaces of the houses which had been erected by the defendant Stapleton. The object of the proceedings was to obtain the judgment of the Court so that it might be known that the by-laws must be observed. Mr. Grain argued that his client was not liable, as the lease had passed out of his hands. Mr. De Rutzen, after hearing witnesses, said it was clear that both defendants had taken a share in building on the open space without the consent of the Commissioners. It was important that it should be nipped in the bud, for, if additions were allowed, in time the whole would be built over. He fined each of the defendants 10s., with three guineas costs in one case, and 1s. and 2s. costs in another. Mr. Finnis then proceeded with a third summons against the defendant Stapleton for building on another part of the estate without notice to the Commissioners or depositing plans. Mr. Grain admitted that an error had been committed, but said his client was quite willing to comply with the regulations. Mr. Finnis said the Commissioners had no desire to press the case unduly, but he hoped in future that the defendant would take care not to infringe the by-laws. Mr. De Rutzen said it was important that the notices should be given, and fined him 40s. and 2s. costs.

SURVEYOR'S CLAIM ON A CONTRACTOR.—At the Court of Record, Scarborough, before the Borough Recorder and a jury, the case of Baker v. Jowsey was heard on Tuesday and Wednesday week. Plaintiff, James Baker, carries on business in Scarborough and Parliament-street, Westminster, and defendant, William Jowsey, is a contractor at Scarborough. The action was for £127 4s. 10d., for work done, services rendered, and money paid at defendant's request, and defendant paid £20 into court to satisfy the claim. For the plaintiff it was stated that he was called in by defendant to settle a dispute with the South Cliff Tramway Company in respect to the amount due under a contract, when plaintiff rendered efficient services and was paid £90. Afterwards the defendant contracted with the Seamer School Board for the erection of schools there, and had only proceeded with the work a short time when he became involved in disputes with the board. He again applied to Mr. Baker to assist, and 59 letters passed between the parties between February 14th and September 10th of the present year. Plaintiff eventually came down and saw Mr. Woodall, the clerk of the Seamer School Board, and Mr. Carrall, their architect, on several occasions, and endeavoured to effect a settlement. Plaintiff had charged three guineas per day for his services, third-class railway-fare, and 7s. per day hotel expenses, and of the total claim £127 4s. 10d. was disputed. Plaintiff's counsel added that it was known to defendant that plaintiff had got into difficulty with his private affairs, and defendant no doubt thought that if he refused to pay, plaintiff would not dare to come into court and have certain affairs inquired into. Plaintiff was examined in support of his claim, and said that the usual charge was by commission, if over a certain sum, but below that the surveyors charged five guineas per day. Mr. Carrall, architect to the Seamer School Board, said, when the dispute occurred as to extra work, defendant introduced plaintiff to him as his surveyor, and the latter endeavoured to arrange the dispute. Defendant, however, was not open to reason of any sort, although witness offered to make considerable sacrifice out of his own pocket. He considered three guineas per day not an excessive, but a fair, charge. In cross-examination he said he believed he spent altogether about seven hours with plaintiff and defendant discussing the matter. Mr. Woodall, clerk to the Seamer School Board, corroborated as to plaintiff's services, and said it was owing to his action that the board consented to knock off the £1 a day penalties, which they were entitled to under the contract. For the defence it was contended that the sum charged was a monstrous charge for the services rendered, and would be amply met by £20, as the final settlement was made without Mr. Baker's assistance. Mr. J. Barry, Scarborough, said £20 was sufficient for the work done. The measurement could be

done in a day. Mr. W. Peacock said it was ridiculous that anybody should occupy 15 days for a little job like that at Seamer; he would not pay three guineas a day to a surveyor. Mr. D. Petch, architect, Scarborough, also thought the charge excessive. The jury returned a verdict for £35, in addition to the £20 paid into court, and the costs were ordered to follow the verdict.

CITY COMPENSATION CASE.—(Lord Mayor's Court.—Before the Recorder and a special jury.)—A claim was made on behalf of Mr. Wayland to recover compensation against the Metropolitan and Metropolitan District Railway Companies in respect of certain property in Eastcheap, of which he was the freeholder, and which was required by them under the compulsory powers of their Act of Parliament for the completion of the Inner Circle Railway. On the part of the claimant, the value of the property was variously estimated by Mr. Castle (Messrs. Fuller and Horsey), Mr. Chatfield Clarke and Mr. Price (Ellis and Co.), at from £16,000 to £16,500. On the part of the defendants, Mr. Alderman Ellis (Lord Mayor elect), Mr. George Trist (Watney and Trist), and Mr. Farmer (Debenham, Tewson, and Farmer), valued it at under £10,000. The case lasted nearly two days, and ultimately the jury found for the claimant for £12,975.

RAILWAY COMPENSATION CASE.—(Middlesex Sheriff's Court.—Before Mr. Under-Sheriff Burchell and a Special Jury.—Greenville and Woodbridge v. the Hounslow and Metropolitan Railway Company.)—This was a remarkable railway compensation case. Between three and four acres of land was required for the new railway being constructed at Hounslow, and the claim was about £7,000, and the surveyors who were examined for the claimants considered the land was fit for "building purposes." On the part of the company the claim was termed "exaggerated," as the utmost value was estimated at between £1,500 and £1,600. The case occupied the whole of Wednesday, and had been adjourned from August, when only a few jurymen attended, and it was postponed until this week on account of the "insufficient number of jurymen." On behalf of the company it was alleged that it was 20 years "in advance of the time" to term it "building land." In the course of the case Mr. W. G. Harrison, Q.C. (with Mr. Dugdale), who appeared for the claimants, said that lawyers disagreed and doctors differed, but of all men "surveyors disagreed." Mr. Grantham, Q.C., with Mr. Wright, represented the company. The learned Under-Sheriff left the jury to decide on the conflicting evidence of the surveyors, and after a brief consultation gave a verdict for £4,000.

MOSSE V. KILLICK.—This was a peculiar case. The plaintiff, a clergyman, who is patron and former incumbent of the valuable benefice of Great Smeaton, in Yorkshire, in the year 1879 presented the defendant to that living. The rectory house was at that time temporarily tenanted by a Major Godman; the plaintiff claimed a certain amount of rent payable by the tenant of the rectory-house, and brought an action therefor in the Court of Queen's Bench, in which he failed. There was a further charge for fixtures, which it had been agreed should be taken by valuation. Included, was an item for a conservatory of peculiar construction, which the defendant contended was not a fixture; it was attached to the freehold, and even then a useless incumbrance. The defendant also set up a claim, on demurrer, for use and occupation of glebe by the plaintiff for certain of his brood stock of horses, together with some stacks of hay, the plaintiff alleging in reply that he had rented the pasturage of the then occupying tenant, and had duly paid his demands. The case was sent down to Mr. Ralph Nicholson, of Westminster, diocesan surveyor for Ripon, as a special referee, to try the case. Mr. R. O. Lane, barrister, represented the plaintiff, and Mr. Gainsford Bruce, barrister, the defendant, at the trial. A curious point turned upon the straying of the plaintiff's horses, in consequence of the fences being broken down by the South Durham Hunt. It being deemed advisable that the referee should view, an adjournment for that purpose was made.

UNHEALTHY SCHOOLS.—At Wandsworth on Wednesday, a summons was heard against the occupier of the Boys' School at Roehampton in respect of a nuisance on the premises. Mr. Radford, the surveyor under the Board of Works, said the drainage of the school was in a very bad state. It was not only dangerous to the inmates, but it was a nuisance to persons who passed the schools. The schoolmaster, who appeared to answer the summons, said there had been scarlet fever in the school, causing it to be closed for six weeks. There was a scare in the neighbourhood, and many of the families left, so that the subscriptions ceased, and the committee could not meet. The school was open again, and he thought they would be able to proceed with the work. They were quite anxious to get rid of the nuisance as the Board Mr. Corsellis, the clerk of the Board, suggested that scarlet fever broke out at the school in con-

sequence of the state of the premises. The schoolmaster said the disease broke out, not in the school, but outside. An order was made as prayed, the work to be completed in a month.

WATER SUPPLY AND SANITARY MATTERS.

ASHFORD, KENT.—On Wednesday week, Mr. Samuel J. Smith, C.E., inspector of the Local Government Board, held an inquiry at Ashford, Kent, with reference to an application from the local board for leave to borrow £15,000 for the purchase and enlargement of the waterworks; £16,000 for the contemplated intercepting sewer and works of sewage disposal; and £300 for road repairs. As to the waterworks, a copy of the award was put in, stipulating that the board should pay to the water company the sum of £10,311, and also £411 8s. 6d., the arbitrators' fees. The inspector commented on the smallness of the pipes in some of the side streets, remarking that the Local Government Board would not sanction such pipes now. The surveyor to the local board exhibited plans of proposed additions to the works, including a new reservoir to hold 115,000 gallons, new rising main, duplicate engines and pump, the whole estimated to cost about £4,000. In regard to the sewage-works, Mr. Mansergh, C.E., gave explanations, showing that the estimated cost was £13,370, and £2,000 for a new sewage system to South Ashford. The inspector said the system of sewage treatment in operation at Canterbury would not be permitted at Ashford, and the board must decide on some chemical process before the sanction of the Local Government Board would be given. He mentioned the process adopted at Tong, near Bolton, as being reported to be very successful. Mr. Mansergh advised the Coventry system.

SOUTHAM, WARWICKSHIRE.—On the 21st ult. the sewage disposal works were handed over to the sanitary authority. The works comprise the laying of a main outfall sewer, from tanks to new outfall grounds, and the preparation of the same for the reception and purification of the sewage. The purification works consist of three and a half acres of land situate about one mile from Southam, and formed into six level beds. The ground was dug over to the depth of 3ft. 6in., underneath which is placed a foot of sand and gravel, having drains, sewage distributing carriers and chambers, and roads. The system adopted is intermittent filtration. The rural sanitary authority only a few years ago carried out at Southam a system of sewage and screening through so-called filters in tanks in duplicate, the result of which proved a total failure, and terminated in action being taken by the riparian proprietors below the town. In the scheme of filtration now adopted, the existing tanks in duplicate, which are situated near the town, are utilised to arrest the solids and road detritus, which deposit will be removed periodically by means of a four-inch diameter chain-pump, and will be dug into the ground adjacent to the tanks. The distance from the tanks to the sewage farm is about a mile, a nine-inch main having been laid at a gradient of 1 in 600. The normal flow of sewage is estimated at 75,000 gallons every 24 hours, with a capacity for 565,000 gallons in case of storm, and outlet into the river in case of necessity. By opening the disc-valves the sewage can be applied to any one or the whole of the six beds at the same time, and would be capable of successfully dealing with upwards of half a million gallons per day. The cost of the works, inclusive of purchase of land, has been about £2500. Mr. Edward Pritchard, C.E., F.G.S., of Westminster and Birmingham, was the engineer-in-chief; Mr. Charles Law Green, C.E., the resident engineer, and Mr. Alfred Palmer, of Birmingham, the contractor.

THE DRAINAGE OF TWICKENHAM.—The Local Board of Twickenham having applied to the Local Government Board for sanction to borrow an additional sum of £10,000 for works of sewage, Major Hector Tulloch, R.E., one of the inspectors of the latter authority, has just held a public inquiry into the subject matter of such application. About £70,000 has already been expended in the drainage of the town, which, it was stated, is so near completion that no further loan beyond that now asked for would be required. The precipitation and filtration scheme in progress is that of the town surveyor, Mr. H. M. Ramsay. It was understood that Major Tulloch would recommend the sanction of the Local Government Board to the proposed loan.

The parish-church of Thurston, Norfolk, was reopened last week after restoration, including rebuilding of north wall and the re-laying of the entire roof with new thatch. The work has been carried out by Mr. John Fowler, of Seething.

An exhibition of Scandinavian art is to be held next year at South Kensington.

STAINED GLASS.

ST. LEONARD'S.—The east window of St. John's Church, St. Leonard-on-Sea, has recently been filled with stained glass. The subject represented is the Crucifixion, with Mary Magdalene kneeling at the Cross; on either side are standing figures of St. John and the Blessed Virgin Mary and St. Peter and St. Paul. Under each of the figures are subjects relative to the life of St. John (after whom the church is named). There are angels at the top of each light looking towards the figure on the Cross. In the tracing is the Dove and the Alpha and Omega. The window was designed and executed by Messrs. Heaton, Butler, and Bayne, of London.

SWINDON.—Two memorial windows have just been placed in Swindon Church, Wiltshire. The larger of the two is a two-light and tracery window, with the subject of the Call of Nathaniel, carried through the two lights, with floriated ornament surrounding the same, and a similar style of ornament in the two bases, with an inscription at bottom of window (same ornament carried through tracery). The other is a two-light and tracery window, with the subject of Christ healing at the Pool of Bethesda, carried through the two lights, with perpendicular canopy above, and baselined in a similar manner. In the largest piece of tracery is the bust of St. Luke as the Good Physician.

CARDIFF.—Four of the windows, facing Working-street, in the reference department of the new Free Public Library, have been filled with stained glass at the cost of Mr. J. Ware. The glass has been carried out from the designs of the architects of the building, Messrs. James, Seward and Thomas, of Cardiff, by Messrs. W. B. Simpson and Co., of St. Martin's-lane, London, W.C., and the subjects are:—1, Poetry, represented by a portrait of Milton; 2, History, represented by Gibralt; 3, Travel, represented by Raleigh; 4, Fiction, represented by Scott. The whole of the figure work has been drawn by Mr. F. Weeks, and the lead lines are gilded. Four other windows of stained glass have been promised for the entrance corridor of the building.

STATUES, MEMORIALS, &c.

THE YORKTOWN MONUMENT.—The *American Architect* gives an illustration of the design for the Yorktown monument, prepared by a commission appointed by the Secretary of War under an Act of Congress. The commission was composed of Messrs. R. M. Hunt and Henry Van Brunt, architects, and J. Q. A. Ward, sculptor. It is the design accepted by the joint Congressional Committee. It will be constructed in one material throughout. The preference of the commission is in favour of Ellettsville limestone. The Act of Congress, following the original resolution of one hundred years ago, specifies "a marble column"; and in accordance with the evident intention of Congress, the commissioners, in the design, have confined themselves to Classic precedents. The monument is composed of three principal parts. The first is a base, which, with its stylobate and its pediments, is 37ft. high, and occupies an area 30ft. square upon the ground. The second is a highly sculptured podium, 25ft. high and 13ft. in diameter, in the form of a drum supporting a column. The latter, which is part third, is 60ft. high, and at the base somewhat more than 7ft. in diameter. This shaft, for the sake of economy, is composed of a succession of drums or courses of masonry, giving practical reasons for a departure from the conventional treatment which belongs to monolithic shafts. The joints are partly masked by four bands, decorated with laurel leaves, and justified for a decoration of stars symmetrically disposed upon them and breaking the outline of the column. From the symbolical point of view, the monument is intended to convey, in architectural language, the idea set forth in the dedicatory inscription that by the victory at Yorktown the independency of the United States of America was achieved or brought to final accomplishment. The four sides of the base contain, first, an inscription dedicating the monument as a memorial of the victory; second, an inscription giving a succinct narrative of the siege, prepared in accordance with the original archives in the Department of State; third, the treaty of alliance with the King of France, and fourth, the treaty of peace with the King of England. In the pediments, over these four sides, respectively, are presented, carved in relief, emblems of nationality, of war, of the alliance, and of peace. The base is thus devoted to the historical statement. It explains the subsequent incidents of the monumental composition, which are intended to appeal solely to the imagination. The immediate result of the historical events written upon the base was the happy establishment of a national Union of thirteen youthful, free and independent States. To celebrate this joyful

Union, the sculptor has represented upon the circular pedium which arises from the base, a solemn dance of thirteen typical female figures, hand in hand, encircling a drum, which bear upon a belt beneath their feet the words, "One country, one constitution, one destiny." It is a symbol of the birth of freedom. The column above, surmounted by a figure of Liberty, may be accepted as typifying the triumphant results of a century of freedom, in the harmonious union of thirty-eight independent States, each of which is marked by a star upon the shaft. In the midst of this constellation appears the shield of Yorktown covering a branch of olive. The model has been exhibited at Yorktown during the recent celebration.

CHIPS.

The paving and lighting committee of the Ipswich town council have recommended that body to raise the salary of Mr. E. Buckham, the borough surveyor, by £75 a year.

The prizes and certificates gained by the students in the Colchester Science and Art Classes were distributed on Monday evening. The report showed that, in art, out of 63 examined 50 were failures, 11 obtained ordinary passes, and two only were marked excellent. In the Science department, out of 109 examined, nine prizes and 56 certificates were obtained. Complaint was made at the meeting that, although the members had increased, the attendances of students were very irregular.

The town-council of Weymouth opened on Wednesday week three sets of competitive designs sent in, for the improvement of the King's Statue, and decided to exhibit them for one week at the Guildhall, before deciding the award of the premium.

At the annual meeting of the St. Nicholas, Newbury, Stained Glass Window Society, it was stated that it was proposed in future to aim at raising about £115 annually, to provide one new stained glass window each year in the parish church. On the motion of Mr. W. Money, F.S.A., it was resolved to erect a window as a memorial to John Winchouse, better known as "Jack o' Newbury," to whose munificence the building of a great part of the church was due.

The local board of Heston and Isleworth decided by the narrow majority of 7 votes to 6 to provide the surveyor, Mr. Bromley, with a horse and vehicle, or in lieu of that, to raise his salary from £200 to £300. Mr. Bromley was appointed six months since.

The general purposes committee of Cardiff rejected on Monday an offer made by the Marquis of Bute of a site on which to erect a commodious central market, and instructed the borough surveyor to prepare plans for altering the present building.

At the meeting of the Darlaston sanitary authority on Wednesday, it was reported that five persons had been attacked with blood poisoning, one of whom had succumbed, in consequence of drinking water highly contaminated with sewage matter. It was stated that water taken from certain wells had caused 15 deaths from scarlet fever in Darlaston during the past four weeks. It was decided to close the wells and obtain wholesome water for the people.

A new Wesleyan chapel and schoolroom was opened at Baraby, near Beccles, on the 27th ult. The building is Italian in its architecture; constructed externally of red and white brick and stone. It is found that the acoustics of the building are excellent. The work has been carried out by Messrs. Dunn and Cutler, builders, of Beccles, from the designs and under the superintendence of Mr. Edgar Goff, architect, of Lowestoft. The cost has been about £450.

The tower of St. Peter's Church, Ipswich, which has been reported unsafe by Mr. J. O. Scott, is to be levelled to the belfry floor and rebuilt therefrom.

St. Peter's Church, Vere-street, Oxford-street, having been seated in oak, with carved pulpit, &c., and decorated from the designs and under the superintendence of Mr. James K. Colling, will be reopened on Sunday next.

The New Spa hydropathic establishment, Bishops Down, Tunbridge Wells, was reopened on Tuesday week after the addition of a wing from plans by Mr. Benjamin Taberner, of London. Messrs. Wilcombe and Oakley, of Tunbridge, were the contractors.

An entertainment to workmen and their wives was given at Holloway College, Egham, on the 19th ult. by Mr. Thompson, Mayor of Peterborough, the contractor for the building, in commemoration of the opening for service of a large mission-room attached to the college. The room had been decorated, and a stage erected, under the superintendence of Mrs. Crossland, wife of the architect.

Our Office Table.

At the meeting of the Metropolitan Board of Works on Friday last the Works Committee, to whom the subject of a site for a new fish-market for London had been referred, presented their report, recommending the Board to approve of a site at Blackfriars, as well as application to Parliament next session for power to acquire that site. The Chairman of the Committee moved the adoption of this report. An amendment was proposed in favour of the site at King's Cross; but this was rejected, and the recommendation of the Committee was lost by a majority of one.

The Viennese Society of Artists propose to open in April next, in their Galleries at Vienna, an exhibition of the chief works of art, native and foreign, which have been produced since the last Great Exhibition of 1873. It will comprise works of architecture, sculpture, painting, drawing, and die-sinking, as well as those of the various arts of reproduction. It is patronised by the Austrian Government, which is to give prize medals to exhibitors under the award of a jury.

A MEETING of the Midland Association of Gas Managers was held at the Grand Hotel, Birmingham, on Thursday week, under the presidency of Mr. Peter-on, of Cheltenham. There was a good attendance of members from different towns in the Midlands, and discussions took place on the "distribution" of gas, and on the standard water-horse. Mr. J. Tindall (Walsall), who contributed a paper on the former subject, urged the desirability of a more effective distribution of gas in street mains, and of regulating the pressure by governors at the works. He held that the district supplied should be divided into two or three levels, as the case might require, supplying each level separately. Even where a district was level the distribution would be better effected by divided systems of supply. The advantage Mr. Tindall claimed for his plan was that it would enable them to equalise pressure as nearly as possible at the consumers' meters, and reduce leakage to a minimum. The subject was discussed at some length.

GRAVESEND, principally associated in the minds of Londoners with tea and shrimps, may after all have a more noble part to play in the future commercial history of England. For years past there has been an increasing disposition to make use of Gravesend as the place of embarkation and debarkation for the port of London. Some of the immense steamships of the National Company, which used always to start for New York from Liverpool, now set out from Gravesend. The Peninsular and Oriental ships prefer Gravesend to Southampton. The docks which are to be constructed on the opposite shore will occupy one of the finest natural positions for docks to be found in the kingdom, the Tilbury Marshes lying for the most part below high-water mark. It is by no means unlikely that Gravesend may become what its sanguine inhabitants at present certainly contemplate—another Liverpool and the true port of London.

The following caustic note by "Live and Let Live" appeared in Tuesday's issue of the *Western Mail*, anent the Pontardulais Market and Public Hall competition:—"The extravagance of the directors of the Pontardulais Market Hall Company is really most reprehensible. They actually propose laying out £5 5s. in the purchase of plans for their new hall. As no architect with any brains or taste is likely to be caught by such munificence, it stands to reason—especially as a footnote to the advertisement shows that an architect is not wanted, but only a lot of plans, to be manipulated at pleasure—that the directors ought to have applied to one of the Swansea or Llanelly builders, who would gladly have made a plan good enough for them for nothing."

An excellent room for exhibiting the pictures and other works of art which are offered as prizes in connection with the Art Union on behalf of the Manchester School of Art, has been secured in the Victoria-buildings, St. Mary's Gate, Manchester. The exhibition was opened to the public on Tuesday, free of charge, and, apart from the particular object in view, the collection is well worth a visit. The whole of

the works have been received as donations from artists, local art dealers, and London publishers, and their aggregate value is estimated at about £6,000. The School of Art will, it is hoped, be largely benefitted by this effort of its friends, and the public who have purchased, or intend purchasing, shares in the Art Union, will have the gratification of knowing that the prizes are of substantial value. The etchings and engravings—all artist's proofs—comprise works by S. Consins, R.A., Legros, Rajon, Seymour, and others. The chief prize is a painting by Calderon, "The Queen of the Tournament," worth 800 guineas. Other prizes are selected from the works of J. C. Horsley, R.A., A. Grimshaw, T. S. Cooper, R.A., and others. The paintings and drawings alone number about 200. The Art Union drawing will take place on the 19th December.

This is the state of things described as existing in a fever-den at Chesterfield:—Two small rooms, indescribably filthy. A sleeping-room, unventilated, 10ft. across each way, the air so vitiated that it was almost impossible for a sick person to recover in it. Four children in one bed, one of them dying of scarlet fever; five persons on a mattress on the floor. The "condition of the room horrible, and the stench fearful." Eighty-three cubic feet of air for each member of the family who slept in that room, whereas a common lodging-house is compelled to allow 300 cubic feet per person, and a sick person ought to have 850 cubic feet of air. These are the bald facts brought out at the inquest, and in the face of them the jury appended to their verdict a mild request that the Corporation should make a thorough investigation into overcrowding in the borough.

AN endeavour is being made, in connection with the forthcoming Health Congress and Domestic Exhibition next month at Brighton, to bring together for exhibition a thoroughly illustrative collection of architectural and decorative designs as complete and as representative as possible. The idea is a good one, but the efforts of those engaged in the enterprise will surely be seriously hindered, in securing the desired end, by the singular terms of the circular issued to the profession by the general committee. These rates for payment, both for superficial wall space and floor frontage, may be all very well for the exhibition of manufacturers' specialities and productions. Few architects or artists, however, will agree to such terms; while those of good repute and ability are hardly likely, on any terms, to allow their designs to be shown in an exhibition where space can be secured by any tyro for the payment of a few shillings where to exhibit, probably in the most prominent position thus paid for, works devoid of any merit at all. The exhibition may be an important one, and its arrangements may be exceedingly comprehensive; but it would be by better far to exclude all such contributions as above referred to, than in the end only have a show of miserable examples, no matter how well the space thus occupied may have been paid for.

It is pretty well known that the water-fittings of many parts of London are very inferior in quality, ancient in pattern, and in most indifferent repair. It is not so well known that some of the Water Companies of the Metropolis have long possessed powers enabling them to insist upon improved fittings. They have, indeed, remarks *The Ironmonger*, regulations providing for the thorough overhauling of all such appliances, but as they themselves have been backward as regards constant supply, they have been conveniently blind to the deficiencies of their customers' appliances. In this way one fault has led to the perpetuation and multiplication of others, thereby storing up, both for the companies and their "tenants," an infinity of trouble and aggregated expense. Examples of this trouble have recently been forthcoming in that portion of South London which is supplied by the Lambeth Waterworks Company. That company is now engaged in efforts intended to reduce waste, and to bring the fittings nearer to a reasonable standard of perfection than they have been hitherto. The preliminary visits of inspection have shown that the waste of water from defective closets, cocks, pipes, &c., is very large. Notices of the usual kind have been served accordingly, and have excited strong opposition on the owners of property. The tenants have suffered from the supplies having been cut off in many instances, but if they are

wise they will cheerfully second the efforts of the company, seeing that they will thereby obtain fittings of a proper description.

AFTER much delay, the Great Western Railway Company have set about the construction of a loop line to Weston-super-Mare. The new loop-line will be four and a half miles in length, and proceeding from the Bristol side it is meant to diverge from the trunk railway about a mile and a half south of the present Worle Station, joining the main line again nearly a mile and a half south of the Weston Junction, thus cutting off about three miles of the main railway, and, for through trains, adding a mile to the length in going round, compared with the distance at present traversed. The drawings and specifications for the works have been prepared by Mr. Francis Fox, C.E., Bristol, and the directors of the company are prepared to receive tenders for the construction of the line. It is intended to proceed with the undertaking as speedily as possible.

MR. SLAGO, M.P., and the other Royal Commissioners on Technical Education, who have been on the Continent for the last fortnight, have been visiting various science schools in the different centres of Italy. Proceeding to Milan, the Commissioners visited the Exhibition of National Products. They next inspected the special school at Como, where instruction is given in the weaving and dyeing of silk. Thence they went to Biella, the centre of a prosperous trade in woollen and cotton goods. On Tuesday night the Commissioners returned Paris, where they will be joined by Mr. Samuelson, M.P., and will forthwith enter upon an investigation of the trade schools in Paris.

CHIPS.

Works of sewerage have just been completed at Hulton for the Lanesdale rural sanitary authority. Mr. Walker, surveyor to the board, superintended the work, which has been carried out by Messrs. Brigg and Lancaster.

Last week the foundation-stone of new public baths for Wigan was laid. The architect of the new buildings is Mr. George Heaton, of Wigan, who was awarded the first prize in the contest for designs; and the builder, Mr. William Winnard, of Wigan.

A public clock, presented to the borough of Maldon by Mr. George Courtauld, M.P., was inaugurated on Thursday week. It is a dial-clock projecting on brackets from the town-hall front; it is provided with automatic lighting apparatus and a chime of five bells, for striking the Westminster chimes at the quarters. Messrs. Gillett, Bland and Co., of Croydon, carried out the work, including the erection of a turret in which the bells are housed, at a cost of about £400.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—Society of Engineers. Discussion on A. T. Walmisley's paper on "Iron Roofs," 7.30 p.m.

Royal Institute of British Architects. Opening address by the President, G. E. Street, R.A. 8 p.m.

Surveyors' Institution. Opening address by the President, E. Ryde. 8 p.m.

TUESDAY.—Institution of Civil Engineers. "Iron Permanent Way." By Chas. Wood, M.I.C.E. 8 p.m.

WEDNESDAY.—Society of Arts. Opening address by Sir F. J. Bramwell, F.R.S., Chairman of Council. 8 p.m.

FRIDAY.—Architectural Association. Address by the President, Aston Webb. 7.30 p.m.

Trade News.

WAGES MOVEMENT.

APPREHENDED STRIKE IN THE EARTHENWARE TRADE.—If the men strike at Martinmas, the 11th inst., for increased wages, as threatened, the trade in the Staffordshire Potteries will be almost at a standstill. The masters, it is said, are almost unanimous in their decision to withstand it. The men at the recent disputes agreed to go before arbitration, and they had the benefit of two distinct arbitrators, Lord Hatherton and Sir T. Brassey, M.P., who decided against the men. After a comparatively short interval, the men appear to have come to the conclusion to throw over this award.

Epps's Cocoa.—Grateful and Comforting.—"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected Cocoa, Mr. Epps has provided our breakfast tables with a delicately flavoured beverage which may save us many heavy doctors' bills. It is by the judicious use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. Hundreds of subtle maladies are floating around us ready to attack wherever there is a weak point. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame."—*Civil Service Gazette*.—Made simply with boiling water or milk. Only in Packets labelled—"JAMES EPPS AND CO., Homoeopathic Chemists, London."—Mak 2rs of Epps's Chocolate Essence for afternoon use.

Lamplough's Pyretic Saline is refreshing, most agreeable, and the preventive and curative of FEVERS, BILIOUSNESS, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by chemists throughout the world, and the Maker, 113, Holborn Hill. *See Medical Testimony.*

Holloway's Pills and Ointment.—Precious Remedies.—Cramps, vomiting and griping, quickly yield to their potent properties; the deathlike sickness passes away, and the glow of health returns as the riction of the Ointment causes the irritated nerves to become soothed and calmed. In local inflammation they act like a charm.

Douling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to **CHARLES TRASK,** Norton-sub-Hamdon, Ilminster, Somerset. —[Advt.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates.

General Repairs and Alterations Executed: Experienced Workmen always in readiness, and sent to any part of the country.—[Advt.]

BATH STONE.
BOX GROUND,
CORSHAM DOWN
CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.
(See trade advt. on p. XXIII.) Advt.

TENDERS.

* * * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ABERDEEN.—For mason, joiner, slater, and plumber's work required in the erection of a mechanics' and carpenter's shop in the Harbour Yard, Provost Blaikie's Quay, Aberdeen. Mr. W. Smith, Aberdeen, resident engineer:—

Mason's work:—	
Farquharson, W.	£285 0 0
Grant, T., Aberdeen	267 10 0
Grieg and Craib, Aberdeen ...	245 0 0
Smith, L., Aberdeen	243 0 0
Smith & Beattie, Aberdeen (accepted)	232 10 0

Joiner's work:—	
Coutts, G., Aberdeen	129 0 0
Dinnes and Middleton, Aberdeen	119 0 0
Grant, J., Aberdeen	109 0 0
Frith and Tolmie, Aberdeen ...	107 0 0
Farquhar, J., Aberdeen	106 0 0
Skinner and Hall, Aberdeen ...	105 0 0
Alexander, D., Aberdeen	101 0 0
Smith, F. M., Aberdeen	98 10 0
Scott, J., Aberdeen	97 10 0
Jamieson, G., Woodside	97 0 0
Gordon, W., Aberdeen	86 0 0
Johnson and Fullerton, Woodside*	84 0 0

Plumber's work:—	
Blaikie, J. and Sons	9 7 6
Bruce, C., Aberdeen	7 16 6
Robertson, A. and Son, Aberdeen...	5 5 0
Thom and Strachan, Aberdeen*	4 7 0

*Accepted.

Slater's work:—No offerers.

ABERDEEN.—For supplying and fitting up a boiler for the steam tug alarm at the Girdness, Aberdeen Harbour. Mr. W. Smith, harbour engineer:—

Blaikie Bros., Aberdeen	£159 0 0
Abernethy, J. and Co., Aberdeen*	101 0 0

*Accepted.

ALDGATE, LONDON, E.C.—For rebuilding No. 38, Duke-street, Aldgate, for the Trustees of the United Synagogue. Messrs. N. S. Joseph and Pearson, architects:—

Roberts	£775 0 0
Partridge and Henderson	690 0 0
Lidstone, J. and Son (accepted) ...	638 0 0

BALHAM, S.W.—For new chancel and organ chamber to St. Mary's Church, Balham, for the Rev. T. Bates and Committee. Mr. A. Cawston, 11, Clement's-lane, E.C., architect:—

Downs	£1,417 0 0
Higgs and Hill	1,320 0 0
Adamson	1,215 0 0
Bowyer Bros.	1,194 0 0

BALHAM, S.W.—For converting stable and coach-house in Fickett-street, Balham, into a mission-hall, and fitting up same, for Mr. S. Cawston. Mr. A. Cawston, architect:—

Potterton, T. (accepted).

Brampton.—For alterations to the Gregorian Arms, Jamaica road, Brompton, for Mr. Meacock. Messrs. Maggeed and Powell, architects:—

Fisher	352 10 0
Whitby	350 0 0
Riddell (accepted)	192 0 0

Brampton.—For the erection of offices, for the school board:—

Barker, C. (accepted)	£7,587 0 0
-----------------------	------------

In lieu of tender from Robinson recently accepted, but subsequently amended by addition of £1,019.

Bristol.—For erecting a house for the Medical Superintendent at the County Asylum, Bristol, near Shrewsbury. Mr. T. Graves, The Priory, Shrewsbury, county surveyor:—

Higley, J., Pitchford	£1,450 0 0
Gethin, J., Shrewsbury	3,603 0 0
Darlington, H. T., Shrewsbury	3,529 10 0
Harrell, W., Shrewsbury	3,439 10 0
George, L., Shrewsbury	3,335 0 0
Wid, H., Hereford	3,328 0 0
France, T., Shrewsbury	3,300 0 0
Price, R., Shrewsbury	3,150 0 0
Evans, H., Shrewsbury	3,110 0 0
Bowdler, W. and Co., Shrewsbury	3,051 0 0
Treasure and Son, Shrewsbury	2,925 7 0

*Accepted.

Bury St. Edmunds.—For corn warehouse, stables, and outbuildings, Spout-end, Bolton, for Messrs. R. Byers and Sons. Mr. T. G. Mott, Bolton, architect. Quantities supplied:—

Contract A.—Excavation, brickwork, and masonry:—

War house, Stables, &c.	Total.
Brown	£519 0 0
Smiths	£315 0 0
Flattley	£215 0 0
Bradbury	£173 15 0
Merrick (accepted)	£99 0 0

Contract B.—Joiner's, slater's, plumber's, glazier's, and painter's work:—

Roberts	£26 0 0
Skinner	£27 6 0
Townsend	£25 10 0
Purvis and Son	£20 0 0
Taylor, T. W.	£16 10 0
Marsh, W. & L.	£15 10 0

Contract C.—Iron work to warehouse, floors and roofs, and concrete floors:—

Starbuck and Co.	£1,661 19 0
Homan & Rogers	937 0 0

Note.—Excavation and basement to warehouse (separate contract under schedule).

Aspinall, W. ... 255 0 0

*Accepted. —Partly accepted.

Bristol.—For a temporary structure in lieu of Badminton-bridge, about to be rebuilt, for the Bristol town council. Mr. Ashmead, borough surveyor:—

Pope and Son, Bristol	£2,881 0 0
Vernon and Ewens, Cheltenham	2,100 0 0
Butler, Manningley	2,080 0 0
Finch & Co., Cheltenham	1,830 0 0

Bristol.—For alterations at 19, Mary-le-Port street, for Mr. H. Boxall. Messrs. J. W. Trew and Sons, 56, Broad-street, Bristol, architects:—

Smith, W., and Sons, Bristol	(accepted)
------------------------------	------------

Bristol.—For new shop-fronts at 41, Bridge street, and No. 26, Mary-le-Port-street, for Mr. F. J. Tucker. Messrs. J. Trew and Sons, 56, Broad-street, Bristol, architects:—

Farnall and Co., Bristol	(accepted)
--------------------------	------------

Bromley, Kent.—For alterations and additions to 53, High-street, Bromley, necessary for turning same into coffee-house and public baths, for Mr. S. Cawston. Mr. A. Cawston, 11, Clement's-lane, E.C., architect:—

Crosley, Bromley (accepted)	£902 0 0
-----------------------------	----------

Bury St. Edmunds.—For new school for the Governors of Bury St. Edmund's Grammar School. Mr. A. W. Pomfret, architect:—

Grimwood and Sons, Sulbury (accepted)	£9,225 0 0
---------------------------------------	------------

The highest tender for the work amounted to £12,894.

Cardiff.—For construction of sewers in Clive-road, for Messrs. Powell and Cory. Messrs. Jones and Brewer, surveyors:—

Rees	£259 12 6
Day	538 18 7
Jones Bros.	498 0 0
Jones and Jepson	475 4 8
Rich and Harries	450 16 5
Pearson (accepted)	445 0 0

Chesham.—For erection of a public-house to be called the New Inn, at Chesham, on Ashworth Moor, for Mr. T. Mercer. Messrs. J. and J. Booth, Haslingden, architects:—

Accepted tenders.

Mason's work:—

Tomlinson, J., Haslingden	£255 0 0
---------------------------	----------

Joiner's work:—

Holt, J., Shuttleworth	184 0 0
------------------------	---------

Slater's work:—

Tomlinson, J., Haslingden	43 15 0
---------------------------	---------

Plumber's work:—

Schubert, P., Bury	40 0 0
--------------------	--------

Painting:—

Pickup, J., E. ented	25 17 0
----------------------	---------

Total

	£651 12 0
--	-----------

Cardiff.—For the erection of a pair of semi-detached villas, Gunnersbury. Mr. J. Cove-dale Bolton, 2, Avenue Market terrace, Turnham green, W., architect:—

Williams, D., Carnarvon	£847 0 0
Pritchard Brothers, Penryn	840 0 0
Roberts, T. O. and C., Portmadoc	803 0 0
May, T. and Huchins H.	771 0 0
Williams, D. M., Carnarvon	755 0 0
Jones, J., T. Wilhel	750 0 0
Jones, W., Portmadoc	715 0 0
Evans, E., Shifon	710 0 0
Roberts, G., Penryn	675 0 0
Osborne, W., Four Crosses	663 0 0
Jones, R., L. Eyrn	653 0 0
Humphreys, W., P. Wilhel	620 0 0
Evans, R., L. Eyrn	600 0 0

*Accepted.

Cardiff.—For the execution of a special drainage scheme in the town of Clacton-on-Sea, for the Tending rural sanitary authority. Mr. Henry Ough, of Austin Friars, E.C., engineer:—

Wood, W., Chelmsford (accepted)	£5,500 0 0
---------------------------------	------------

Cardiff.—For construction of a gridiron near the Lower Glamorgan-road, for the Harbour Commissioners:—

O'Flynn, T., Cork	£1,578 0 0
Johnson, R. W., Cork (accepted)	793 16 2

Cardiff.—For erection of a school in Whitechurch-road, Crays, for 100 children. Quantities by Mr. S. Rooney, and Mr. G. E. Robinson, Church-street, Cardiff, architect:—

Watkins, T., & Jenkins, Swansea	£10,900 0 0
Bird, Cardiff	10,650 0 0
David and Sons, Bristol	10,610 0 0
Jones Bros., Cardiff	10,610 0 0
Evans, H. A., Bristol	10,610 0 0
Webb, W. and J., Birmingham	10,490 0 0
Thorn, C., Cardiff	10,490 0 0
Davies Cousins, Cardiff	9,910 0 0
Howard, E., Cardiff	9,880 0 0
Farnell and Fry, Cardiff	9,810 0 0
Burton, Cardiff (accepted)	9,550 0 0

(Architect's estimate, £9,671.)

Darlington, Durham.—For extension of the embankment adjoining the river Skerne, at the Corporation Sewage Farm. Mr. Thomas Smith, borough surveyor:—

Wilkinson, J., Darlington (accepted)	£16 0 0
--------------------------------------	---------

(Five tenders sent in.)

Darlington, Durham.—For supply of a quantity of sanitary pipes and agricultural draining tiles, for the Corporation. Mr. T. Smith, borough surveyor:—

For sanitary pipes:—Reid, W., Darlington (accepted).

(Seven tenders received.)

For draining tiles:—Robson, R. C., Darlington (accepted).

(Six tenders received.)

Derby.—For sewerage, paving, &c., part of Ambrose-street, the whole of Bedford, Gauden, Crosby, Malcolm, and Milton-streets, Derby. Mr. T. Coulthart, borough engineer:—

For Bedford, Camfen, Crosby, and Milton-streets:—

Tomlinson, J. & G., Derby (accepted)	£1,222 0 0
--------------------------------------	------------

For Ambrose and Malcolm-streets:—

Todd, G., Derby (accepted)	679 0 0
----------------------------	---------

Dorking.—For works proposed to be done at Cleaveland Lodge, Dorking, for Mr. A. Bencke. Mr. R. W. Edis, F.S.A., architect:—

Colls & Sons, London and Dorking	£1,435 0 0
Butcher, H.	1,380 6 10

Dorking.—For the repairs of water vans for the local board:—

Hedge, J.	£27 15 6
Saunders, J.	27 5 6
Shierlock, T. H. (accepted)	19 17 6

Dorchester, Dorset.—For levelling, forming, metalting, kerbing, and channelling Bell-road and Netherton-road, for the Dudley Corporation. Mr. G. J. C. Brown, C.E., borough surveyor:—

Bell-road.	Netherton-road.
Currell and Lewis, Birmingham	£195 18 0
Berry, W., Dudley (accepted)	195 0 0
Forough Surveyor's Estimate	192 0 0

Dundee, Scotland.—For the erection of shops and dwelling-houses, Overgate, Dundee, for Messrs. Buchanan and MacLaren. Messrs. J. MacLaren and Son, Dundee, architects:—

Accepted tenders.

Mason's work:—Gentle, Dundee.

Joiner's work:—Scott, Dundee.

Total estimated cost, £3,000.

Festiniog (Blaenau).—For Bryn Bowydd C. M. chapel. Vestry and schoolroom contract:—

Owen, W., Festiniog (accepted)	£378 12 2½
--------------------------------	------------

Finchley, London, N.—For construction of 352 lineal yards of 9-in. pipe sewer, with ventilating shafts, &c., in the Great North-road, North Finchley, N., for the local board:—

Cooper, H.	£305 19 0
Rowell	257 0 0
Wernid	222 9 8
McDowell, R.	210 0 0
Shelley, W.	177 0 0
Cattley	163 0 0
Jordan and Co.	162 10 0
McKenzie, Williams and Co., Moor-gate, E.C. (accepted)	158 0 0
Jackson, J.	157 17 6
Wicks and Co.	151 0 0

Finchley.—For alterations and additions to No. 54, City-road, E.C., for the Finchley Central Club (Limited). Mr. G. Treacher, architect. No quantities:—

Hogben and Co.	£406 0 0
Smith	400 0 0
Chapman	400 0 0
Porter	410 0 0
Marshall	411 0 0
Richards, J. O.	408 0 0
Harris	403 0 0

Gunnerybury.—For the erection of a pair of semi-detached villas, Gunnersbury. Mr. J. Cove-dale Bolton, 2, Avenue Market terrace, Turnham green, W., architect:—

Rogers, C., Turnham green	£1,110 0 0
Whitman, E., Chiswick	1,100 0 0
Osborne, J. J., Turnham-green	1,095 0 0
Whitman, H. J., Chiswick	1,084 0 0
Gibbons, W. G., Turnham green	837 0 0
Bailey, C., Hammersmith	571 16 4
Wort, C., Shepherd's Bush	512 0 0

* For drainage, bricklayers', masons', and slaters' work only.

Halifax.—For constructing a sewer in King Cross-street, for the town council:—

Hudson, W. E. (accepted)	£19 4 10
--------------------------	----------

Hackney, E.—For repairs to the roofs of the workhouse and infirmary of the Hackney Union:—

Workhouse.	Infirmary.
Barker	£73 0 0
Blow	53 0 0
Williams & Abigail	75 0 0
Burnan and Sons	53 0 0
	112 0 0

*Accepted.

Halifax.—For erection of a hospital at Stoney Royd, Halifax. Quantities by Mr. E. R. S. Escott, borough engineer:—

Parker, Halifax	£1,497 0 0
Green, Halifax	1,471 0 0
Culpan and Son, Halifax	1,379 0 0
Illingworth Brothers, Bradford	1,280 0 0
Foster and Yates, Halifax	1,276 0 0
Bolton and Co., Halifax	1,213 0 0
Sutcliffe and Woodhead, Halifax	1,180 0 0
Firth and Son, Queensbury	1,069 0 0
Dyson and Son, Halifax	1,059 0 0
H-Jford, Halifax	1,041 0 0
Walker, Halifax	1,034 0 0
Hopkinson and Son, Halifax	1,030 0 0
Naylor, Halifax	1,021 0 0
Gaines, Halifax	1,013 0 0
Brook, Halifax	1,003 0 0
Drake and Riley, Halifax	991 0 0
Fearnley and Firth, Halifax	978 0 0
Wilson & Son, Halifax (accepted)	955 0 0

(Engineer's estimate, £1,030.)

Hawley, Hants.—For additions to All Saints' Home and completing chapel, Hawley. Mr. A. H. Hoole, architect:—

Goddard and Son	£1,785 0 0
-----------------	------------

Hawley, Hants.—For erecting stables to the Manor Farmhouse, Hawley. Mr. Arnold H. Hoole, architect:—

Goddard and Son	£394 0 0
-----------------	----------

Hildersham.—For erection of temperance hotel at Hildersham, for Mr. G. D. Webster. Mr. J. Earnshaw, Brighthelm Quay, architect:—

Mason's work:—

Owston (accepted)	£560 0 0
Rennard	550 0 0
Walkington	540 0 0

Joiner's work:—

Clark	410 0 0
Mainpriz	400 0 0
Leeson	365 0 0
Bailey (accepted)	310 0 0

Kensington.—For new offices on forecourt No. 260, Kensington Park-road, S.E., for Messrs. Biant and Son. Messrs. Muggeridge and Powell, architects:—

Riddell	£435 0 0
Fisher	397 0 0
Burman	380 0 0
Taylor	387 0 0

Knowbury.—For the erection of a mission room at Knowbury, Shropshire. Mr. E. Turner, Bowing Green-street, Leicester, architect:—

Howell, W., Tenbury	£960 0 0
Hine, J., Ludlow (accepted)	875 0 0

Lanark.—For the erection of a new chapel at Smillum Orphanage, Lanark. Messrs. Pugin and Pugin, Westminster, architects. Quantities by Mr. R. O. Harris, Queen Victoria-street:—

Accepted tenders.

Excavator, mason, and bricklayer:—

McMorian, E., Carstairs Junction	£951 0 0
----------------------------------	----------

Carpenter, joiner, and ironmonger:—

Baxter, J., Glasgow	688 9 11
---------------------	----------

Slater and plasterer:—

Glaister, T., Lanark	238 4 7
----------------------	---------

Plumber, painter, and glazier:—

Proctor and Son, Biggar	145 0 0
-------------------------	---------

Total

	£2,005 11 6
--	-------------

Lancing, Sussex.—For additions and alterations to The Warren, for Mr. E. Solz. Mr. Frederick W. Hyde, architect:—

Blaker, R. C., Worthing (accepted)	£550 0 0
------------------------------------	----------

For general repairs, painting, &c., to The Warren:—

Sandall, W., Brighton (accepted)	£110 0 0
----------------------------------	----------

Liverpool.—For the supply of fittings for the water engineer's department, for the town council:—

Robson, G. (accepted)	£48 0 0
-----------------------	---------

Liverpool.—For the supply of steel castings, for the town council:—

Souther and Southern (accepted)	£1,512 10 0
---------------------------------	-------------

(Fifty tons at £29 per ton; extra work, £62 10s.)

Liverpool.—For vestibule doors at the Walker Art Gallery, for the town council:—

Firth, H. (accepted)	£108 4 0
----------------------	----------

Llanabescolen School Board, near Carnarvon.—For new school and master's residence, to be built at Bethel, near Carnarvon. Mr. O. M. Roberts, Portmadoc, architect:—

Pritchard, O. and W., Llanfair	£1,680 0 0
Jones, E., Dolydd Greslon	1,660 0 0
Morris, O. O., Greslon	1,540 0 0
Owen, R. R., Greslon	1,500 0 0
Jones, E., & Owen, D. Bangor	1,488 0 0
Griffiths, W., Waelawr	1,440 0 0
Owen, W., & Edwards, H. Caethro	1,430 0 0
Williams, J., Goeite Treborth	1,395 0 0
Williams, G., Penryn	1,375 0 0
Jones, R., Tyddyn	1,356 0 0
Williams, D., Carnarvon	1,318 0

THE BUILDING NEWS.

LONDON, FRIDAY, NOVEMBER 11, 1881.

MR. STREET ON BAD BUILDING.

AS might have been expected, Mr. Street, in his able opening address at the Institute on Monday, dealt largely with the artistic duties and responsibilities of the profession. For the first time during a long series of presidential addresses, we have heard art placed first and spoken of as the real object of the Royal Institute of British Architects, and, notwithstanding Mr. Street's denial of the existence of the selfishness which it has been alleged has sometimes characterised the proceedings of the corporation over which he now presides, it may be reasonably doubted by outside critics whether the Institute has on all occasions been distinguished by magnanimity, or even by such activity as it has recently shown in the furtherance of one or two useful reforms.

One of the most instructive topics of the address was the apt comparison made by the speaker between the vernacular architecture of the present day and that of the last century. It was justifiable to inquire, how it is that with the ever-increasing body of architects, of education and training, the buildings erected by 19th-century builders are so inferior to those built in 1750? The question may certainly be fairly put to a body which represents, as it is contended, the architecture of the country, and, as Mr. Street owned, architects cannot quite escape the responsibility. We venture to put another question, the legitimate answer to which will, we think, show that the responsibility for the bad building which now exists mainly rests with the profession. Why is it the public prefer to have bad or inferior buildings rather than employ architects? With regard to the taste of the 19th-century builder, which, as Mr. Street very justly said, is to do everything for display and to waste money on ornaments to the "show-fronts" of the house, may it not be fairly argued, as by Mr. J. P. Sedden in the *Times* of yesterday, that this taste has been fostered by architects themselves? Has not the mania for sham Italian and Gothic facades, costly ornamentation in stucco and stone, to be laid largely to our own doors, and are architects entirely innocent of the "show-front?" We are very pleased to find that the new president has plainly hinted to architects the extent to which they share in the responsibility for creating a taste for ornament, and we hope that the remark will be taken to heart as it deserves to be, and not be lost. The matter is certainly of sufficient importance, for it may be asked whether much improvement is likely to take place till the builders, bricklayers, and carpenters of our houses are set the example by architects. We have, on so many occasions, spoken of the duty of architects to show that good plans and sound economical and simple construction lie at the root of all artistic building and good ornamentation, that it is gratifying to find so eminent an architect as the president saying that "our duty is to show by example that simple building may be quite as good as extravagant, and that the essence of all good architecture is that it should be solid and lasting before it tries to be ornamental." Another vice of the modern system is, we think, that want of solidity to which the speaker referred, though we venture to remark that the vice is not exclusively the builder's. It springs viciously but naturally out of the desire on the part

of the public to possess cheap and showy houses which shall compete with costly and elaborate designs, and among the results are the unfortunate examples too often before us of competition designs executed with the determination to obtain a semblance of all that is attractive with the least possible expenditure. The President did not go farther than point to these weaknesses; he might have shown that the lack of solidity in modern buildings was largely attributable to the pernicious taste for expensive ornamentation, and that the contract and the percentage systems of payment have led to both the evils, as we lately endeavoured to point out.

The necessity for a Government department for art naturally arose out of a consideration of the subject of bad building, but the President only lightly touched upon that part of the subject. We have always contended that in matters of taste the less there is in the shape of official interference or control the better, and this view is supported by the evidence of those who are the best able to form an opinion of the operations carried on by the Academy of Fine Arts in France, and the governmental control exercised over architects in Germany and other Continental states. Mr. Street referred to the subject in his address, though the views he expressed are hardly reconcilable with each other. In one part we were told, in allusion to the request made by the Metropolitan Board of Works to the Council of the Institute to exercise control over the designs of buildings in Northumberland-avenue, that "the position was a dangerous one, 'for, however good the taste of individual members may be, there is an unwillingness on the part of a body of men to criticise too severely the work of a brother architect.'" Every one will be disposed to agree with the truth of this opinion, and, to think with Mr. Street that if the Institute has no more power than it has at present, that it would be better, or at least quite as well, if it had less. Later on, however, the President, in speaking of the arrangement of routes for new streets and sites for public buildings, remarked that it would be advantageous if the subject were laid before the Council of the Institute, so that it might offer advice and opinion. In such matters, in defining positions and laying down lines of streets, the Institute might certainly be consulted with advantage, and probably hideous iron railway bridges, such as those which now disfigure the Thames, might in future be avoided. But did not the Institute express its anger when the Ludgate-hill bridge was contemplated, and with what effect? We have all the monstrosities we possess in the shape of structures, in spite of the Institute and, as regards questions of design, any attempt to control elevations would be a signal failure, as the results pointed to bear ample testimony. More irreconcilable with the previously expressed view of the President is the idea of the necessity of the creation of a Government Department of the Fine Arts. It is a very difficult thing to impose rules on architectural designs—they cannot be made conformable to the opinions of critics of various proclivities and tastes; but it is quite another matter to regulate building operations, and we join most heartily in the President's hope that before long the consolidation of the Building Acts of the whole country will be effected on a reasonable foundation.

BUILDING AT THE WEST-END.

CONTINUING our recent notes of new buildings at the West-end, we remark a few signs of activity in Victoria-street, Westminster. For a number of years, this rather busy thoroughfare seemed to have suffered from the mania for huge dwellings,

in flats and maisonnettes, and the neighbourhood, as a residential part, was threatened by an invasion of offices on a scale of palatial grandeur, built in stone or stucco. There has lately been a renewal of this rage for model town-residences, notwithstanding the failure of some of the undertakings, for we find no less than three or four important buildings of this class have lately been erected. The experiment of providing dwellings for the middle classes on the system followed by our French neighbours, has at least encouraged several to embark in speculations of this kind, and the heavy ground-rents of land in this locality have induced lessees to cover the frontages to the best advantage. Near the Grosvenor Mansions, and at the corner of Alexandra-street, is a large stone-fronted Late Gothic building remaining in carcase; a board outside informing the public that it is for sale. It is several stories in height, and has a corner turret or bay; the windows are mullioned, and the front is relieved by bays. The chief features of the architecture are the high, steep, double-sloped roof, the hipped dormers over the bays by which two or three tiers of attics are obtained in the roof. The fact of such a costly pile of "flats" not having been finished seems to throw a doubt on the success of similar speculations which are being made in the same street, and to suggest the question whether such large blocks of residences on this system can prove remunerative to the owners. A large adjoining plot of corporation land is vacant, to be let on lease for 80 years, and next to this is another extensive block of mansions, in red brick and cement, which has just been finished, entitled "Queen's Mansions." Architecturally, the building cannot be regarded as anything more than a speculative builder's work. The façade presents a monotonous series of windows and balconies with corner oriels and bay windows at intervals; no roof is visible, and the only relief is the additional height of a story at the ends and centre. The building is of five and six stories, besides the ground-story. Entering one of the sets on the ground-floor we find a spacious hall, lighted mainly by stained-glass windows from side areas, which are left between the chief blocks. A dining-room, about 30ft. long and of proportionate width, lighted in front, and three good bedrooms, bath-room, and offices are on this floor, with rooms for servants in the basement. The other floors furnish similar accommodation, and are approached by a wide staircase with spacious landings. Each residence is quite independent; there is a lift for service, gas is provided on staircases and landings, and each tenant has a brick wine and coal-cellar in the basement. The rents, which include all rates, taxes, and water, and the use of hall porter, vary on the chief floors, from £320 for the ground-floor to £260 for the second floor for the first year, and there is a small increase of rent for the second and third years. The balconies, of which there are three tiers in front, are useful additions, and add to the convenience and comfort of the upper floors.

A colossal and, in many respects, remarkable building, is in course of completion a little higher up. It is intended for the "Army and Navy Hotel," and its position is perhaps unique for such a purpose. The architect, we believe, Mr. Pilkington, of Edinburgh, has introduced a bold semi-Greek treatment, a style which has found admirers in the Northern metropolis, and which has been vigorously used by the late Mr. Alexander Thompson, and his school of Classicists. In London we have few buildings that represent the characteristics of this version of Renaissance. The most noticeable thing about the new hotel is the largeness of scale of the details; these have a monolithic size and appearance, admirably

suggestive of the unlimited stone resources of the North. The rounded angles of the façade are built of large blocks of a warm-coloured sandstone, from Northumberland, with moulded channels or rustications, and the ground and first stories are distinguished by a liberal use of the same material, above which the structure is chiefly of red brick of a deep colour. There is a large and lofty arched entrance in the centre, supported by Ionic columns of sandstone, and side bay windows, with rounded corners, crowned by massive entablatures, in which a deep coving is introduced beneath the cymatium and corona. The centre of the façade above the entrance is also marked by stone pilasters and entablatures to the windows; and the top story has a bold cornice and cove of stone, which is carried down in the form of wide architraves to the upper story of windows. Conventional ornaments of bold voluted design are carved at the heads of the architraves under the cornice, and vigorous foliage, with volutes, appears beneath the bay windows, and enriches the stone corbelling. We may mention that the return sides of the façade are not square, but are at a considerable angle, the effect of which makes the flank on the west side, adjoining an open space, a conspicuous elevation. Here the architect has connected the two lower tiers of windows by massive architraves which are carried up and finished by deep Greek cornices and pediments, crowned by acroteria or antefixæ. The heads of the lower windows have tympana, which are probably intended to be carved. The building is too unfinished to enable us to judge of the interior; there is apparently a large coffee or reading-room on the flank side, to judge from the proportions, and iron and concrete have been used in the flooring.

Brick and terra-cotta dressings have been largely used in this locality: for instance, nearly opposite, in a style much less grand and colossal in its details, is St. Margaret's House, a building in which red brick and light terra-cotta have been combined with some effect. The style is Renaissance; there is an arched entrance which leads to an open lobby and staircase, and the pilasters carrying the arch are panelled, and have emblematic figure-subjects of the Virtues introduced. A balcony over is carried by bold terra-cotta trusses. The façade is relieved by brick pilasters, and bay-windows enriched by dressings of terra-cotta, and the transoms and treatment of the entrances and windows are worth notice for the manner in which the latter material has been applied. The building we allude to is occupied by the National Penny Bank and other offices, and the floors above are devoted to chambers. Near, on the opposite side, is a large block of maisonnettes, suits of rooms and offices, the materials being red brick and cement, but designed in a very commonplace type of Classic; close to which red brick and terra-cotta have been well used in the Imperial Bank, a new building nearly completed, from the designs of Mr. R. W. Edis, whose drawing we hope to reproduce shortly. The building has two frontages; the main façade has two lofty bay-windows of four stories above which the front is gabled. The style is a kind of English Renaissance, sensibly treated, and plain; slight brick piers emphasise the angles of the bays, and the gables are broken by brick pilasters between the lights. But the main feature is the entrance and ground-story to the bank. Here red terra-cotta of a deep red colour has been used in a porch with pediment between the bays, supported by Ionic columns, while pilasters, partially fluted, of the same order, mark the angles of the bays. The spandrels, frieze, and other dressings are all of the material, and the execution of the work, and the cast ornamentation of triglyphs, drapery in spandrels, &c.,

are creditable. The brickwork above is pointed in black mortar, and the colour of terra-cotta harmonises satisfactorily with it. On the opposite side of the street is a large block of residences and offices in a more thoroughly Queen Anne spirit. It is built of red brick; the roof is of steep pitch, with two tiers of dormers, and a small tower or bay projects from the corner. The chief features in the elevation are pilasters in the upper stories corbelled from the face of the wall. The lower windows have pediments and stone dressings, and the general design partakes of Mr. Norman Shaw's style. We have no space here to notice other buildings. It is sufficient to say that this street of mansions is still active in brick-and-mortar; and there is one marked characteristic of the new architecture which distinguishes it from the old. The older façades are of stucco or stone, and are generally designed in a stereotyped Classic. If we care to note the difference between the Grosvenor Mansions, for instance and those of recent construction, it will be observed in the style of the architecture and the materials employed. The former are of stucco built in a costly Renaissance style, in which the entrances are made large and important features. These and the windows are introduced within arched openings—a style common in Paris. The upper stories are adorned by pilasters and panels of ornament. London smoke has made these lofty rows of mansions wear a dingy aspect, and many of them have been turned into offices. The new buildings are almost entirely constructed of red brick and stone; at least red brick enters largely into the façades, and palatial dignity of scale has not been the chief concern. Albeit its dingy appearance, Victoria-street may be compared to a new Paris boulevard. Its very straightness and the repetition of its features lack all the picturesque elements of the olden streets. What it will become when all its vacant spaces are filled up is conjectural; but it is quite possible that something may yet be done to relieve it of that painful formality and quasi-palatial grandeur it has at present.

THE BUILDING TRADES IN AMERICA.

It is a matter, not only of interest, but of considerable importance, to note occasionally the course of industrial affairs in other countries, and particularly of a continent like America, where labour questions attain such magnitude, and where so many of the conditions under which trade is carried on are similar to those of our country. Such an inquiry is especially useful at the present time, as it appears that throughout the United States a very decided revival of business has taken place, and there is more activity and briskness being shown everywhere than has been the case for some years past. The demand for labour is universally good, wages are fair, with an upward tendency, and nearly all classes are fully employed. We will first of all devote our attention to New York, and to a report lately issued by Mr. Hice, one of the chief authorities at the Census Office, containing a summary of the manufacturing industries of that city, exclusive of the great staple industries, such as textiles, the iron and steel trades, glass making, railway, shops, &c.; in fact, that class of manufactures which the French call *la grande industrie*. The list given by Mr. Hice is too long to quote *in extenso*, for it contains no less than 76 trades, in which are engaged 11,068 establishments, with an invested capital of 157,581,749dols., or about £30,516,319. The material used cost 267,012,236dols. (£53,403,415), and the product was valued at 435,422,102dols. (£87,084,420). The greatest number of hands employed at any

one time was 262,459, of whom 133,995 were males about the age of 16 years, 63,482 were females over 15 years, and 1,373 were children. The total amount paid in wages during the Census year was 89,513,931 (£17,902,786). A short epitome of those trades which have most to do with building will be of interest.

Industry.	Capital.	Material used.	Product.
Carpentering	\$1,725,682	\$3,438,871	\$7,051,328
Lumber, planed	\$83,197	1,152,860	2,202,919
Machinery	3,643,313	2,265,117	5,977,076
Marble and stonework	2,253,388	2,181,783	5,618,669
Masonry, brick and stone	604,000	1,060,433	2,103,744
Paints and materials	4,462,370	2,938,857	6,967,939
Plumbing and gasfitting	961,858	1,867,228	3,807,848
Upholstery	919,787	1,926,312	2,976,524
House furnishing goods	10,750	9,191	23,743
Furniture	4,333,683	4,204,602	8,605,779

The building trades indeed in New York State appear to be in an exceptionally prosperous condition, and the work now in progress in the city alone will represent an expenditure of 25,000,000 (£5,000,000). The most noteworthy feature is in the business buildings, which are remarkable for height and costliness of decoration. Indeed, ground is becoming so valuable in New York, that it is hard to say where the highest of buildings (which cost nothing extra in the shape of taxation) will eventually stop, the average elevation of the new streets in the city being ten stories. In the suburbs, too, there is just as much activity as in the city, the demand for residences for business men being unprecedented, and this is just as much in New Jersey as in New York. Throughout the whole of New York State, mechanics are thoroughly well employed, there being scarcely a town or village where some new school, church, hotel or factory, is not in progress. In consequence of all this healthy briskness, wages in the building trades have greatly gone up of late years, and especially during the last three years. Bricklayers, who in 1878 earned from 12dols. to 15dols. a week, now get from 18dols. to 24dols. (72s. to 96s.), and are in some places agitating for 27dols., and while some special class of workmen have increased their earnings 50 per cent., there is scarcely any branch which has not risen at least 25 per cent. Labourers, porters, and others of this kind, have increased from 30 to 40; and it may be safely said that there is not necessarily a single man out of employment in New York at the present time, whereas the unemployed three years ago were numbered by thousands. The following table of some of the most ordinary trades shows the rate of weekly wages and hours of labour in the two years 1878 and 1881 respectively:—

Trade.	Hours.	1878. Wages.	Hours.	1881. Wages.
Bricklayers	59	\$12 to 15	59	\$18 to 21
Masons	58	12 „ 13	59	15 „ 21
Carpenters and Joiners	50	9 „ 12	59	12 „ 18
Plasterers	50	10 „ 15	50	15 „ 21
Painters	58	10 „ 15	51	15 „ 18
Plumbers	50	12 „ 18	51	18 „ 21
Gasfitters	60	10 „ 14	59	15 „ 21
Slaters	50	10 „ 15	50	15 „ 21
Blacksmiths	60	10 „ 14	60	12 „ 21
Cabinet Makers	60	9 „ 13	60	15 „ 18
Coopers	60	12 „ 10	59	9 „ 15
Coppersmiths	60	12 „ 15	60	12 „ 15
Millwrights	60	10 „ 15	60	15 „ 21
Labourers	60	6 „ 9	60	9 „ 15

As far as the building trades are concerned, the average wages of the principal Eastern cities are about 2.50dols. a day for carpenters, a little over 3dols. for masons, and 2.50dols. for painters. Boston pays less than New York and Philadelphia, where rent, provisions, and general expenses are on a greater scale than in other towns. In the Western States, we find the same rule applying to the biggest cities, such as St. Louis and Chicago, where carpenters are getting 3dols., masons 3.50dols., and painters 2.50dols. a day. One would have thought that as the trade rolled westward, wages in the extensive and sparsely populated states would have been much lower; but in point of fact, it is just

the reverse, owing to the mining element, which has come into play and put all skilled labour at an abnormal figure. In Colorado, for instance, carpenters and painters get 3.25dols. a day; masons 4.25dols.; while in Arizona and New Mexico they can earn still more. It is not until we reach the Pacific section and find in California and San Francisco the competitive effects of large industrial towns, that wages of the building and other rates assume a more reasonable aspect, while employment is more difficult to obtain. The following table of building wages in the various states and cities may be of considerable interest for the purpose of comparison with wages in our own country, and to serve as a guide for those who are thinking of trying their fortunes in the New World.

States and Cities.	Carpenters. Per day.	Masons.	Painters.
EASTERN STATES:—			
Boston	\$2.50	\$3	\$2.50
Maine	1.75 to 2	2 to 2.75	1.75 to 2.25
Connecticut	1.75 „ 2	2 „ 2.75	1.75 „ 2.25
New Hampshire	a trifle higher.		
Vermont			
New Jersey	2.50	3.0	2.50
Massachusetts	2.25	2.75	2.25
ATLANTIC STATES:—			
Maryland	2.0	2.50	2.0
Baltimore	2.25	3.50 „ 4.0	2.25
Richmond (Va)	2.25	2.50	2.0
Savannah	1.75	2.50	3.0
Carolina	1.50	1.75 „ 2.0	1.50 „ 2.0
Mobile	2.25	2.25	2.25
MIDDLE AND SOUTHERN STATES:—			
Arkansas	3.0	5.0	2.0
Mississippi	3.0	5.0	2.0
Louisiana	3.50	4.0	3.50
Texas	2.0 „ 3.0	3.0 „ 4.0	3.50
WESTERN AND PACIFIC STATES:—			
Oregon	3.50	4.0	3.0
Utah	3.0	3.50	3.0
Arizona	3.50	4.75	3.50
Colorado	3.25	4.25	3.25
Omaha	2.75	3.0	3.0
San Francisco	2.25 „ 4.0	3.0 „ 4.50	3.50

STONEHENGE.—III.

WE have already given a plan and a section of Stonehenge, as it, in all probability, originally was when first built, and can but regret the little there is available to guide to any more clear and certain idea of the special circumstances and conditions under which this old-world structure was put together, and the stones of it brought into place. It is well worth further research, now so much needed; for could we but for a brief moment imagine the special circumstances of that so distant time, we should all the better be able to comprehend the motives which led to such building. First, as to its date. It is somewhat curious to look through an ordinary chronological list of the great events in human history, and at the various ways by which they have been noted—e.g., that of the famous Olympiads, originating as they did (and the fact is sufficiently curious) from the Olympic Games which took place every fifth year. This would seem to have been the most ancient and world-famous mode of computing time. It dates from B.C. 776. Then there is the era of the foundation of Rome, about—for the authorities are not quite agreed—753 B.C. Then there is the Christian era, now in such universal use over all Europe, at least, and Northern America, with a number of others, most of them recorded by years. But, in the days in which Stonehenge was built, or the stones of it brought together, we get, it would seem to be certain, quite beyond all this, and find ourselves literally in the very dimness and darkness of the past itself. Olympiads and years avail us not, and the historian of human events has nothing to tell us. He can but speculate about it, and thus go backwards till his sure dates quite fail him. It is curious to note here in passing how all this is narrowing itself, for the antique Hebrew history is getting to be

quite near, comparatively, and within visible ken. In this Stonehenge puzzle we can but leave the *historian* and look to the *geologist* for help and information, or at least speculation and useful conjecture. Indeed, the longer we look at this strange monument, of a long past state of things human, the more and more uncertain do we get, and the more necessary is it to go again and again to the *monument itself* for information, and to the yet visible remains of it, and to map these out correctly with all their yet remaining surroundings, at present too little thought about. We refer to the *embankment* and ditch surrounding the stone circles. Stukeley's plan would seem to be fairly given, as he saw things; but we hope shortly to be able to give a *plan of Stonehenge* as it veritally now is.

It would be perhaps difficult to say what first there is most strange about this strange monument; but we are inclined to think it must be the fact of the very materials of which it is composed, and the *where* they came from. The outer inner circle of stones, and the inner "apse" stones, it has been thought, may have been brought from Wales or Cornwall, or from the Channel Islands, and it is certain that this would not have been done but under the influence of very powerful motives—probably religious motives—since the stone to be found in the immediate neighbourhood would have answered to the full, if but the mere building of this stone circle had been all that was aimed at, or had there been nought but mere utility to provide for. This may to many seem but a slight matter, but can anyone imagine in these days of utilitarianism and matter of plain fact, anyone, or any company, travelling to a far-off country for the mere materials for a new church, or other structure? If Stonehenge was erected, as has been thought, at two distinct eras, the inner "boreshoe," as it has been termed, and inner circle of small stones—foreign stone—probably, says Mr. Stephens, formed the first and earlier temple. These may, he thinks, have even been built up elsewhere, at some even more distant date, and from thence brought over to Salisbury plain and set up there. An invading and conquering people, he thinks, may have brought over these weighty blocks of stone, hallowed to them, and then to add to their impressiveness repeated in the building up of the new work the same idea on a larger scale, and making use of the stone, found on the spot or near it, for the purpose. And he cites the fact of the "Kaaba," in Mecca, as a modern example of an ancient shrine, inclosed in a later, and larger, and more impressive and imposing structure. This may, indeed, have been so, though it takes from the sense of unity of idea we have of Stonehenge, as a whole, and as the embodiment of a simple idea from a single source. And it destroys also the supposed fact of Stonehenge being an insular thought embodied in stone. It makes of it a *Continental* thought. Looking at the plan of Stonehenge, as on page 519, it would seem to have not a little to support it; but turning to the section on page 420, we seem to have before us a single and complete idea, mysterious enough may be, but all built up at one time, and all for a unity of purpose, little as we may see of it, or into the meaning of it. We fear to speculate, and can but hope for further research and "digging," and inquiry on the spot, by those, too, that are careful and competent for the work. Might we not urge here that before anything a careful survey of this monument should be made, and thus to get, at the least, a correct *Plan of Stonehenge* as it now is?

We should not have ventured, interesting as the subject is, to dwell so long upon it, save to suggest that not only should every possible care of the ruins of Stonehenge be

taken, but that some idea of the nature of such rude structures be afforded to the London public. Might there not be, we would ask, casts taken of one at least of the *trilithons* yet standing, of two or four of the stones of the outer circle, and of one or two of the smaller stones forming the inner circles. At South Kensington, or the British Museum, these might well be shown, and they would much help to add to the architectural and archaeological teachings of those valuable and so useful collections. This could not be a very costly matter; but it would help much towards the idea of forming, by degrees, a complete exposition of the first beginnings, and then "progress" of architectural art. There is, most certainly, far more of art teaching in these so rude monolithic blocks than at first sight appears, and it is fortunate that attention has been called to such a monument of the dead past as Stonehenge. We cannot but most fully agree with the suggestion that has been made—that the attention of the Legislature should be called to it, as an historic memorial, and that it should thus be made *public property*. We can but hope that the House will some day give it a spare half-hour. C. B. A.

LUDGATE HILL, PAST AND PRESENT.*

A NARRATIVE of Ludgate-hill has been written by Mr. W. P. Treloar, which will afford a few hours' interesting reading about that famous highway, its legends and historical associations. The author has contented himself with giving the history of one of the principal streets, recalling its past and furnishing the general and archaeological reader with vivid sketches of the time when gorgeous pageants took place on the Hill of Ludgate, when "royal progresses" were not unusual occurrences, and when the gate opened in the city wall. In such a picture of Old Ludgate we must expect to see a very different order of surroundings to those which now meet the gaze. There were no lofty shops on either side, no iron railway-bridge, and the present cathedral with its dome, was not in existence; but the old one, with its long nave and lofty, central spire. Standing on the rise of the Hill, the author carries the imagination back to the time when the palace of Bridget's Well, or Bridewell, stood; when the brawling stream of the Fleet was crossed by Fleet-bridge; the Friary of the Dominicans, once the seat of Parliament, existed; also the old Bail Hill and Newgate Gaol, and the ancient Lud Gate itself. The author gossips pleasantly about Playhouse-yard, the old Bell Savage Inn; the players, Burbage, Tarleton the clown, &c. That Ludgate-hill was a famous locality in our chronicles, there can be no doubt. Of Lud Gate itself, the oldest is supposed to have had its origin in King John's reign. It was adorned with sculptured figures, purporting to represent Lud and his two sons. These figures, shown by a woodcut, represent them in Roman costume. The writer says: "That there was a town on the site which is now occupied by St. Paul's and its surroundings, and that a heathen temple afterwards, perhaps a temple of Diana, may have stood there, is by no means improbable; nor is it impossible that the town may have had a gate, though it is exceedingly unlikely that in the time just before the Roman invasion it was surrounded by a stone wall, since the Britons were never known to have walled towns—a fact certainly remarked by Caesar, and never contradicted, even when London was spoken of not long afterwards."

The derivation of the name "London," long a question among antiquaries and etymologists, is discussed, but no new light is thrown upon it. The old Roman wall is traced, and several interesting archaeological discoveries are sketched, including the large Saxon cemetery on the site of Old St. Paul's, remains of Roman interment; and we find mention made of the urns, lamps, lacrymatories, and coloured glass, and earthenware—specimens of which were only lately dis-

* Ludgate Hill: Past and Present. (Illustrated.) London: Griffith and Farran, Ludgate hill.

covered in the churchyard during recent alterations.

Mention is made of the Fleet river, its course, and its gradual conversion, by the increase of population, into a ditch; of Bridewell, once a palace and fortress, in the line of the old wall, which commenced at the Tower and finished its circuit at near the foot of the present Blackfriars-bridge. Bridewell continued to be a Royal palace till the death of Henry VIII. Graphical accounts are also furnished of Baynard's Castle and its intrigues; of the "Wardrobe" Old St. Paul's, an engraving of which is given; also Ludgate Prison, Lollard's Tower, many reminiscences of which are narrated.

The chapter on "The Origin of Bell Savage Inn" will be read with interest; and the author crow is into a few pages a good deal of reading. Its numerous titles have perplexed the antiquary. In one document it is called "Savage's Inn, otherwise the Bell on the Hoop," and this is the earliest mention of it. It was the property of one Isabella Savage, whose name appears to have been the origin of the title. In more modern times, says Mr. Treloar, it bore the name of "La Belle Sauvage" and this title is thought to have been derived from the custom among the Tudors and Stuarts to make anagrams, and to convert them into rebuses or pictorial tokens. Thus it is easy to imagine Isabella Savage or Bella Savage converted into "La Belle Sauvage" or "La Belle Sauvage." The author says: "The place is sometimes called the Bell Savage, and in later times Old Bell Savage." This may suggest a rather simple derivation, when we consider that the ancient building, like the great pile which covers its area to-day, was close to, and one portion of it may have opened upon the ballium or bailey (which at one time would have been crossed by a bail or bar of wood), the residence of the High Bailiff and the bail or boundary of the district. Now as the Inn was the mansion of the Savage family and near the bailey or ballium, it is at least conceivable that it would come to be known as the Bail or Bailey Savage Inn, and afterwards the "Old Bail or Bailey Savage Inn." The pictorial token may have been suggested by similarity in sound between bail and bell.

Describing the hill, the author alludes to the houses of timber and plaster built in overhanging stories, which were not replaced by brick till Edward IV.'s time. The floors of clay and rushes no doubt led to the epidemics which devastated the city, and sufficient evidence is brought forward to show the social state of the people. Ludgate-hill in Elizabeth's time must have witnessed many festivities; the houses were poor, but picturesque, with long gardens sloping to the Thames. The reader's imagination is kindled by fragrant and historical incidents, such as the expiation of Wyatt, and the cutting off of his retreat at Temple Bar; but we pass on. The transition of many old mansions into inns for public entertainment which took place in Shakespeare's time, was the origin of the large courtyards and galleries such as those at the Bell Savage. Shakespeare's Theatre at Blackfriars is mentioned, and allusions made to Doctors' Commons, Herald College, Stationers' Hall, Surgeons' Hall, Paternoster-row, about all of which many interesting particulars are given. The author recalls the changes which took place, the plague of the time of the first James, and gossip about Ben Jonson and his club, Baroque, Shakespeare, and other notabilities. The Restoration and the subsequent plague are recalled upon, the rejoicings and gloom which followed one another, till the Great Fire changed the aspect of Ludgate. The legends of the hill now take a new phase; old buildings disappear and new ones have taken their place, and the author sketches the appearance of the town. The plan of Sir Christopher Wren for rebuilding the city, a scheme abandoned by the architect, and some of Wren's churches are mentioned. It is said that Wren designed the present slender spire of St. Martin's, Ludgate, to give a greater importance to the dome of St. Paul's, before which it stands as we look up Ludgate-hill.

The narrative then takes us to the Ludgate of Queen Anne and the Georges. The royal processions of William III., the balconies and windows hung with rich draperies and Turkey and Persian carpets, equalled in splendour the pageants of Elizabeth. The rebuilding of St. Paul's is briefly described, and many of the incidents of the period are recorded.

A few interesting wood engravings are interspersed through the pages. The view of old Ludgate shows the old structure, with its mask of stone pilasters and niche above the gateway; another is a good view of Ludgate-hill after its removal. The outer yard of the Bell Savage, and other reminiscences from old prints, are appropriately introduced, and lend an interest to the narrative. Not the least instructive part of Mr. Treloar's book relates to the changes and improvements which have taken place. "Ludgate-hill in the New Light," is an interesting chapter. As a readable account of one of the great highways of London, the author's little book is acceptable, and will furnish the general reader with a carefully-prepared *résumé* of incidents and facts, which are to be found only scattered in large and costly volumes.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE Opening Meeting of the Session 1881-2, was held on Monday evening, and was attended by an unusually large number of members and visitors. Mr. G. E. Street, R.A., the president, who wore the chain and badge of the office, and his Royal gold medal, occupied the chair. Nearly an hour was occupied in the preliminary business, including the balloting for new members. The following gentlemen were declared duly elected. As Fellows:—William Leiper, Glasgow; John Slater, B.A. (Lond.), Bedford-row, W.C.; Daniel Brade, Kendal; William Harvey, Whitehall, S.W.; Capel Nankivell Tripp, Gloucester; Henry Thomas Gordon, Basinghall-street, E.C.; William Bide, Ipswich. As Associates:—Robert Barton Morgan, Birmingham; Lawrence George Sumners, Nottingham; John Tweedale, Leeds; Thomas Ames, Bathampton, near Bath; John Henry Eastwood, Red Lion-square, Bloomsbury, W.C.; Horace Thomas Bonner, Lewisham, S.E.; George Elkington, jun., Cannon-street, E.C.; Arthur Edmund Street, M.A. (Oxon), Cavendish-place, Cavendish-square, W.; Arthur Edward Lloyd Oswell, Shrewsbury; George Thomas Poole, Southampton; James Martin Brooks, Wellington-street, Strand, W.C.; Maurice Charles Haubert, Queen Anne's-gate, S.W.; George Borer, Finsbury-circus, E.C.; John Henry Curry, Tulse-hill, Brixton; Alfred Millwood, Oxford-road, Hammersmith, W.; Percy Paul Green, Greenhill, Hampstead, N.W.; Edward William Mountford, Buckingham-street, Adelphi, W.C.; John Wardle Bulcock, Blackburn; Arthur John Gale, Surrey-street, Strand, W.C.; William Jacob Gibbon, Oxford-terrace, W.; Ernest Augustus Eckett Woodrow, Hornsey-rise, N.; Walter Blackwell, Millman-street, Guilford-street, W.C.; Arthur Charles Bulmer Booth, Bennet's Hill, E.C.; James Tolley, jun., Cannon-street, E.C.; Thomas Batterbury, Great James-street, Bedford-row, W.C.; Richard Mauleverer Roo, Lendenhall-street, E.C.; John Malcolm, Queen Victoria-street, E.C.; Henry William Peek, Gower-street, W.C.; Joseph Porter Power, Dashwood House, New Broad-street, E.C.; Edward Alan Jackson, New Court-chambers, Chancery-lane, W.C.; Henry Petit, Welbeck-street, Cavendish-square, W.; Alfred Augustus Bonella, Montague-street, Russell-square, W.C.; Henry Gregory Turner, New-court-chambers, Chancery-lane, W.C.; Andrew Edwards, Red Lion-square, Bloomsbury, W.C.; Peter Dollar, Great Marlborough-street, W.; and Francis Lennox Canning, Palace-chambers, Westminster, S.W.

The President then delivered his Inaugural Opening Address.

It is a time-honoured custom, he said, that the opening meeting of the session shall each year be devoted to a review of our position, the work we have done during the past year, the losses we have sustained, and finally the openings which appear to offer themselves for the promotion of that which, above all, concerns almost all of us: the advancement of the art to which we have devoted ourselves. We all know how much it pleases some of our critics to assert that the objects of this corporation are selfish first of all, and devoted to the improvement of the art and the science of building only in a very secondary degree. I need hardly waste words upon a refutation of such statements. The real object of the

Institute of British Architects is very different: we exist not only because of, but for, our art. It is not because we are architects that we band ourselves together in selfish opposition to the interests of the world, but rather that the interests of the outside world and of the profession may be harmonised and proved to be identical; and equally that our well loved art may be more studied, more admired, better understood, and more widely practised, not only by ourselves but by the public outside our ranks. The real interests of the public and of ourselves are identical. The obligation to carry on the business side of our work upon the highest rules of honour and integrity as between man and man is placed in the very front of the conditions of membership of this Institute. We admit of no compromise or conditions; and the condition of membership here is undoubtedly that of working thoroughly in the spirit and traditions of gentlemen. In addition to this, the practical work which we have to do is, by meetings, by reading of papers, and by discussions, to keep up and increase as far as we can the general interest in and knowledge of our art, without which neither accomplished architects nor an intelligent public will continue to exist. Naturally our work of this sort divides itself into that which relates to the scientific and that which is concerned with the artistic side of our art. I think there has of late years been rather a tendency to devote more time to the former than to the latter; but the art of building, the art of draining, and the like are exact, and do not admit of perpetual discussion. The development of attention to the study of novelty in construction is not always for the advantage of good building. Half the inventors, whose circulars cover our tables every morning, claim as the chief merit of their inventions that they are cheap, and I would that occasionally they convinced us that they were equally lasting. You will pardon me for frankly speaking my mind on an occasion such as this. I maintain that British architects are honourably distinguished for the way in which, as a rule, they deal with all those questions of new forms of construction, of water supply, of drainage, and of the general conditions on which comfort and convenience in our houses depend. English comfort is a proverbial expression almost all over the world, and our architects are fairly entitled to a large share of the credit of its creation.

I wish it were quite possible to make the same assertion with regard to our artistic successes. It strikes me more strongly, the more I think of it, that we cannot quite escape some responsibility for the bad work which is done by builders without our aid. How is it that, with an ever increasing body of architects, educated and trained more and more carefully, the vernacular architecture of the country becomes worse and worse every day? The vernacular architecture of a country is that which the carpenter, the bricklayer, the mason, the smith, or the plasterer does if left wholly to himself. We all know that the time was when little even of this work was wholly contemptible; take even the last century, and in such work one sees a simplicity and restraint in design, and an absence of vulgar display, which make one feel a charm in work most of which never passed through an architect's office. Go from the house built in the suburb of an English country town in 1750, to one of the houses which rise in countless numbers on all hands now, and your verdict as architects and as artists must always, I fear, be given in favour of the former. Compare the two, and you will find that the taste of the eighteenth-century builder was for simple and good work before ornamental, so that he seldom came to the latter at all: whilst the taste of the nineteenth-century builder is to do everything for display, sacrificing the money which might have made his work at least substantial, to an investment in so-called ornaments to the show fronts only of his house, which are costly to put up, costly to keep in repair, and hideous in their glistly unfitness for their place. They have some comely key-stones, ornamental railings and balconies, a few lumps of terra-cotta, cornices and window dressings of elegant character, and highly suggestive chimney-pots; and for the sake of these the house has walls and floors so thin that every sound can be heard throughout, and so weak that in a heavy gale you rock in your bed. For all this, we are only indirectly responsible, but I do think that we must allow

that too many, if not all of us, think too much of the fronts of our buildings, and so have practically brought up a whole generation of builders and workmen to believe firmly that all buildings ought to have one "show front," whilst we so often sacrifice solidity to the pleasure of creating what we call ornament, that we have led them naturally to assume that ornament is an object by itself, to be clapped on to a building at all hazards, and even at the sacrifice of solidity. This large and serious question deserves discussion and action. For, depend upon it, some screws must be very loose indeed in our system if all our work is so wholly outside the world as not to influence the vernacular architecture of the people for good. My only suggestion at present is that our duty is to show, by example, that simple building may be quite as good as extravagant, and that the essence of all good architecture is that it should be solid and lasting before it tries to be ornamental, and that ornament is a feature which grows out of utility, and cannot be applied to a building like a loose-fitting garment to cover defects or to distract attention from parts which are not supposed to be seen. It is unworthy of architects to build what is in its very nature ephemeral, and I wish heartily that, before all questions of style this vital one of solidity were always present to us when we are making our plans. Depend upon it, the builders who have been trained by architects who never build what is not solidly and well-constructed, are much more likely to build for themselves in the same spirit and way, than they ever are if they have been otherwise taught. And, after all, it is the work done by builders without the intervention of an architect that we see wherever we move in this ever-increasing city, and in others similarly conditioned. It is work which it ill-becomes us to treat as non-existing. It is, on the contrary, one of the very first necessities of the day that we should, in some practical way, deal with it.

There is another question to which the one just mentioned naturally leads, and this is one as to the extent to which we may be able to effect, in the interests of our art, the future architectural arrangement of the streets and buildings throughout our great cities. To state the case in this way is perhaps in fact to answer it, as far as relates to direct interference with or influence over what is done by municipal authorities; though as our Institute boasts properly that it is a British and not only a London Institution, our object ought always to be to keep this fact well before us, and to act even out of London whenever the importance of the case demands it. In 1876 the late Mr. Wyatt, in the course of a discussion on Mr. Eastlake's interesting Paper on the Work and History of this Institute, told us that the author had omitted to mention one proof of its growing influence. This he saw in the request, then just made to us, to exercise control over the designs and elevations of buildings in Northumberland Avenue; a request which became, I believe, a law to the extent of making it necessary that all these designs should be "submitted" to the Council of the Royal Institute of British Architects. Well I know not, gentlemen, what the general feeling on this subject is now. Some I know agreed with the view which I took at the time that the position we were taking was a dangerous one and one that could do no sort of good to our art. The taste of the individual members of a council may be excellent; but there is an unwillingness on the part of a body of men to criticise too severely, or to agree in suggestions as to the alteration of the work of a brother architect. Opinions differ round our own table as to what is best, sometimes even as to what is good, to such an extent as to end in approval being given to works in a general way to which probably every one of the council in his own heart can see little good. Nor is this all. The elevations alone, which are not complete without plans, are submitted; modifications of a very simple kind alone can be and are advised, the advice is neglected, and the building is after all erected with little, if any, attention to the opinion of the council of this Institute. In the end, if Northumberland Avenue ever becomes an avenue of buildings, the Institute will have to ask itself whether the control it has exercised has been sufficiently strong, and the result so good, in comparison to that of the streets in which we have not been able to interfere, as to justify Mr. Wyatt's anticipatory satisfaction. For myself, I have no hesitation in saying that it

would be better, if we are to have no more power than at present, that we should have less.

I do not think it right to close the few words I have thus said on the Northumberland Avenue question without endorsing what fell from my predecessor in this chair on the subject of architects who are members of the Metropolitan Board. He was speaking of the business relations which constantly bring members of our body, as well as the Institute itself, into correspondence with the Metropolitan Board of Works, and he concluded with the expression of an opinion, in which I concur so completely, that I think it only right to repeat it. Mr. Whichcord's words related to the composition of the Board. "Architects," he said, "may be elected members of that Board, just as barristers, solicitors, and doctors may be so elected. It would be ridiculous to say that professional men shall not sit at that Board because they may have had a pecuniary interest in some of its public building transactions. But I shall run no risk of censure when I say that a Fellow or an Associate of this Institute, if he be elected a member of the Metropolitan Board of Works, ought not, from that moment, to have any professional connection whatever with the purchase of land offered for sale or lease by the Board; nor should he be professionally engaged in the superintendence of buildings to be erected on land which is the property of ratepayers whose agent and representative he is." Such a statement is so obviously right and beyond question, that I am sorry it should still be necessary to repeat it.

Upon the broad question of giving general advice through our Council, I feel sure that the Government, or the governing bodies of our great cities, might well, and with advantage to themselves, consult us from time to time on the preliminaries of great building operations; and I have no sort of doubt that we should always be willing to give the best help in our power. Whether the points to be settled are the best routes for new streets, the best sites for great public buildings, or the best openings for architectural improvements, it would be advantageous to every one if the subject were laid before a committee of experts—such as the Council of this Institute is—for its advice and opinion. Take such cases, for instance, as the choice of a site for the New Courts of Justice; or as to the choice among various schemes for the placing of the new Government offices which are even now required; or as to the conditions on which railways are to be brought into London or across our river, and it is obvious that our opinion might well be asked, and almost certainly be acted on, with advantage to the world and without prejudice to any one. In the last case, for instance, can it be doubted that, if we had been consulted, the House of Commons would never have allowed the London, Chatham, and Dover Railway to erect its bridge across Ludgate-hill, and to erect a second and almost equally ill-placed bridge across the Thames, within a few yards only of another built on wholly different lines? Nor would the South Eastern Railway have been permitted to build the two gigantic and odious sheds on the river-side, which have been the ruin of so much of the beauty of the matchless prospect. Such subjects lead me to say how useful a function this Institute might perform if it could keep a more active surveillance on the mode in which the works of deceased artists are dealt with. I am not among the passionate admirers of such a work as the General Post-office; but, at any rate, it was a consistent design, carried out in an honest and uniform spirit, and complete in outline and character. New wants have arisen since it was built, Rowland Hill has come and gone, and more and more accommodation is required. But it is almost beyond credence, that some of that increased space should have been obtained by a series of erections on the roof of the original building, hideous in themselves, and wholly careless of the effect produced, or even of having in themselves any architectural character at all higher than that of a third-rate house or workshop. Yet so it is. And perhaps it was because for years the porticoes and colonnades of another great public building—the British Museum—were entirely filled with glass-encases and partitions, without any entry from the public or from us, at such a defacing of a consistent and costly design, that the Government which represented the country was so heedless of the monstrosity of which it was

guilty, when it made the additions to the Post-Office. Nor is it out of place here to ask when the front of the Colonial Office in Whitehall is to be finished? Its architect evidently prepared for the erection of two towers or pavilions at the angles of the chief front. His proposals were not acted on—and there to the present day stands the building, with its two most important angles evidently unfinished. Every day a large proportion of the members of both Houses of Parliament, and most of the Ministry, pass under the walls of this unfinished front, without I suppose one thought of the injustice done to the memory and reputation of one of the greatest architects of his time. Surely on such a question as this, this Institute, if no one outside will move, ought to take some action.

Then again I hope we are all agreed that there is no work in which we can as a body do better service to our art, or more certainly show our real sense of its value, than by sturdily opposing all schemes for the destruction of existing works of architectural art, or constructions of historical or archaeological interest. We have a committee for the conservation of ancient monuments; it is a strongly constituted committee, and its existence cannot be too widely known. There is always work for it to do. Take, for example, the case of the City churches. When I return from some foreign travel, and cross the railway bridge into Cannon-street, I feel a pride in the architectural beauty of the City of London, which is never lessened by contrast with what I have been seeing elsewhere. And to what, may I ask, is the beauty of this view owing? There is a magnificent river and a sublime bridge, but beyond and above these a cluster of towers and steeples, of so much variety of design, so skilfully treated, so picturesque from every point of view, as to afford unending delight. In the year 1800 there were 107 churches in the City, in the year 1877 only ninety-five remained, and of these there were no less than thirty-one scheduled as "at present" to be pulled down. Only the other day another of Wren's reputed churches, St. Matthew, Friday-street, was said to be condemned, and though the particular case is not a strong one, it seems to me high time that this Institute should strain every nerve in order to save any more such regrettable destruction of the buildings to which London owes so much of its pre-eminent beauty. If architects stand by quietly, it may be assumed that there are no artistic objections to such destruction. We may still permit men to go on in the cheap and easy fashion of making our ancestors' piety and liberality pay for building and endowing churches which we, with all our increased wealth, choose to think we cannot afford to erect; and by the time that all the empty churches (consequent largely on a non-resident clergy) have been removed, and their sites sold for counting-houses, shops, banks, and what not, men will awake to the discovery that the architectural beauty of the city is a thing of the past, and that the loss is irremediable. At the West-end I hope the same words of warning are not required. Your council have been appealed to in reference to a rumour that St. Margaret's, Westminster, was to be taken away. This is a constantly recurring rumour. The penny-aliners probably think that everyone wishes it removed. They forget that it has just been refitted at great cost, that it is a building full of architectural and historical interest, and they are not aware that the builders of our great churches and cathedrals, being artists, had never any objections to the erection of small buildings near to, or in contact with larger ones, to which they gave infinitely more value and scale than they otherwise possessed. I am glad to be able to assure you, however, in this case, on the best authority, that there is no foundation whatever for the rumour. It is remarkable to notice how much is lost on all sides for want of some active hands to save threatened works of art. We look round on the Paris, the London, the Florence, the Cairo, the Venice of our youth, and find that on all sides work has been destroyed, apparently mainly for the sake of change, for the loss of which no new building will ever atone. In London there is the well-known case of the colonnade of Burlington House taken away upon the understanding that it should be rebuilt, but lying in a mouldy heap somewhere on the other side of the river. In some similar limbo, we suppose, are the stones of Temple Bar, for the re-erection of

which in some spot not far from its old place, such for instance as an entrance to Temple Gardens, one would suppose that funds might without difficulty have been found. Farther to the west is an even more interesting work—the water gate at Buckingham-street, Adelphi—treated in an even more ingeniously spiteful way. For here the lovers of the beautiful have created a garden with lawns and shrubs and winding walks, which one would suppose might have been allowed to undulate as well as to wind. At any rate even now the level of the garden might be lowered for some distance on either side and in front of the gateway, and Luigi Jones's work might again be seen in its integrity, instead of being earthed up to nearly half its height, and of having its archway used as a receptacle for rubbish, and the decay of its old stonework hastened as much as possible by the piles of damp earth and plants carefully placed against it by the landscape gardener. And, to conclude, there is the case of the church in Edinburgh, for taking down and re-building which, on a new site stone for stone, the railway company were bound to, and did, provide the funds. Here again the stones remain in a heap, and the Corporation, unless they are much troubled, have kept the money for their own municipal purposes.

I might easily multiply examples of the same kind. They all seem to point in the same direction—to the necessity in such a country as ours for the creation of a Government department of the Fine Arts, whose office should be not only to give order to our magnificent but often confused and inaccessible collections, but to take care that our national buildings and our historical monuments are classified and preserved as far as possible from further damage either at the hands of time and weather, or at the equally destructive hands of those who have no hesitation in wholly destroying the architectural character of a great public building. I believe that the appointment of such a ministry might be followed very soon among other things by an addition to our museums, which has often been urged strongly—but hitherto unsuccessfully—of a museum of casts. Every one admits the advantage to students of art of such a museum. Berlin has shown us the way, and the expense could not be so great as to be a difficulty in the way of so rich a country as this is. Moreover it seems to be a necessary complement to the other collections which have been accumulated within the present century, as affording the very best means of educating the eyes of a people who are undoubtedly holding their own against foreigners in all artistic matters far better than they did before such museums were first of all formed. The collections at South Kensington contain a good many most valuable casts, but they represent only comparatively modern art, and even then are in no degree whatever complete, and they are not, as they should be, exhibited by themselves, or classified in such a way as to be thoroughly useful to students. I hope that no opportunity will be lost of pressing upon Government the sense that this Institute must feel of the importance of such an addition to our national collections. It is a feeling which is sharpened in us by the knowledge of the fact that such a museum would, to a very large extent, illustrate the close connection which ought to exist between the work of the sculptor and the architect. The best work of the greatest sculptors have nearly always been their decorations of architecture; and the evidence of this necessary connection before the eyes of the people is the best way of familiarising them with the fact, and of leading them to feel the want in our own buildings, in which, even when the architect has advertised his desire to see sculpture introduced, the spaces he has left for it are still, as a rule, conspicuous by their emptiness. The Government which, with a large and wise liberality, would deal with such questions as these, would secure for itself perhaps less temporary popularity, but would have the satisfaction of knowing that it more permanently benefited the highest interests of the community than it could by exclusive attention to purely political questions, and as such work ought to be independent of party, what one set of ministers undertook would not be likely to be undone immediately by their opponents and successors in office.

At a recent Conference, the question of competitions led to much discussion, and the resolutions arrived at have been discussed by the

Council, who will ere long lay before you the result of their deliberations. The position which I hope will be taken by you will be to arrange that in the event of a competition being indulged in, due securities should be given for really accomplished assistance, or advice, or judgment on the competing plans, not only in regard to technical questions as to compliance with conditions, but at least as much on true artistic questions, which are even more to be thought of, more vital, and more difficult to settle. But it is, I hope, no part of our business or duty to do so much in the way of facilitating competitions as to lead the world to suppose that we are in any sense whatever admirers or encouragers of a system, the defects of which, under the best arrangements, are so many and so patent that the best men keep themselves wholly or almost entirely out of reach of them, with the result that works which result from competitions are seldom those which we look back on with the greatest satisfaction.

Our Conference in its discussions leaned rather to the merely business-like side of our work, but let us hope that this was corrected in some degree by the visits paid to various buildings and collections in the metropolis. Of the latter, those to Buckingham Palace and to Sir Richard Wallace's were the most important. Probably we all regretted that the palace of our well-loved Sovereign was not more worthy, in structure and in decoration, of so great a monarch.

Our numbers still continue to increase. Last year at this time the total number of fellows and associates was 716. The additions during the year have been 23 fellows, 143 associates, 9 honorary associates, and 9 honorary and corresponding members; and deducting the losses which we have sustained by death or otherwise, our numbers now stand at 370 fellows and 491 associates—a net gain of 19 fellows and 126 associates. It is to be hoped that this large accession of new members does not mean that we are reaching a lower level of qualification so much as that the Institute is becoming more recognised as the centre of our work. A large increase of members involves also an increase of our means, and additions to our library, which is rapidly increasing and is now of great value. Another addition to our means of doing good work is Mr. Godwin's generous foundation for the promotion of the study of modern structures and building improvements and adaptations. This has the special peculiarity of being open to all members, and though it is not educational in quite the same sense as most of our other prizes, it will, there can be no doubt, be of high value in its results to the profession.

Of the losses which we have sustained during the year, a few words will suffice, in addition to what will appear in the *Transactions*, upon some of the names whose absence from our ranks we deplore. The death of William Burges took from us unexpectedly, and in his full vigour, one whose belief in his art, whose devotion to its study, whose enthusiasm for his work have rarely been excelled. A student from first to last, an artist whose hand was always seen in every detail of his work, his example is one to be held up always for our admiration and emulation. He knew that unless an architect's work is good and thorough it has no enduring life. He knew that this lesson required to be taught us more than any other, and he made it the business of his life to teach it; and I honour him the more that he gave to others what he had with infinite pains learnt. It was one of his greatest pleasures always to discuss in public or private old modes of procedure, of manufacture, of design. There was nothing selfish in his acquisition of architectural or archaeological information. He was as ready to communicate as he was to acquire, and many of his published papers are replete with learning and information. The study of Early French Pointed architecture had evidently produced a very strong and lasting effect upon him as an artist. He revelled in the somewhat rude and ponderous version of it which he affected, and it was in the sculpture and the decoration with which he rejoiced to overlay his work that he allowed his quaint and exuberant fancy to have full play. There was so much originality in what Burges did that his work was certain to be criticised. It was warmly admired and as warmly opposed, and he would have been the last man to wish it otherwise. In one thing at least all were agreed, and this was that his death was a real loss to our art. The Royal

Academy has at last recognised his undoubted claims; and, unfortunately, it still remained for this Institute to follow with a testimony in the shape of the gold medal, the bestowal of which, I am sure, could not have been much longer postponed. In Frederic Ouvry we have lost an adviser, who was not only always ready to give us his valuable counsel whenever we asked for it, but we had the satisfaction of seeing combined in him the able solicitor and the accomplished antiquary. Among foreign architects, whose deaths we have to deplore, are some of great mark. Hector Lefuel, Member of the Institute of France, was well known by his works to many of us. The names of Davioud and of Mariette Pasha must not be forgotten. Both of these did great work in different directions, and will long be remembered among us, the former especially by what certainly was a bold flight of genius—the Trocadero building, and the latter by his good work among the monuments of Egypt.

The architectural publications of the year do not appear to be numerous. I cannot say how much I regret this. Nothing tends more to raise our art than some attention among us to these literary illustrations of architectural history and style in which so many architects have in past times distinguished themselves. We have examples in the case of some of our oldest members which may well be commended to the notice of their juniors. Nothing, let me assure them, so certainly gives young men their first footing on the ladder which leads to fame and success. Our old Librarian, Mr. Dollman, has shown us how valuable a work it is possible to produce in his monograph of St. Mary Overie's Church, as to which I have already had great pleasure of expressing my opinion here. The Society of Dilettanti has published another part of the "Antiquities of Ionia," in which, seeing that Mr. Newton, Mr. Watkiss Lloyd, Mr. Fergusson and Mr. Pullan have combined their forces, we need not doubt the result. The magnificent government work, the "Monumentos Arquitectonicos de Espana," is still going on, and we are looking forward to the early publication of Herr Richter's promised edition of Leonardo's "Trattato della Pittura"—a work which will have almost as much attraction for architects as for painters, for among the many hitherto unpublished drawings which will be contained in it some, I understand, are architectural designs. No great public works have I think been completed during the year. At Vienna, at Brussels, and in Paris great works are approaching completion, all of them undertaken in a spirit of lavish expenditure, which is somewhat surprising to us in this country. The Cathedral at Cologne has been completed—the most gigantic work of modern times—in presence of which all unkind criticism ought to be hushed in admiration of the grandeur of the idea. The so-called restoration of St. Mark's, Venice, has, I hope, for a time been arrested—whether permanently or not it is impossible to say. Only too frequently works are done for which the necessity, if it exists, cannot but be regretted. Such a case is that of Coutances Cathedral, where the north-west steeple has been just made to look as it might have done, when first built, by the obliteration of every mark of age. I most sincerely trust that this may not be the forerunner of an entire scraping of the whole of this magnificent church! The question of the restoration of ancient buildings is one which is constantly coming up for consideration, and I am constrained to say that unless the very greatest care and judgment, and the utmost reverence for every relic actuate the restorer, restoration is not only a serious risk, but an unmitigated evil. There is the risk of doing too much and of obliterating every sign of antiquity. Such works in our own country as the redecoration of the Chapter House at Salisbury, or in Germany, such works as the decoration of the Castle at Meissen, and the far more interesting Castle on the Wartburg, near Eisenach; or in France, such as the redecoration of the interior of the Sainte Chapelle, fill me, I confess, with distress. No one wishes more than I do to see our painters at work upon our walls; but I do not wish to see their works obliterating, as they do at the Wartburg, every mark of antiquity inside the building. Our new walls and buildings are numerous enough for all that they can do; and in the repair of old work—it is the repair strictly speaking that is the one thing needful, and beyond which it is undesirable to go. And even

this ought never to be treated as proper work for any but the most skilled hands.

Various matters of considerable practical interest will come before you this session. The proposed repetition of the Electrical Exhibition is one which will be full of interest. Hardly second to this in its interest for architects is the Smoke-prevention Exhibition, which is to take place this month and next at South Kensington. There is small encouragement in London to use the best materials for building, if they are to be defiled as soon as built by the foul atmosphere which we create for ourselves; and our utmost endeavours ought to be given to the cause both of clean lighting and clean warming, if we have any care whatever for the permanent effect of our buildings, both internally and externally. Among other subjects which I hope your council will see their way to bring before you, are suggestions for the consolidation of the Building Act of the whole country in one uniform Act; and the preparation of such a statement on the subject of the law of light and easements as may help to form the basis of an Act of Parliament to do away with the present uncertainty and variety of opinion and practice; and the Council will no doubt feel it necessary to bring before you some amendment on the present mode of electing to the highest office in our body.

Her Majesty's Gold Medal was given last year to Mr. J. L. Pearson, and this year to Mr. George Godwin. Next year, according to the established custom, it will be given to a foreigner. On these occasions it is generally of necessity given to one who has no connection with this Institute, and I do not hesitate to say that if the best man exists in our own profession, but outside our own ranks, we should both better obey the Queen's intention and gain more credit, than if we insist upon regarding membership of this Institute as a preliminary condition for British membership, which is what hitherto we have practically done.

The most serious matter before us for next year is the first Obligatory Examination for admission to the privilege of membership. It would be strange, indeed, if in a land of freedom such as ours there had been but one opinion as to the wisdom of the proposal, but it would be almost equally strange if, in a land of order such as ours fortunately is also, the examinations were not carried out with due zeal and thoroughness by your executive. Some of us may think that old times were not so very bad, and that want of some small preliminary technical culture and education did not prevent many of our British architects from being really great men. But these are not the sort of men who will be affected by our examination, the object of which is rather to raise the general standard of education, and so to keep out of the Institute those who are wholly incompetent, than any vain hope of suddenly creating an unlimited supply of admirable artists. We must not raise our expectations too high, or we shall certainly be disappointed. At the same time I feel very decidedly that it is the duty of the Institute to take care that the examination is a *bona fide* one, involving careful preparation on the part of the candidates, and a real acquaintance with at least the groundwork of an artistic and a professional knowledge. There will be no difficulty in testing satisfactorily the ability of those who come to be examined in many of those branches of our work in which every one who intends to act as an architect ought to be well grounded. The power of drawing accurately and intelligibly plans for buildings which will stand when built, is a *sine qua non*; and there is much work of this sort as to which we shall have no difficulty in framing sufficient tests. The far more real difficulty is in an examination into the capacity of candidates as artists; and here it will not be desirable to make the test very difficult, for I know well under what difficulties students often labour. As a visitor and teacher for some years in the schools of the Royal Academy, where probably owing to the examination at admission the ability of the students is above the average, I have to see with constant regret a singular want of acquaintance with the first principles of architectural design, and with the rudiments of architectural detail, which mark the work of many students. But it would be a fatal mistake to make the artistic part of our obligatory examination so very easy and rudimentary as to allow of even the most ignorant of our candidates scraping through. The examination once instituted must be a real one, in the sense of

meaning that the candidate has at least reached some fixed standard—even if a rather low one—of efficiency all round, and such a standard should, as far as possible, be so settled at first as to remain permanently the same. We are not likely to have a better prepared class five years hence than we have now. All the necessary means of education exist now, and have long existed. The system of pupilage, which enables men to learn exactly how those who have succeeded in making their mark are in the habit of working, is no doubt the strong point of our English system; and this can be supplemented by work in London under the professors at King's College and University College, and both in London and the provinces under the Government teachers. Then there is the Architectural School of the Royal Academy, presided over by an active member of our Institute, and where the students have the advantage—as from the crowded state of the school there can be no doubt they feel it—of the personal teaching and direction of most of the architect members of the Academy in succession. Finally, there are the inducements held out, both here and at the Royal Academy, to the more able and earnest art students, in the shape of prizes more or less attractive, and only to be gained by those who have achieved considerable artistic excellence. No one can fail to be struck with the high average of the work which is done in competition for the medals and prizes which we annually distribute, whilst at the Academy, though the excellence of the competition has been for many years very remarkable, I am sanguine that the alterations which have just been made in our laws, with among other things the provision of a travelling studentship of £200 attached to the Architectural Gold Medal, will produce an even better effect. The further new provision of a travelling studentship for travel in the United Kingdom is valuable as showing that the existence of native art worthy of study is at last recognised by the Royal Academy, treading in the footsteps of our own Pugin Travelling Studentship, of which the results have been so eminently satisfactory. Such successes as the gaining of these artistic prizes in competition, either here or in the Royal Academy, will count as somewhat more than any artistic examination which we can conduct in a few hours here; and in the same way that when a graduate of one of our universities presents himself for examination, what he has already had to do for his degree will not require any sort of repetition at our hands. The Institute having taken this examination in hand we must all do our best to ensure its success, and in one respect many of us can do more perhaps than we do. It is the master who does bad or inferior work who ruins the prospects of those whose education he has undertaken, and the better the master's work the better will be the prospect of those who have been trained to look up to him. I may dare to say, in reference to our English School of Architecture, that it has in some respects made marked progress within the recollection of most of us. No school has advanced more in draughtsmanship, whilst the study of ancient examples at the fountain head has become universal among all those who have any enthusiasm or ambition. The individuality of the artist, which is the special mark of English art, is stamped as strongly on our architecture as it is upon the sister art of painting, and I trust that we here shall always steer clear of any attempt to follow foreign systems in this respect. I heard only a short time ago the lively expressions of regret of a great German authority, that their Governmental system of teaching deprived them of the enviable independence and originality which struck him so much in our English system of architectural training.

Let me now say a few words to those who at present do not see their way to joining the ranks of this Institute. They are of two classes—the old and the young; of the former it would be idle to shut our eyes to the fact that some very eminent names do not appear in the list of our members. Whatever the cause of their absence, I cannot say how much I deplore it, and how heartily I wish it were possible to induce some, if not all, of them to give up their self-imposed isolation. We see it asserted from time to time that this Institute concerns itself with nothing but questions of professional practice, professional etiquette, professional payments—that its whole concern is with the professional as

opposed to the artistic side of our necessarily two-sided life. Well, I have spent a good deal of time at your meetings and at your Council table, and my experience is not quite so dreary as these statements would, if they were justified by facts, make it. But those who think that less than the right amount of interest and time is given to artistic questions should by joining us strengthen the hands of those—among whom they may count me—who more or less agree with them. No one is more loyal than I am in every respect to that Academy of the Fine Arts to which it is my good fortune to belong. Were this Institute in the least degree hostile to it I certainly should not have the honour of occupying this chair. But it is impossible to contend that all the artists in our profession are to rest quiescent outside because some half-dozen seats in that body are reserved for a few fortunate architects. It was a wise and noble act, when the Royal Academy was founded, to make its constitution what it was, and to combine within its ranks representatives of all the arts. But our art requires much more than this, and we cannot too much interest ourselves in the work of this Institute, in order, among all things, that the position of our art as an art may more and more be recognised.

One of the aims of this Institute is to regulate—as far as it tries to do so, and that is not very far—professional practice by discipline, which, being suited for gentlemen, is suited for artists; and those who do not belong to us do, most undoubtedly, whether they like it or allow it or not, reap advantages from our existence by their side. If the Institute were even remotely like a trades-union, then no appeal should come from me to these outside brethren. But knowing what its worth is, I do not choose to lose this opportunity of appealing to them to join us.

The younger class is very differently situated. That active body, the Architectural Association, is, in so many respects, working in a groove which runs parallel to our own, that I feel some means might and ought to be devised for enabling its members to join us. There is so much that is admirable in their self-constituted system of education, in the energy in which they pursue their work, and in the high excellence of very much of it, that I rather grudge their securing all the energy of the young for an institution with which we have nought to do. Surely some plan might be devised by which our juniors might, under their own government, betraiding themselves until they gradually fall into their places among us, instead of as now finding themselves obliged to belong to both institutions where one should suffice. The young men want self-government: but I, who am no longer a young man, do not hesitate to say that this Institute suffers much and seriously by their practical abstinence from our meetings, our society, and our work. And if it were possible—and it does not seem to me to be impossible—I should like to see their connection with us established together with full liberty of self-government as to all those educational arrangements which they at present appear to manage so admirably and to prize so much. Few of us grow much better artists as we grow older. A man's best work is generally done between the ages of twenty and forty, and we should all gain very much if our younger friends would occasionally read papers and join in discussions with us older men. What chance there may be of doing anything in this direction I know not; but nothing would give me more pleasure, during my time of office, than having to assist in any such fusion of the two bodies as may be found practicable.

There is again another class which might be more largely represented here, and this is the class of provincial architects. Some of our most distinguished members practise in the provinces, but the number of these who belong to us is very small. But I cannot but regret that no scheme has yet been successfully launched for creating local associations in connection with this Institute, whose members should be bound by exactly the same by-laws, and who either in towns or districts should have the right of electing annually their own representative to sit on our Council. It may be objected that if all my suggestions were feasible and were acted on, there would be no one left outside our ranks, and we should then inevitably attempt to make ourselves a close corporation. I do not fear this, or I should not make such proposals. The British public, depend upon it, will take good

care that it can retain its liberty to employ whatever architect in its wisdom it prefers; and the casual intrusion upon us of an amateur, or of a sculptor or painter, seems to me to be likely to do much more good than harm to us and to our art.

Let me endeavour to gather up the suggestions already made as to the work which lies before us, to be done somehow or other if this Institute is to do its duty by our art and by the world.

We have gone on far too long enduring the existence of bad building on all sides, shutting our eyes to it and declaring it to be none of ours, and that we can accept none of the responsibility for it. Believe me, we are deluding ourselves. If the architects are now more numerous, more united, and so much more powerful than ever they were before, to what purpose is their power if it cannot persuade those who build so badly to build better? The fault, I fear, is with us. We hear architects of position plume themselves on being "practical" men; we see them indulge in so-called practical discussions, whilst they earnestly deplore the over-great attention which others would fain see bestowed on what they call merely artistic questions. So much is said about practice and practical matters that by degrees they cease to realise that the business they are pursuing ought primarily to be regarded as an art pure and simple, and thus looking first of all at the lower side of their art, they end by ignoring wholly the higher side. Don't mistake me. In our art the best artist is the most practical man. There is the highest art in the best disposition of a ground-plan. There is equal art in the best construction applied to a scientifically devised plan, and in the same way there is the highest art in so disposing the plan that the arrangement shall be convenient for the purpose and yet admit of well-balanced masses in the elevation, and well-arranged outlines and skylines. Beauty of detail is inferior in artistic importance to these qualities, but essential of course to a perfect work. I plead that, if we all in due order took this really practical view of the requirements of our art, all our buildings would begin by being well planned, would next be well and soundly built, with elevations meant to bear inspection wherever seen. There would be no sham fronts or false use of materials or deceptions as to construction; and if our nine hundred architect members were all building in this way, depend upon it the day would not be far distant when good building would be so much the fashion, that the builder unassisted by an architect would not care to do such vile work as now he almost always aims at and succeeds in doing. The conclusion to which I have come after many years' experience is that the well and honestly constructed building never excites contempt. We may regret that it has no style, but if it have the qualities just named it may be said to have the first elements of style in itself and can dispense with anything adventitious. That fashions in art come and go, most of us have already seen evidences; but really good work is never out of fashion, whatever its style. One revolution we have seen accomplished under our very eyes. We have lived in the days of compe, we are now living in the age of brick. We have seen the world outside us converted from the use of a bad and mean material to that of a good and honest one; and I am sanguine enough to believe in the possibility of such a change in other respects as may make all building throughout England more tolerable because more honest and less vulgar than it now is. If I did not think this a matter which ought to be taken to heart by every one of us, I should not venture so frankly to state my strong opinions. I hope that I shall not find myself without general support, and that in due time our own consistent determination never to build anything which is not solidly and well constructed with the best art we can bestow, will not only make men honour us for our work, but anxious above all things consciously or unconsciously to build and work in the same way. Certain it is that, when we have accomplished this, we shall have just reached the point which every good school of architecture throughout the world seems to have reached long before its best period.

Sir FREDERICK LEITCH, P.R.A., said his connection with the Institute as one of their Honorary Associates, and his relation to the Royal Academy, combined to render it doubly

pleasant to be intrusted with the duty of proposing a vote of thanks to the President for his very remarkable address. In its forefront, Mr. Street had touched a chord to which every heart in that room must have responded by his forcible and energetic protest against the depraved vulgarity of the weary acres of buildings which were continually rising to the right and left of us, structures in which the hand of the architect had neither part nor lot. The chief sufferer from the want of taste or beauty in a dwelling was its occupant, but the effect of the continual sight of a succession of such buildings was far reaching in its influence on the public taste. Indeed, the constant inhaling of the miasma of ugliness thus generated, threatened with death the very sense of beauty. He believed that the real remedy for this growing evil had been pointed out by the President. It was to promote a love in the public for solid, simple, plain workmanship, because to minds accustomed to see such work, and imbued with this love, the desire for meretricious tawdriness was totally foreign and repugnant. The remedy for the evil, then, was the regeneration of the public taste by evoking the due appreciation of all honest and artistic work. The President had been inspired by the triumphs of the production of ugliness with the suggestion of the appointment of a Minister of Fine Arts. In theory, there was a great deal to be said in favour of such a scheme. Such an influence exerted by the State, to check all that was bad and to foster all that was good in public taste, would appear at first sight to be most beneficent. But he could not help feeling there was much to be advanced on the opposite side. The public taste was, after all, in the long-run the arbiter as to what was good and what not good. Any effort by the true architect to run counter to this would—while this grotesque indifference to beauty and this callous indifference to ugliness and the hideous continued—be, he feared, a life-long struggle against the serried and stolid ranks of the Philistines. He rejoiced very much to hear their President give prominence to one scheme in which he had himself for some time taken some interest, but in vain—he alluded to the President's earnest plea for the formation of a large collection of casts, such as they might see Berlin, Paris, Munich, and even one of the chief towns in little Switzerland possessed. Very much could be learned from such casts, which could not be acquired by the student so well in any other way, and he was surprised that this country had not done more to establish a museum of casts. The President had mentioned the new schemes which had been propounded with the aim of increasing the usefulness of the Royal Academy school to young architects, but he had omitted to allude to one feature of the scheme by which the Academy was endeavouring to unite more closely the three arts of painting, sculpture, and architecture: he referred to the proposal to eliminate any barriers that might have existed between the three arts by allowing the students of one to attend all three classes. These new rules were made with the earnest hope that they would aid in consolidating and strengthening the three professions which were one kin.

The Right Hon. A. J. B. BEESFORD HOPE, M.P., seconded the vote of thanks to the President for his long, extremely masculine, able, sensible, well-spoken, admirably-composed address—epithets which he applied to it not as a fluffing string of adjectives, but advanced critically by one who has undergone in the remote past some of the heart-searchings which must be felt by one who addressed the members from that presidential chair. In one of his own very inferior productions he also had dealt with the proposition to establish in this country a State Minister of the Fine Arts, but he had looked at it from a different standpoint to that taken by Mr. Street. There was, he feared, great danger that the actual work of such a minister would devolve upon one of those artistic productions known as the permanent official, who would be the suburban builder in *exelsis*. All who had to deal with public offices knew that behind the member of Parliament sitting on the front bench, and nominally having the control, was the vague shadow of his master, the permanent under-secretary, who alone knew the inner workings of the office. Let them beware lest the permanent under-secretary of the minister of fine arts had in reality become the

permanent overseer. Again, the Minister of Arts must necessarily be removed and replaced with the mutations of party politics. In one ministry, a man with artistic tastes would encourage and foster art, but the next ministry, in consequence of a war with the Cannibal Islands, might find it necessary to economise, and would select for this post an officer who would cut down the public arts to the quick. Again, such a minister must not be so powerful that he would override the great independent organisations which were doing so much for the art of the country, such as this Institute, the Royal Academy, and the British Museum. After some eulogistic remarks on the work of the Institute, which he said could never justly be sneered at as a mere trades-union, Mr. Beesford Hope closed by seconding the vote of thanks to Mr. Street for the address with which he had cheered, elevated, and instructed them.

The motion having been carried amidst loud applause, Mr. STREET briefly replied, saying that, while there was much to be said in answer to points raised by both speakers to the motion, he would not detain the meeting at so late an hour. He was perfectly aware that his suggestion of a Minister of Fine Arts required guarding in the most careful way to make it practicable.

RHIND LECTURES IN ARCHÆOLOGY.

THE concluding lecture of this course was delivered last week in the Masonic Hall, Edinburgh, by Mr. Joseph Anderson. The subject was "Hill Forts, Vitrified Forts, and Ground Structures." The lecturer observed in the outset that there was no class of ancient remains within this country of which they had less precise knowledge than the hill forts. The reason of this was not their rarity, because they formed perhaps the most numerous and widely distributed class of ancient structures now existing, but the ordinary methods of obtaining precise knowledge of their form, structure, and contents had not been applied to them, and the ordinary agencies of destruction incident to a high condition of social and agricultural progress had long been busy among them. They differed essentially from all other constructions, because they were adaptations of natural sites for defensive purposes. The natural site was the defensive position, and the fort thus derived its form, and in many cases also its character of construction, from the nature of the eminence or promontory on which it was built. It would, therefore, be contrary to the nature of circumstances to expect that they would exhibit anything of the uniformity of plan or structure which was exhibited in thebrochs. Still, it was clear from the little they did know of them that there was certain groups possessing certain features of construction in common, which differed from other groups possessing certain features of construction in common; and it was evident that if a sufficient body of materials existed on record regarding the different members of those groups, their typical characteristics might be readily traced. In the mean time, it was only possible to indicate some of their general characteristics as exhibited by a few of the better-known examples. They naturally divided themselves into two great classes by their construction—first, those that were of earth; and second, those that were constructed of stone. In most cases the earthworks were so low and slight that they could not have been of much service unless crowned with palisades. They were usually on sites that were more susceptible of cultivation than the hill-tops, which were the common positions of the stone-works, and hence they had suffered more generally from agricultural operations than the forts of stone. They were usually irregularly circular or oval in plan, consisting of a varying number of low embankments drawn round the summit of a natural eminence. The hill forts, which were constructed of stone, sometimes consisted of a single wall drawn round the brow of a hill, and inclosing the more or less level area which formed its summit. One of that description at Garrywhone, in Caithness, was an oval enclosure, about 200 paces long by 65 in breadth. The foundation of the wall was about 15ft. thick, and in some places 3 or 4ft. of its height remained. In the thickness of the wall on the east side the remains of two chambers were visible. There were two entrances to the area of the fort—one at the

north end and the other at the south end of the hill. The entrance at the north end had three of the great corner-stones of the gateway still in position. They were single stones or flat boulders, about 5ft. high, set on end. The dilapidation of this remarkable example of a stone cashel was due to the construction of a mill-dam in the valley below, the stones having been rolled down the hill to form the embankment. He noticed it because it was the only hill fort he had seen which still retained the stone pillars of its gateway, and because the story of its demolition illustrated the fate of many of the most perfect and interesting remains of this country's antiquity. A more complex variety consisted of two, three, or more walls drawn concentrically round the upper part of a conical hill, as in the case of the example known as the White Caterthun, Forfarshire. There was another variety of those hill forts which had attracted more attention, on account of the singularity of the phenomena which they presented. These were the vitrified forts, because in their walls there was always more or less of the scorified or vitrified appearance, which was the result of the action of fire upon masses of loose stones. Having described several of these, and pointed out that there was not sufficient evidence to establish that the vitrification was a method of construction, the lecturer proceeded to observe that there was a class of underground structures of peculiar form which was common in Scotland, and was entirely unconnected either with hill forts or any other variety of defensive structure. They were mostly situated in arable land now under cultivation, and they had usually been discovered by the plough coming in contact with the roof. One had been so discovered at Broonhouse, in Berwickshire. It had been known before, and most of the roofing stones removed; but on this occasion it came under the observation of Mr. Milne Home, who communicated an account of it to the Society of Antiquaries. At Migvie, Aberdeen-shire, an underground structure was discovered in 1862, and was described and figured in the proceedings of the Society by the late Mr. Andrew Jervise. The similarity of these two structures was not less striking than the excessive peculiarity of their distinctive features. These features were—(1) their position underground; (2) the contracted entrance; (3) the form of the chamber—a long, low, narrow and curved gallery, gradually widening inwards; and (4) the construction of the chamber, with convergent side walls supporting a heavily lintelled roof. Many examples possessing such typical features had been discovered from time to time in various parts of Scotland. They were numerous in the upland districts of Aberdeenshire. Closely analogous to these in its main features was the underground structure at Buchaam, in Strathdon, described in a communication to the Society by Dr. Arthur Mitchell. Another one at Eriboll, in Sutherland-shire, described by Dr. Mitchell, was peculiar for the smallness of its size, being nowhere more than 4ft. in height, and, for the greater part of its length, only 2ft. wide. Dr. Mitchell remarked that it was difficult to see what purpose such a structure could have served; but he added that it was worthy of note that in that district similar underground constructions were not rare, and that they were called by a Gaelic name which signified hiding-beds. Whatever might have been the actual purpose or purposes to which they were applied, the fact which was of importance in this investigation, was that these structures, though varying in area, from Berwickshire to the north coast of Sutherland, were all of one special character. Occasionally they occurred in considerable groups, as at Airlie, in Forfarshire, and Kildrumny, Aberdeenshire. The lecturer proceeded to notice a few examples, which, by their associations or their contents, disclosed indications of the period of the type. Indications, he said, had been found in connection with the structure and contents of these singular buildings which carried the period of their construction close up to the time of the Roman occupation of the southern portion of Scotland. Objects of the Roman period had been found at Tealing, Pitcur, Newstead, and Crichton Mains, Mid-Lothian. Of the culture and civilisation of the people who constructed these strange subterranean cells, it might be impossible in the present condition of their knowledge to form an adequate estimate. But they could say this of them with certainty, that whatever might have been the

special motives and circumstances that induced them to give this peculiar expression to their architectural efforts, they exhibited in other respects evidences of a culture which, though it might be inferior in range and quality to that of the Christian time, was nevertheless, so far as it went, of even higher quality than that exhibited in association with the vastly superior architecture of the brochs. And while on all these lines of investigation they had traced the manifestations of these early forms of culture and civilisation up to points at which they touched the culture and civilisation of the Roman Empire, it was to be observed that they did no more than touch it—they were not merged in it. In all their distinctive features they were still Celtic in character, and Celtic exclusively. There was nothing Roman in the art that decorated those forms; there was nothing Roman in the architectural character of the structures in which they were found. The forms, the art, and the architecture were those of Scotland's Iron Age—the Pagan period of the Celtic people.

DWELLINGS FOR THE POOR.

LAST week we gave a few facts and figures touching the difficulty and cost of securing sites for dwellings of the artisan and labouring classes. We now briefly refer to some other statistics which have been collected and tabulated by the Dwellings Committee of the Charity Organisation Society, and which bear upon the momentous problem of housing the poor in populous neighbourhoods. The evidence furnished in the committee's report on this subject clearly establishes the faulty procedure under the Act. It has been well called a "slow and cumbrous method," consuming much time in formalities prescribed by the statute. The Lisson-grove case we referred to last week, points forcibly to the want of a more expeditious method of dealing with property of the worst possible class. The machinery in force for awarding compensation is undoubtedly very defective. After the arbitrator inquires into the claims and makes a provisional award, the claimants object, the objections are heard, and a final award is made by the arbitrator. When the amount exceeds £500 any party may appeal to a jury. The committee justly finds fault with this cause of delay, and thinks the provisional award superfluous, causing useless delay and expense. Mr. Viger's evidence is to the point; why should there be three tribunals when one will do? The appeals are sometimes numerous, and the umpire is obliged to sit several days, counsel represent witnesses, and, after this expense, an appeal to a jury may have to be made.

Then with regard to the basis of compensation, surely the condition and sanitary defects of buildings taken under the Act ought to be taken into account in determining the amount. By the Amending Act of 1879, an arbitrator, if satisfied that certain houses were a nuisance at some date between the official representation and the confirming Act, can deduct the expense of abating the nuisance from the estimated value of houses. No one can complain of the fairness of this mode of assessing compensation; yet it was not recognised in time. The report goes further, and it proposes that when property is allowed to fall into an unhealthy condition and requires reconstruction, the local authority should have power to demolish, and to compensate only for the value of the land and the materials. The evidence showed also the large sums that have to be given for low public-houses. Eight and nine years' profits are demanded for short leases.

With regard to the number of persons provided for in new buildings we have several statements. The population of Westminster was estimated at 235 to the acre, the Metropolitan Association providing dwellings for 1,000 persons to the acre. The Metropolitan Association for Improving Dwellings lodge 1,135 people (five persons to one family) on an acre including open spaces, and the Peabody Trustees provide for 941 persons to the acre. Bearing on this point, it may be noted that some of the land sold to the Peabody Trustees was worth 1s. per foot and more. If used for dwellings, it is only worth 3d. One witness said, in the Whitechapel and Limehouse scheme "we could not pay 3d. per foot and get four per

cent. return." Scanning over the table of prices given for land, we find the lowest price per square foot is 8d., the highest being 13s. 4d., the latter price being for a site in Golden-square. It has also been shown that improved dwellings have increased the rateable value. The rent paid by the labouring class earning less than 41 per week is necessarily small, and the amounts average about 2s. 6d. to 3s. a week. It is very clearly pointed out that the cost paid for sites, clearing old houses, and rebuilding is quite disproportionate to rentals of this amount. Miss Octavia Hill's plan of purchasing houses, purifying and fitting them for habitation, has been found successful, paying 4 or 5 per cent.

Referring to the cost of providing dwellings, it is stated by Mr. Catliff that the cost of erection may be taken at £52 a room. At 7½ per cent. this would be 1s. 6d. per room, per week, and including rates and taxes the rent would be 2s. 2d. per week, an amount more than the lowest class could afford. Looking over the table of the cost of providing dwellings, the Peabody trustees have provided accommodation at from £262 to £315 per family. The Corporation of London have spent £305 per family in Farringdon-street, and the Victoria Dwellings Association £171. All these are in central positions. On Miss Octavia Hill's plan the cost has been about £118 to £130, and the rents vary from 2s. to 10s. We refer the reader to a general return from all the societies which provide dwellings in the metropolis, from which it appears that several of the best known companies do not provide tenements at less than 2s. 6d., the rents being generally 4s. to 9s. Many of these dwellings are consequently inhabited by a class of tenants who are above the class intended to be benefited; it is also of some interest to remark from the evidence of those interested in dwellings of this class that they seldom let in localities where small houses enter into competition. For instance, the small houses between Deptford and New Cross, and in some other suburbs, are let before blocks expressly built for the accommodation of the poor. At Walworth and the new Surrey Gardens estate the same may be noticed. The fact is, the labouring man prefers a small house which he can call his own to a set of rooms on a flat, and when such houses are to be got in the suburbs the temptation is even stronger.

PRACTICAL NOTES ON PLUMBING.— XIX.*

By P. J. DAVIES, H.M.A.S.P., &c.

INSIDE WORK, OR SANITARY PLUMBING.

WE now come to the bath-room, Fig. 120, 55, which has the handles of the cocks fixed over the top part of the foot, as at 42 and 44, 43 being a pull-up quick waste. This waste discharges into the coffee-pot trap 56; also shown at Fig. 95.

It discharges into the 1½ in. B.W. (bath waste) pipe, with not less than 10ft. of vertical pipe, to cause a draught, and from this into the waste-pipe W, and to the gully-trap Fig. 122. All the fittings in the above diagram will be referred to hereafter separately.

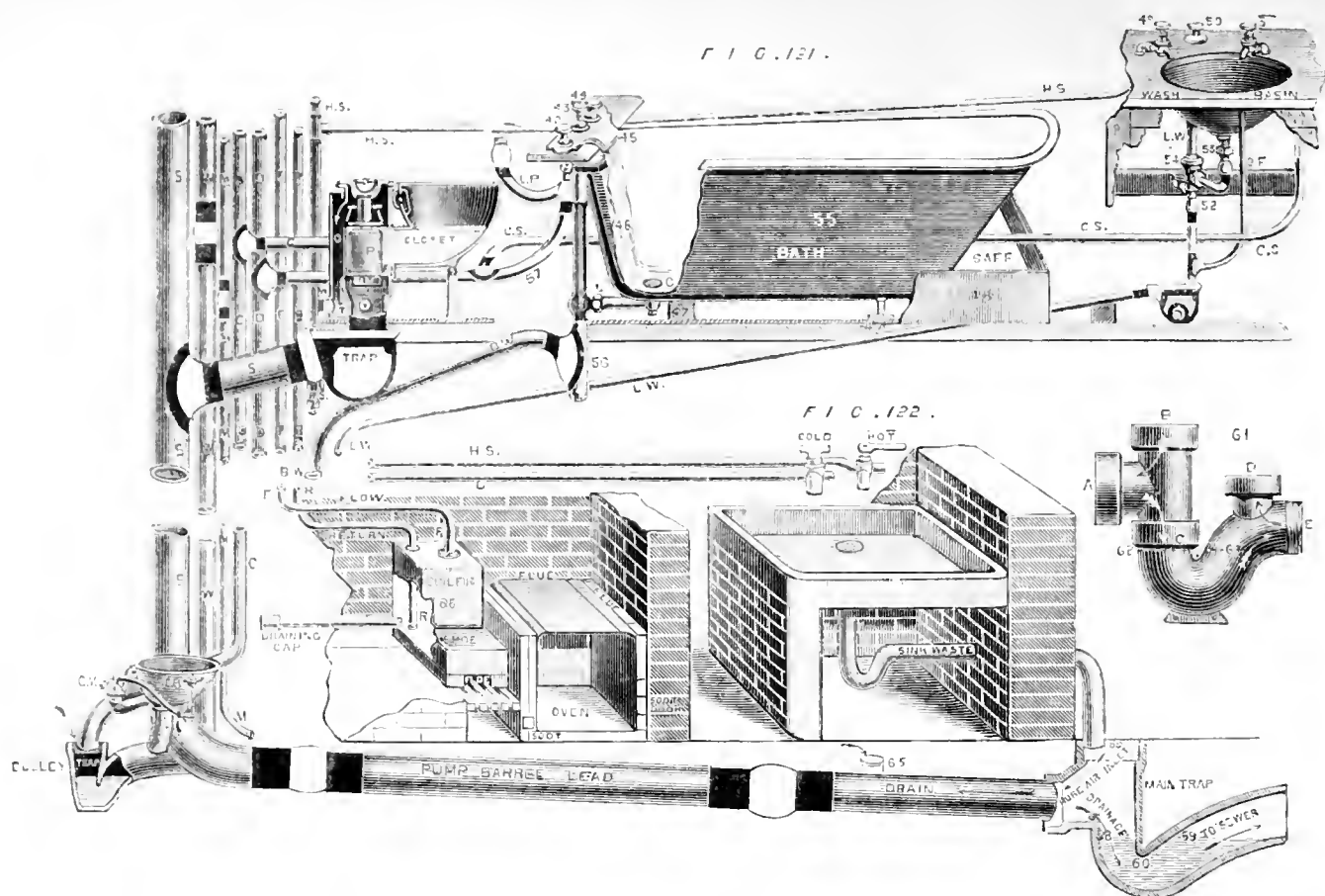
The bath stands upon two pieces of quartering 47, 47, and these pieces of quartering are laid upon the lead safe 48. The hot and cold-water pipe connections are made with 1 in. stout lead pipe 57 and 58, and with welded joints on the linings.

At the head of the bath is fixed a washing-basin, having hot and cold water-pipes C S and H S, with taps 49 and 51 fixed over the top.

50 and 51 is a quick waste, screwed to a board below the basin, and the board fixed to the wall, &c. This quick waste should have at least a 1½ in. clear water way, and run into some kind of trap that will not momentum out, should the handle of the waste be suddenly raised and then let fall, to let out the water to a proper washing level or height.

Here great caution is necessary, for the reason that should the trap momentum out and the water-seal be broken, the gas can freely pass up and through the overflow-pipe, O F, thence through the overflow-holes in the basin. Here suppose a person to be washing his or her face, and the consequent results.

* All rights reserved.



If you trace the run of the H.S. pipe you will notice that it is taken off the bath supply, from off the top of the hot-water tank at 23. Should you require these pipes to be always hot and the same temperature as the water in the circulating (hot-water) tank, you must take the H.S. pipe back again to another part of the tank; but it must be remembered that a difference in the levels must be made in order to get a flow and return; at the same time you must be very careful not to have any of the pipes trapped.

At the foot of the bath is fixed one of Jennings' trapless closets, but over a \odot -trap. This closet is supplied from the closet-cistern (see Fig. 120). The whole of the pipes are so arranged that not one of the pipes hides another, but may be seen or got at for repairs or otherwise at any moment.

The overflow from the bath should discharge over a head outside, as also the closet safe overflow; or if it must, as will sometimes happen, be taken down the inside of the house, let them be taken to a sink or other place where a constant supply of water can be depended upon, should there be any kind of trap employed. If the washing-basin is left unused for a season or a length of time; for instance, during the absence of the family, &c., it would be best for perfect safety to use a ball-trap like Fig. 103, but not like Fig. 102, because, as will be easily seen, one will cease to act when there is not water, while the other acts best without water.

There should at all times be a closet on each floor, and as near the staircase as possible, so that it is within an easy distance of all the rooms, especially the bedrooms. On the dining-room floor there should be a closet, urinal, and washing-basin, and the same near a billiard-room; and, if possible, in all cases keep the urinal distinct from the closet. Most of the water companies in and about London enforce the use of "water-waste preventers" to both closets and urinals, and where this regulation is enforced they invariably insist upon the use of ball-valves instead of ball-cocks.

SERVANTS' CLOSETS.

Though my articles are supposed, and *de facto* are intended to instruct plumbers as to the best method of fixing any kind of work that may fall in their way, I must beg to be excused if occasionally I depart from the absolutely practical path, and endeavour to show, from

moral reasons, why this, that, or the other is necessary and requisite. The question of servants' closets is more important than *prima facie* it may appear—viz., There are many servants who, whether male or female, are particularly delicate in visiting a closet if seen by the opposite sex. This is by many persons of a more obtuse temperament, considered "false delicacy," and, possibly in this respect they may be right to some extent, as of course, the requirements of nature are common to us all; nevertheless, that this delicacy does exist is beyond any argument, and as the want of closet convenience is mainly the cause of the discrepancies in the action of the liver and consequent indigestion, biliousness, congestion, &c., I have thought it politic to preface my instructions on this most important point with the reasons why they should be strictly attended to.

In large houses, where servants of both sexes are employed, it is usual to fix the closets for males and females in the basement, and where practicable, the better method is to place the closets for one set in the front, and the other set at the rear of the house. The advantage in this arrangement does not consist only in the sanitary advantage already alluded to; but it also tends to prevention of unseemly familiarity amongst servants that would otherwise exist. I am, of course, conscious that it will sometimes happen that on account of the construction of a house, it is not possible to follow my instructions by placing male closets at one side of the house, and the female on the other side, but at any rate they should be so arranged that they are not both within the same range of sight.

The above diagram illustrates the plumbing work in the basement of a house, showing the soil-pipe S, brought down with a bend at the bottom, and in this case continued under the house with 6in. pump-barrel, instead of drain-pipes, and carried on to the interceptor or main-trap. This trap effectually cuts off all sewer-gas from the house, which will be evident to anyone if they will notice the water within the well or cess-pool part of the trap as shown at 58 and 59. It will readily be seen that if any sewer-gas does pass from the sewer it must come through the water, as it cannot get through the diaphragm (60). Not a little advantage attached to this trap is that it prevents, to a great extent,

rats making way up the drains into the house (122).

When selecting these traps it will be found best to choose like Figs. 93 and 94, having a drop from the inlet (61) to the water-line (58)—that is, when the drain and pipes run in a right line, as here shown. Mr. Buchan makes a very good trap, as also Mr. Stiff (Weaver's), and Messrs. Doulton (the Croydon) for straight run of drains; but supposing the drains do not run in a right line, or that you cannot get any of the above makers' traps, you can easily overcome the difficulty by the use of an ordinary trap and a square junction, as shown at 61. This has exactly the same effect, and in many cases answers better. Mr. Jennings being conscious of this, is making the trap and a short square junction (J 61, Fig. 122), which may be turned to suit any line of drainage. The dotted lines 62 and 63 show the water-line D, the sewer ventilating socket B, the socket to receive the round grid. A is the inlet to the trap.

VENTILATION.

Now that we are at work with the main-trap it will be as well to prepare for the ventilation of the drains, soil-pipes, &c. This is a point that should never be overlooked, for however good the inside work may be, if the pipes are filled with bottled-up gases of a foul and poisonous nature the whole system is bad and unsafe, to say nothing of the rapid destruction of the leaden-pipes, &c., which otherwise will last ages. (See my letter on "Sanitary Plumbing," July 8, 1881, page 57 of this journal.)

I must now refer you to the pump-barrel drain and main trap (Fig. 122). The simplest, and, in my opinion, the best method of ventilating is the old plan, that can be seen in hundreds of our old buildings. The main drain has an interceptor trap—that shown in Fig. 122 answering the purpose. Next we find the tops of the soil-pipes are made to answer a double purpose, for taking away the rain-water and for ventilation. At the bottom, near about the stump (65), and often at the trap, is fixed a short length of rain-water pipe, and taken into the drain, though not unfrequently is that to be found an open grating, fixed directly over the top of the drain.

Now let us examine the much-talked of new system of ventilation, known as "foot ventilation," &c. On again looking at the main trap

you will notice "pure-air inlet." The arrows show that the air is passing down through the socket, and away along the drain, up the soil-pipe, and out at the top, which should be the highest of a building, as at 27, Fig. 120. This is a true and most simple method of ventilation, totally unfettered by patent law, and with nothing to prevent its being used in the humblest dwellings.

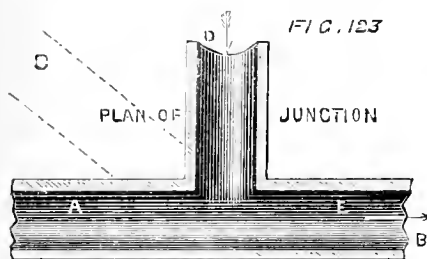
The only thing necessary is to fix the lead pipes with a continual rise, without a lot of bends, more especially sharp ones, as they are great enemies to ventilation. Continue the 4in. soil-pipe the same size to the highest part of the building, taking especial care that no branches enter this pipe unless they are properly trapped.

If you examine the waste-pipe (W) you will observe that it discharges over the mouth of a gully-trap, which enters the main drain. Here again is foot-ventilation, the inlet of fresh air being indicated by the arrow passing onward through this pipe, and discharging itself at 25, Fig. 120.

SERVANTS' W.C.'S.

The servants' w.c. also enters the main drain, but at an easy angle, so that none of the soil from this w.c. can wash back or up the main drain (this applies to all branches). Never let a branch enter the top of a drain-pipe, but near the bottom—in fact the best plan is to let this be down in a bed line.

A, Fig. 123, illustrates the manner in which the sewage runs back up the drain when a junction is put in square with the main. The junc-



tion should be as easy as possible, as shown by the dotted lines.

SCULLERY SINKS.

Scullery sinks in large houses should be provided with proper fat-traps, that is, a large tank to hold sufficient cold water to chill and set the fat, and thus prevent it running off into the drain, because if the fat is allowed to enter the drain, it will clog up the pipes. I shall describe a fat trap in detail further on. In Fig. 122, the sink is made to discharge directly into the main trap, which is a very good plan, provided that the fat is not thrown down in a liquid state.

TRAMWAY CONSTRUCTION.

IN nearly every line of tramway in the metropolis it will be found that a more substantial and permanent system has superseded the earlier construction, and this renewal has been partly due to the cost of maintenance of defective tramways and the consideration that sooner or later horses would have to give place to steam or other modes of traction requiring greater substance in the rails. Mr. D. Kinnear Clark, in his recent volume on "Tramways," noticed briefly by us last week, sketches the progress that has been made in this branch of construction. There were two reasons why the change in laying tramways was made: the old rails were deficient in stiffness, they required a more continuous support to prevent deflection; the timber bearings of the same width as the rails were found to be constantly yielding to the weight of the cars, and it was found impossible to preserve the bond between the rails and the road-paving. It is interesting to glance at the numerous patents which have been brought out to obviate both these defects, and which have been illustrated and described by Mr. Clark. We may first mention Kincaid's system as improved. It provides a wide concrete footing and chairs or sleepers with a long base. The concrete extends under the whole width of way, and upon these are placed long-footed chairs which carry the rails. In the Salford tramways Mr.

Jacob, the thorough surveyor, has introduced a new method of fastening the rail to the sleepers, in which a pair of soft iron cotters were substituted for the wood blocks and the spikes. A continuous bed of concrete is also laid under each rail along the whole line 6in. deep, in which the flanges or bases of the chairs are bedded; a good support is thus provided for the paving next the rails, the sets being supported on a layer of cinders on the concrete. The rails are of iron faced with steel, and the surveyor estimates a life of 19 or 20 years for the rails, allowing $\frac{1}{16}$ in. of wear upon them. The rails are of the box pattern, $3\frac{1}{2}$ in. wide and $2\frac{1}{2}$ in. deep, and weigh 52lb. per yard. The chairs are placed at intervals of 3ft. centres and the details are furnished in Mr. Clark's treatise, to which we refer for further information. At Stockton-on-Tees the Kincaid system is being laid by Messrs. Grover and Newton, with slight modifications. The Southampton street-tramways (Wilson's system) also obviate the disadvantages of the old method of laying. Mr. E. Wilson, the engineer, has adopted the central-web rail with cast-iron chairs, laid on concrete. These resemble in cross-section Barker's sleepers. The rails are of Bessemer steel and weigh 55lb. to the yard. The head of rail is $1\frac{1}{2}$ in. wide, with $1\frac{1}{2}$ in. groove at surface, the guard flange is $\frac{1}{2}$ in. wide at the surface, making a width of $3\frac{1}{2}$ in. The flange is tapered a trifle at the lower edge. The joint chairs have a length of seating of 11in. and 5in. in the others; they are placed at 3ft. intervals and are fastened to the rails by 2 steel middle cotters, and by 4 cotters at the joints. The soles of the chairs are let flush into the concrete, and are bedded in a layer of cement. The concrete is composed of 5 parts of clean sharp gravel, or of broken stones (1in. gauge) 2 parts of clean sharp sand and 1 part of Portland cement. The space between the rails is closely filled with fine Portland cement concrete 4 to 1. The advantage of this system is that the chairs are bedded so that their soles are below the sets.

The Aldred-Spielmann system is being employed in the renewal of the London tramways. The rail (reversible) is composite, of steel, and consists of two halves of the same section rebated with inclined surfaces to fit together, each with a groove rolled in it. The two halves of each rail are laid in cast-iron chairs breaking joint and are fixed by a wooden key. The following are the details given: "The bearing rail takes a square bearing on the raised seat at the bottom of the opening of the chair, and by its inclined surface of contact it holds the guard rail in place. Each half-rail is 2ft. in length, weighs 32lb. per yard. The head of the rail is $1\frac{1}{2}$ in. wide, the groove is 1in. wide and 1in. deep, the whole width $3\frac{1}{2}$ in." The chairs are cast hollow, and give a bearing of 4in. for the rails; they are placed 3ft. apart between centres, and are screwed down on transverse timber sleepers $4\frac{1}{2}$ in. deep, 9in. wide, and 6ft. 6in. long. The systems known as Truswell's and Vignole's have also a large use: the latter has been employed for the North London Suburban tramways, Tottenham; and the North Staffordshire lines, Stoke-upon-Trent. The rails of steel have a central web, and the chairs are placed 2ft. 6in. apart between centres. At Liverpool Mr. Deacon's system has been adopted with modifications by Mr. Clement Duncombe, the city engineer. The use of continuous sleepers of cast-iron was considered assential to a good tramway. The T rail or the centre, groove rail, has been used, and the tramways are laid on concrete. Engravings of the Duncombe modification will be found in Mr. Clark's book, from which it is evident that there are several advantages secured, though the sleepers present vertical faces, and do not give support to the sets as in the forms we have referred to above. One advantage of the system is that the rail can be removed or tightened without disturbing the paving—a feature of some value if only on the score of economy.

FISH-MARKETS FOR THE METROPOLIS.

THE Metropolitan Board of Works last Friday again discussed the question of the Fish Supply to the Metropolis. A motion to apply to Parliament for power to acquire the site now occupied by the works of the Gas Light and Coke Company, near King's-cross, having been rejected by twenty-four to eleven, Mr.

Richardson proposed a resolution which was simply directed to the abolition of the monopoly possessed by the City Corporation. This was also rejected by nineteen to eleven, and the Board adjourned without coming to any decision in the matter.

The City Court of Common Council has received and has accepted the report of the Fish Supply Committee, recommending a definite scheme, and only waits now for the needful Parliamentary sanction before proceeding to carry it out. The scheme is not what the previous week's meeting of the Common Council pointed to. The idea of one fish-market at Billingsgate, or at any other site, has been given up. The view now taken by the City authorities is that there are to be two markets—one for water-borne fish, the other for railway-borne fish. For water-borne fish Billingsgate is still to serve, and it is to be enlarged and improved, if possible, so as to get rid of the present obstructions it offers to free traffic. The more important part of the resolutions passed on Thursday week relates to the new inland market by which Billingsgate is to be supplemented. This is to be established in the central position occupied by the new fruit and vegetable market which the Corporation have been erecting near Smithfield. The difficulty is that the ground and the buildings have other uses assigned to them, and that the transfer of them from fruit and vegetables to fish can be made only if Parliament will consent so far to vary the original plan.

CHIPS.

The districts of Sirhowry and Duketown have just been supplied with water from the Ebbw Vale Water Company's mains. The contract, which has involved the laying of 7,500 yards of new water mains, and of 18,000ft. of lead piping, has been carried out by Mr. J. Gould, of Newport, Mon., and was completed during the present week. The same contractor is now engaged in extending the water mains of the Merthyr local board of health to the village of Vorehriw.

The top memorial-stones of a new Wesleyan chapel were laid on Thursday week, in Queen's-road, South Lambeth.

The Crane coffee-tavern, at Cranbrook, was opened on Thursday week. Mr. Cramp was the builder.

Several of the directors, engineers and other officials of the South-Western of France Railway, and members of Dieppe municipality, visited New-haven last week, to inspect the harbour extension works now in course of execution. Of these works Mr. Banister is the engineer-in-chief, and Mr. Carey the resident engineer.

Memorial-stones of a Baptist tabernacle were laid at St. Alban's on Wednesday week. The building will be of mixed styles—Norman and Gothic—and will measure 79ft. by 40ft. It will be seated for 500 persons on ground-floor, provision being made for the future addition of galleries. Mr. F. Parkins, of St. Alban's, is the architect, and Messrs J. and W. Savage, of the same city, are the contractors. The cost of building and fittings will be about £2,500.

A stained-glass window has been placed in St. Paul's Church, Charlestown, Cornwall. The subject is a figure of Hope; and the work was carried out by Messrs. Heaton, Butler, and Bayne, of London.

An organ, built by Messrs. Henry Jones and Son, of South Kensington, under the superintendence of Mr. J. Norton, of Old Broad-street, architect, is to be opened in Christ Church, North Finchley, on Thursday week.

The committee who have in hand the raising of a memorial to the poet Tannahill, have this week decided to invite sculptors to finish in competition sketch models for a statue and pedestal, the materials in the completed work to be bronze and granite respectively. The memorial will be erected in the Abbey grounds, Paisley.

West Newton Church, near Sandringham, was reopened on Sunday, after having been restored at the expense of the Prince of Wales.

Canonbury Tower is said to be in danger of demolition, in consequence of a rebuilding scheme about to be carried out by the lord of the manor, the Marquis of Northampton. A movement has been organised for utilising the building as a local museum.

At Derby and at Peterborough, two well-known builders and contractors, Mr. Abraham Woodiwise and Mr. John Thompson, have been re-elected to the office of mayor.

CONTENTS.

Mr. Street on Bad Building	615
Building at the West End	615
The Building Trades in America	616
Stonehenge: III.	617
Ludgate Hall, Past and Present	617
Royal Institute of British Architects	618
Rhind Lectures in Archaeology	622
Dwellings for the Poor	623
Practical Notes on Plumbing: XIX.	623
Tramway Construction	625
Fish-Markets for the Metropolis	625
Clips	625
Our Lithographic Illustrations	626
Archaeological	626
Competitions	626
Builders' Benevolent Institution	630
Sanitary Institute of Great Britain	630
Building Intelligence	630
Architectural and Archaeological Societies	631
To Correspondents	631
Correspondence	631
Intercommunication	632
Local Intelligence	633
Statues, Memorials, &c.	633
Stained Glass	633
Our Office Table	633
Meetings for the Ensuing Week	634
Tenders	634

ILLUSTRATIONS.

INNER TEMPLE LIBRARY.—THE SHAKESPEARE DINING-ROOM SET.—SOUTH WEST VIEW OF WANDALE, CUMBERLAND.—SELECTED DESIGN FOR THE NEW FREE LIBRARY AND MUSEUM, OLDHAM.

OUR LITHOGRAPHIC ILLUSTRATIONS.

THE INNER TEMPLE LIBRARY.

We give illustrations to-day of the additions that have been made to the Inner Temple Library in King's Bench Walk, from the designs by Mr. Robert W. Edis, F.S.A. The design was exhibited at the last Exhibition of the Royal Academy, and our double-page perspective shows the principal front facing King's Bench Walk. The general arrangement of the new building, which forms an important addition to the previous library, a structure in modernised Gothic of a rather feeble type, may be seen by the plans of ground-floor and library-floor we give. The old library and the corner tower are united by a lobby, so that the three libraries can be brought into communication, though it will be noticed the new front is not exactly in the same line as the old building. This difficulty the architect has met in a satisfactory manner by an octagon stair-turret at this point, which forms a pleasing break in elevation, and answers the purpose of the librarian and others. On the ground-floor the porch seen in our elevation opens into a lobby entrance, which will be paved with mosaic tiles, to the right hand of which is a lecture-room for 60 students, with platform at one end. This room has a panelled plaster ceiling, and is to have a dado of oak panelling. The floor is slightly dropped at one end. From Tanfield-court there is a separate approach to set of new chambers by a second octagon stair turret, which forms a projection on this front, giving access to the top floor above the library, which provide for an additional two sets of chambers, with conveniences. Ascending a concrete turret stair, or the main stairs in the corner tower, the visitor enters the new library, which forms two spacious apartments, each about 37ft. 9in. by 22ft. 6in., baying bay windows towards the main front, and lighted also from Tanfield-court. The chief architectural features are the panelled ribbed ceiling and the bookcases. The former is of plaster, relieved by oak ribs, dividing it into large and subordinate panels. A richly-moulded oaken cornice, uniting with the ribs, surrounds the rooms, and this is enriched by some fine carving and a bottom battlemented member, while the main ribs have carved roses at the intersections. The bookcases, which are executed in oak, are in keeping with the style, and a gallery surrounds the rooms, approached by stairs, which are ingeniously contrived between the bookcase and centre wall. The lofty oriel windows have grained ceilings, and the lights are intended ultimately to be filled with armorial bearings in coloured glass. The spandrels have been richly carved, and the plain

sides are relieved by panelled tracery. The stonework of these bays is internally of Beer stone. The archway between the libraries is also of stone, panelled, and double iron doors, working in grooves or cavities, are provided to insure safety from fire. We may also notice here that with the same object the main floors are constructed on the Dennett system; the iron girders being also entirely embedded in the concrete. In the recesses of the windows gill coils are placed, with openings for fresh air in the outer walls. To assist in the ventilation, openings are introduced near the ceilings of lecture-room and libraries leading into ventilating shafts, which are carried up the building and terminate under the turret, which we illustrate, where a gas-cone is placed to create an upward draught. The stoves and mantels have been executed from the architect's own designs, and the carving, both of the stone and woodwork, has been ably done by Mr. J. Frampton, carver, of Barry-road, Dulwich. The exterior is faced with Farnham red bricks of a particular proportion, five courses going to the foot, and the dressings are of Portland stone. It will be seen the style of architecture is that associated with buildings of this class, and the architect has grouped the features in harmony with the semi-Classic surroundings of this locality. The building has been well carried out by Messrs. Holland and Hannen, the contractors, under the supervision of the architect; Mr. Wheeler is the foreman, and Mr. Colin E. Wilson has acted as architect's clerk of works. We hope shortly to supplement the present illustrations by large scale details of the bay windows to the library.

"THE SHAKESPEARE DINING-ROOM SET."

The interior view which we publish to-day illustrates a dining-room, arranged by Mr. Maurice B. Adams, and drawn to show the "Shakespeare Dining-room Suite," which has recently been made by Mr. Wm. Watt, of Grafton-street, from carefully measured details, prepared by Mr. E. W. Godwin, F.S.A. These particulars were chiefly taken from the original furniture, which is said to be either in the possession of Shakespeare's family at the present time, or known to have belonged to him. The whole of the work is in oak, finished with a beeswax polish, and the set consists of eight small chairs, one stool, two armchairs, a side-board and a table. The top of this latter piece of furniture is made in planks, held together by a grooved ledge at either end. We believe that the set may be seen at Mr. Watt's show-rooms.

WANDALE, CUMBERLAND.

WANDALE, the residence of Mr. C. Ling, is situate about five miles from Carlisle, overlooking some of the prettiest country of the Eden Valley. The house is built of warm cream-coloured facing stone from Lazonby with Prudham dressings; the walls are hollow, and are lined on the inside with brick. The joiners' work to the entertaining rooms, hall, and staircase on the ground-floor is executed in Dantzic oak; and the rooms on the chamber-floor are pitch-pine throughout. In the dining and drawing-rooms the walnut and oak mantels and over-mantels are noticeable features. They were made by the contractors for the carpenter and joiners' work, from the designs of the architects, in a first-class manner. The roofs are covered with tiles. The upper portions of windows are filled with painted glass by Messrs. Gibbs and Howard. The pavement, of German tiles, was laid by Mr. L. Oppenheimer, of Manchester; and the granite concrete floors by Mr. Brash, of Lancaster. Messrs. Beatty Bros. were contractors for masonry, etc. Messrs. W. and H. Davidson for the carpenter and joiners' work, Mr. Ormerod executed the plastering, Messrs. Hill the painting and glazing, and Mrs. Johnson, the plumbers' work. A lodge and stabling have also been erected. Mr. Allan was clerk of the works. Messrs. Hetherington and Oliver, of Carlisle, were the architects, under whose superintendence the works have been carried out.

OLDHAM FREE LIBRARY AND MUSEUM.

A DESCRIPTION of this design will be found on p. 573 ante. The author is Mr. Thomas Mitchell, F.R.I.B.A., of Oldham and Manchester, who won the first premium of £100 in the recent competition.

ARCHÆOLOGICAL.

OWAIN GLYNDWR'S PARLIAMENT HOUSE.—After enduring the storms of several centuries, the venerable building at Dolgelly known as Owain Glyndwr's Parliament House, one of the few relics of bygone ages and a monument of the time when the Welsh nation made a final stand for liberty and self-government, is this week to be razed to the ground. Tradition asserts that the building was erected about 1385 as a gentleman's house; in 1405 Owain Glyndwr assembled the last Welsh Parliament, and from this place was dated the celebrated treaty with Charles VII. of France, which, as given in Rymer's "Fodera," runs, "Datapud Dolguelli decem die Mensis Maii, MCCCC, quarto, et principatus nostri quarto." Subsequently it was the residence of Baron Owen, who was murdered by the Welsh banditti of Dinas Mawddwy. It remained in the hands of his descendants until a few years back, and as there were threats of its demolition for the conversion of the site into shops, a movement for its acquisition as a public museum was set on foot by Mr. Holland, M.P., and Mr. Beale, the high sheriff of Merionethshire. Mr. Plipson, architect, Birmingham, prepared plans for the remodelling of the building, but owing to the want of funds the scheme fell through. The curious carved work is to be reproduced in the new building, which will be an ironmonger's shop.

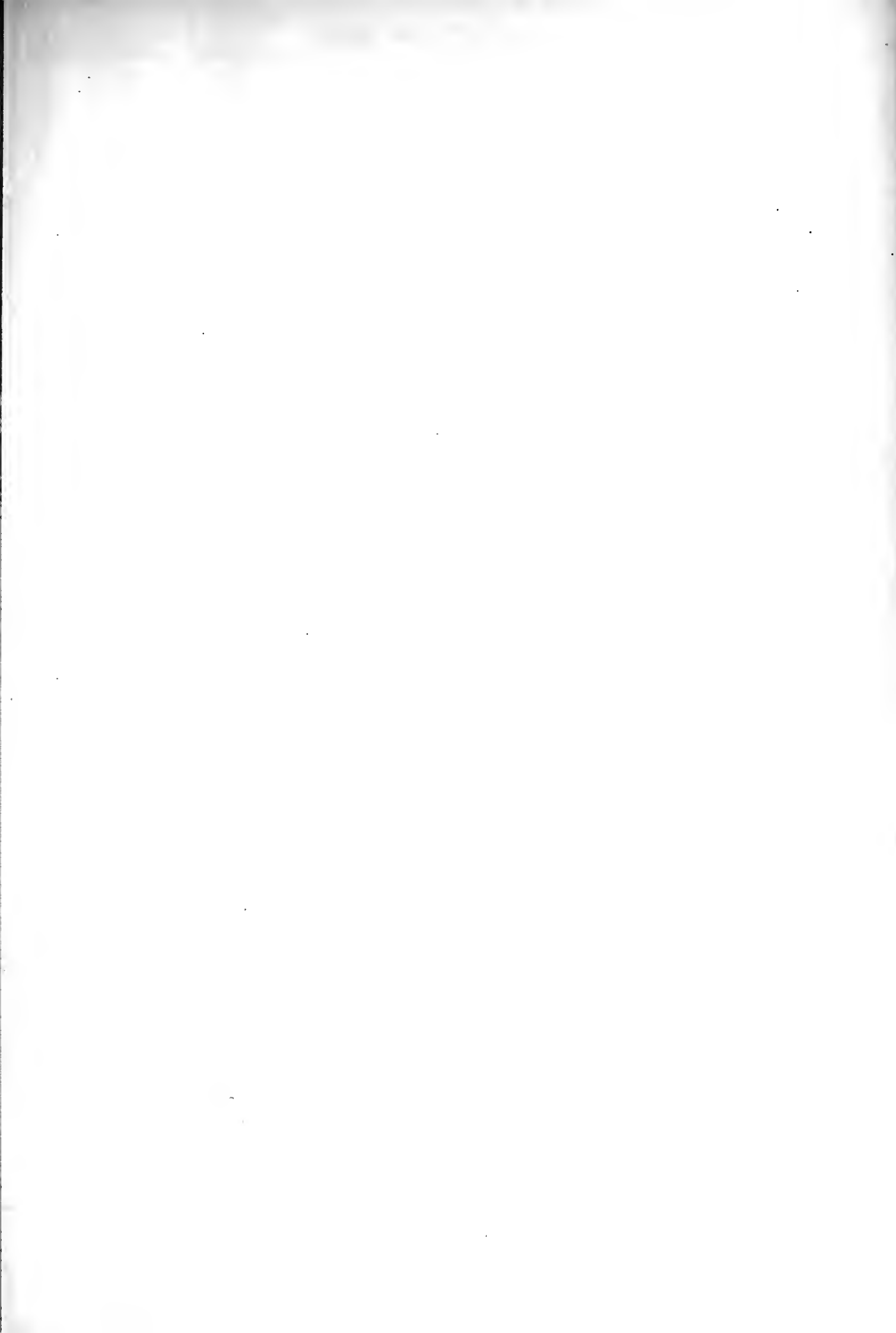
A ROMAN VILLA AT WINGHAM.—The work of exploring the foundations of a Roman villa discovered by Mr. George Dowker, of Stourmouth, in a field called "Vineyards," at Wingham, is being actively prosecuted. The masonry first touched upon proved to be a bath, the walls being covered with black and white tesserae; the floor was also paved in a similar manner, but had been destroyed. Leading up from the bath towards the north are three steps, which lead into a room (No. 1), 10ft square, paved with black and white tesserae arranged in a diamond pattern, and inclosed in a border of alternate black and white stripes. Adjoining and northward of this room is another (No. 2), 12ft. square, paved with black and white tesserae, admirably disposed in a labyrinth fret design, bordered as in the previous example. As far as at present ascertained, the foundations do not extend further in this direction, but on the digging being extended to the west of room No. 1 a portion of the hypocaust was uncovered at a depth of 6ft. The passages through which the hot air passed into the various parts of the building by means of flues have been cleared of the *debris* with which they had become filled by the falling in of the floor above them. The excavations are now being carried on to the south of the bath, where foundations have been touched with the probe some 20 or 30 yards distant, and apparently running in several directions.

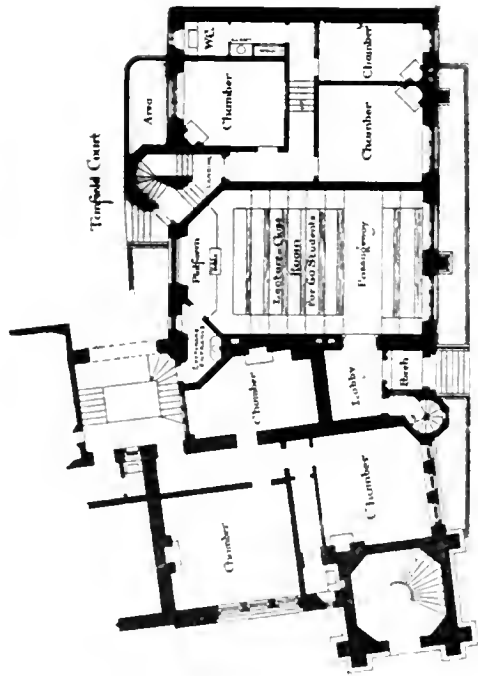
COMPETITIONS.

FULHAM WORKHOUSE INFIRMARY.—The Fulham board of guardians met at their board-room, in Fulham-road, Hammersmith, yesterday (Thursday), to open a report on the thirty designs submitted in this competition by the official assessor, Mr. E. Currey, F.R.I.B.A. The report recommended the premiating three of the designs, viz., "Experience" (in circle), "Simplicity," and "M.D." The consideration of the report was after some discussion adjourned to a special meeting, to be held on Tuesday week, the 22nd inst.

The parish-church of Wilmington, Kent, has just been enlarged by the addition of a new south aisle and heating-chamber, at a cost of about £1,600. The work has been carried out by Messrs. Naylor and Son, of Rochester, from the plans and under the supervision of Mr. W. G. Bartlett, architect, of New Broad-street, E.C.

The Worcestershire Field Club had their autumnal excursion on Monday week, when they visited the churches of Shrawley and Astley, the former a building containing a south door, chancel arch, and other excellent specimens of Late Norman sculpture, the latter also containing some Norman work on south side, but chiefly interesting for the 16th-century altar tombs of the Blount family in the chancel, and the modern tombs in the churchyard of the Rev. W. H. Havergal, and Frances Ridley Havergal, his daughter.



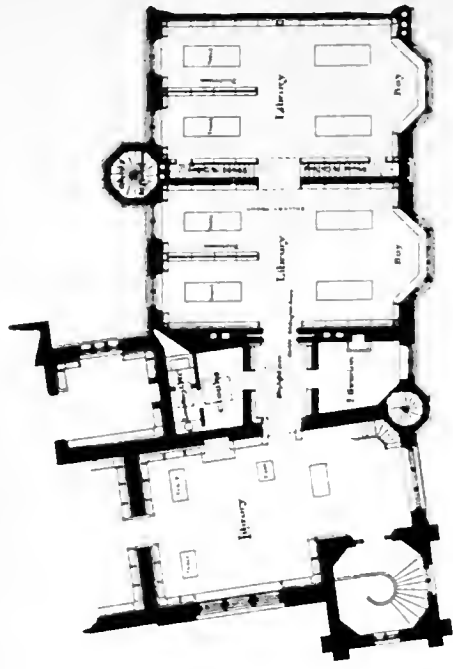


Kings Bench Wall

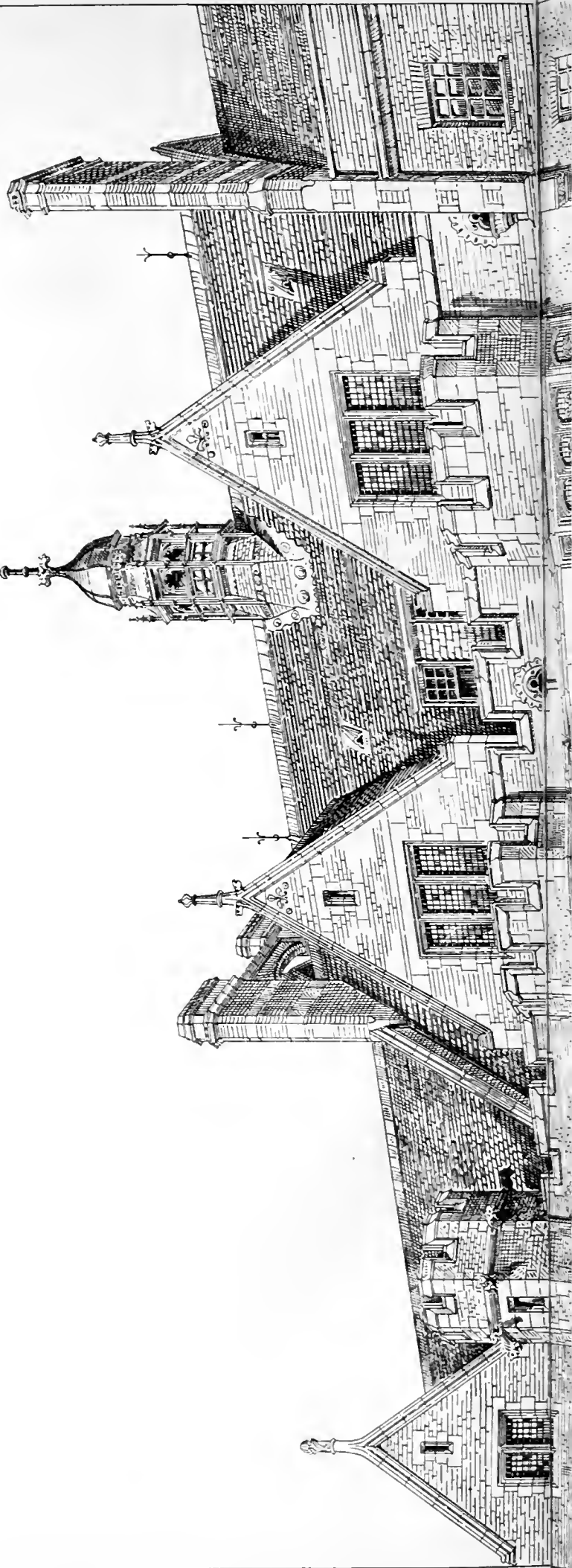
Ground Floor Plan.

Scale of Feet

Twenty Feet



Library Floor.

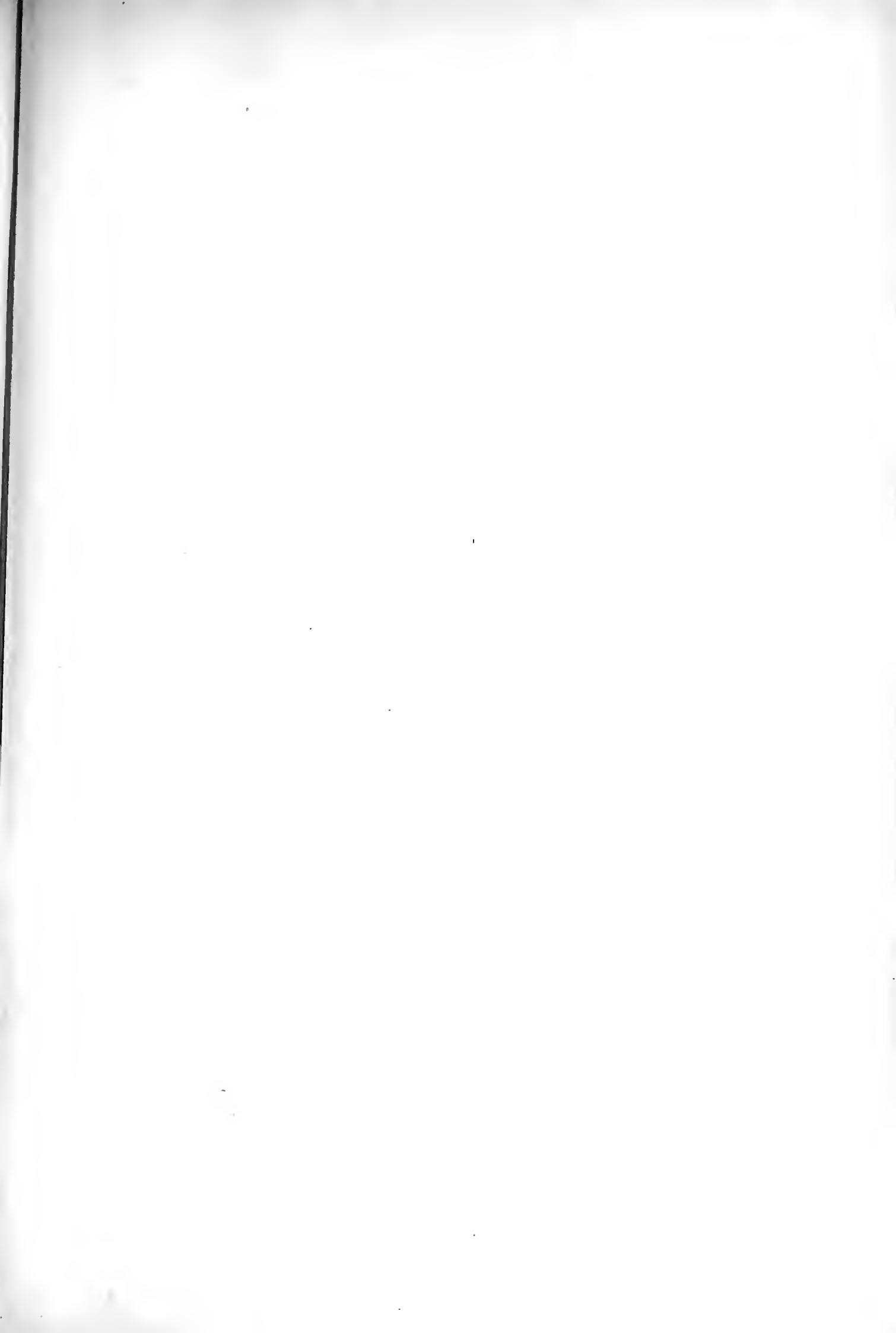


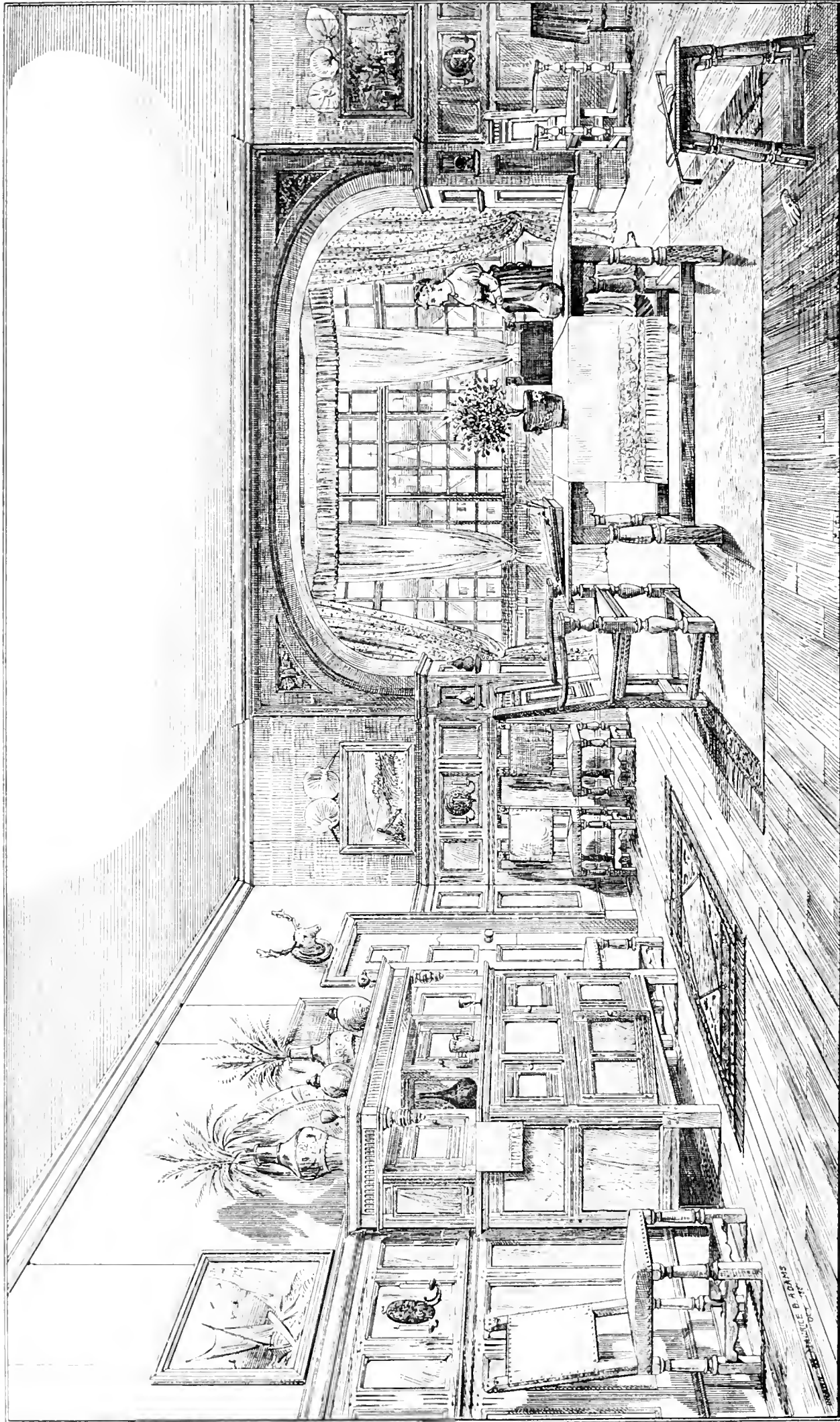


INNER TEMPLE LIBRARY · E.C. · now erecting in King's Bench Walk ·

ROBERT W. EDIS F.S.A. Architect

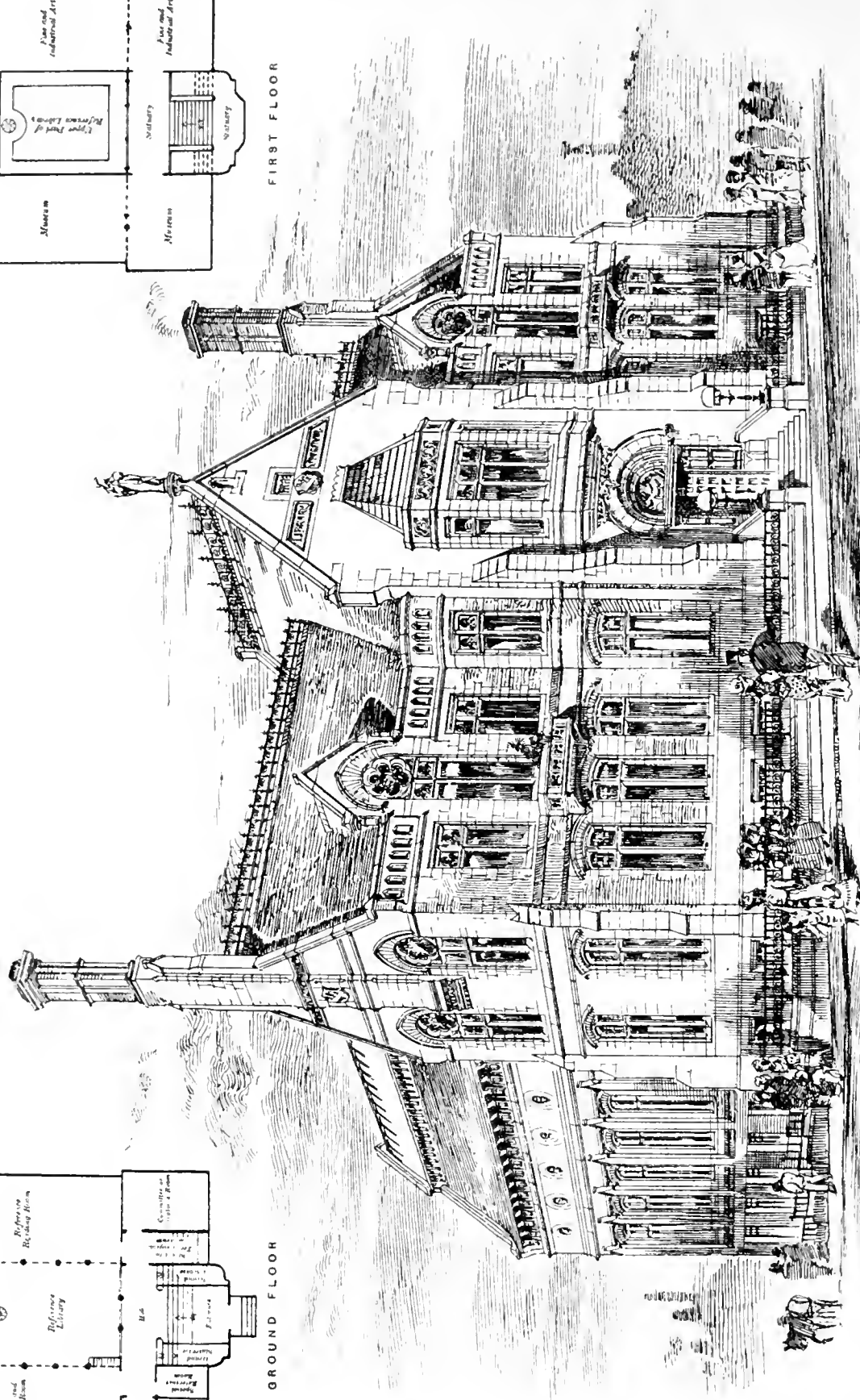
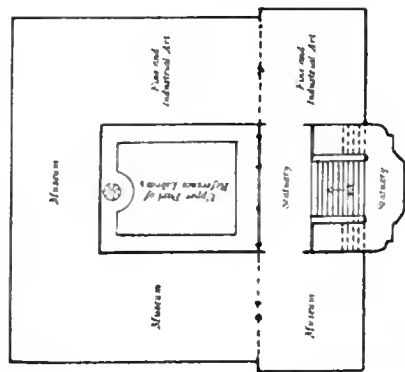
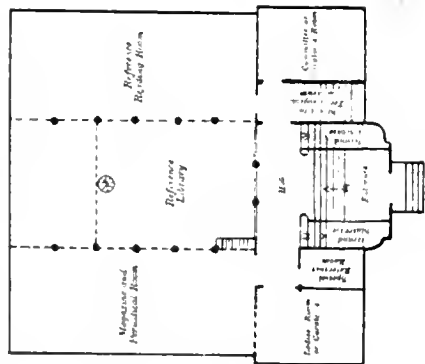
Photo Lithographed & Printed by James Akerman 6 Queen Square W.C.

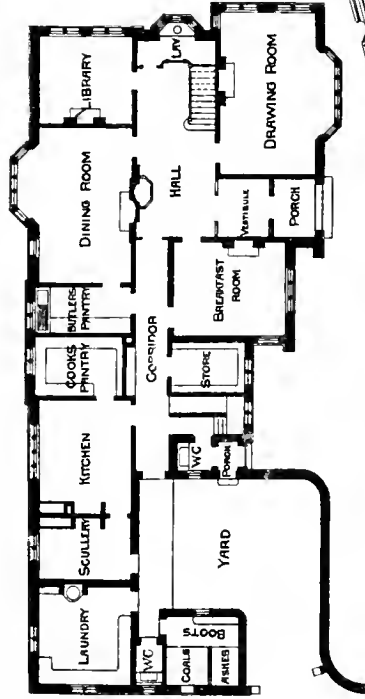




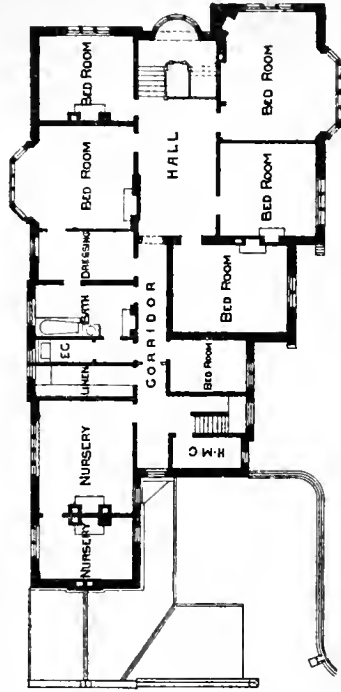
The SHAKSPERE · DINING-ROOM · SET · BY E.W.GODWIN F.S.A

MADE BY WILLIAM WAIT · OCT 81

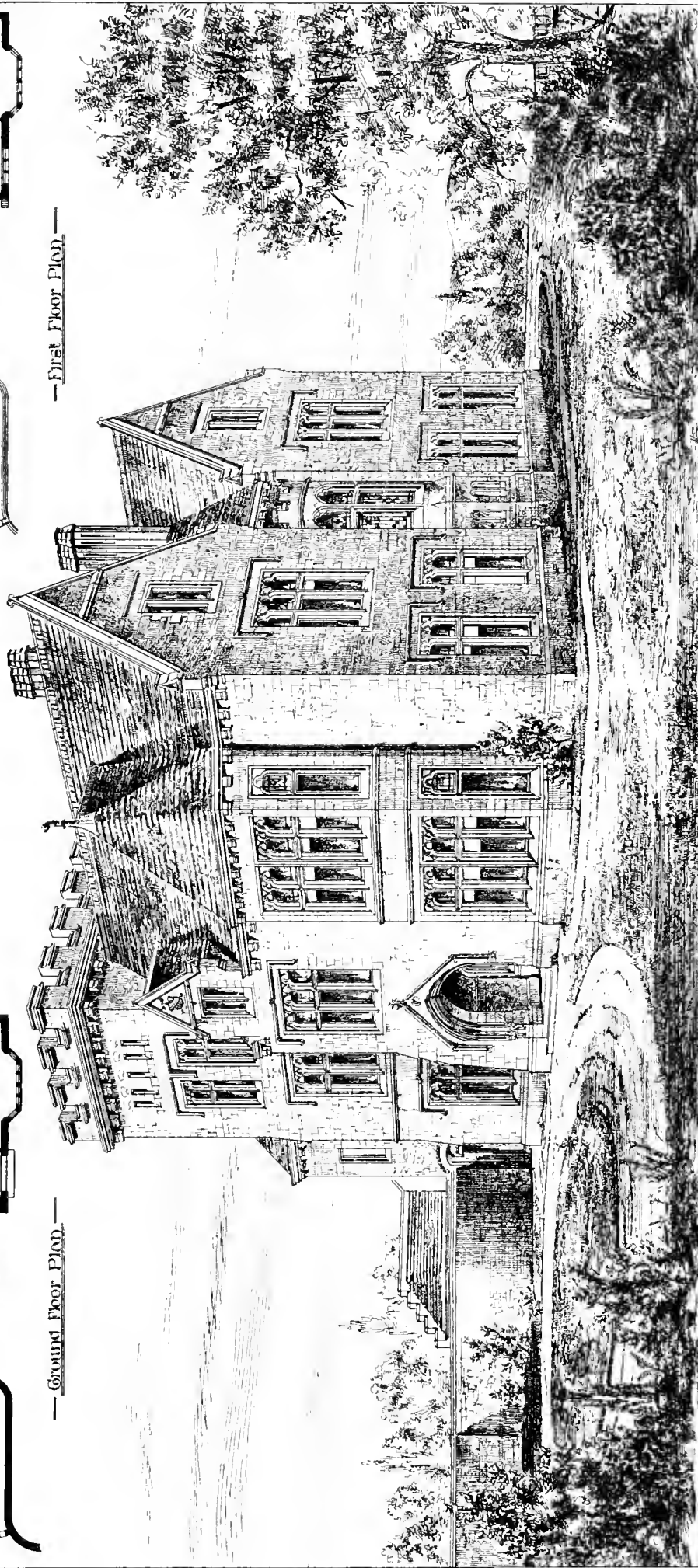




— Ground Floor Plan —



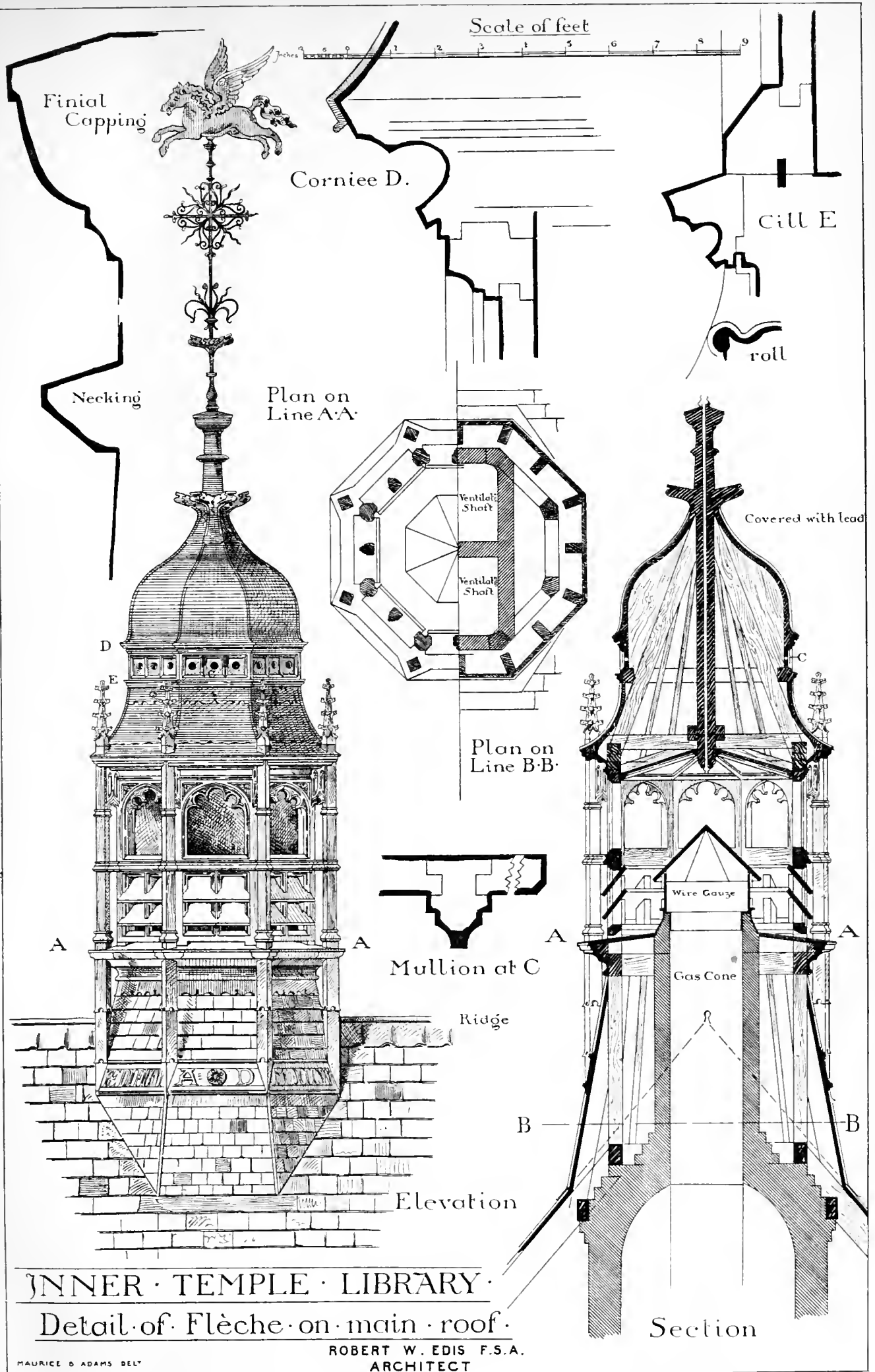
— First Floor Plan —



:South West View of Wandale.Cumberland: *

— Hetherington & Oliver: Arch^{ts}
— Carlisle

Photo Lithographed & Printed by James Alderman, 6, Queen Square, W.C.



INNER · TEMPLE · LIBRARY ·

Detail of Flèche on main roof.

ROBERT W. EDIS F.S.A.
ARCHITECT

MAURICE D. ADAMS DEL.

Photo-Lithographed & Printed by James Akerman, 6, Queen Square, W.C.

THE
the
the
(of
Shen
the
chari
The
even
Insti
had
on
33
the
of
stir
the
per
the
to
wid
ing
his
sure
of
T
tion
am
gri
and
gra
not
on
the
me
M
d
s
P
v
t

BUILDERS' BENEVOLENT INSTITUTION.

ANNUAL DINNER.

THE thirty-fourth anniversary festival of this Institution took place on the 3rd inst. at the Freemasons' Tavern, Mr. George Burt, J.P. (of the firm of John Mowlem and Co., and ex-Sheriff of London and Middlesex), President, in the chair, supported by about 280 friends of the charity.

The Chairman, in proposing the toast of the evening, "Success to the Builders' Benevolent Institution," said the number of pensioners who had been assisted by it, exclusive of those now on the list, was 129, and there were at present 23 men and 30 women in receipt of annuities at the hands of the Institution. The average age of the men in receipt of the benefits of the Institution was 70, and that of the women 72, and the amounts of the pensions granted were £39 per annum for the men and £27 per annum for the women. The object of the Institution was to grant pensions to master builders, their widows, and others connected with the building trades. So far as in him lay, he would do his utmost to achieve that object, and he was sure that he might count on the hearty support of all the friends of the Institution.

The secretary then read the lists of subscriptions, the total of the chairman's list alone amounting to £1,074 7s. This included £105 given by himself, £105 given by Mr. Godwin, and £827 given in ten-guinea donations. The grand total of subscriptions and donations announced was £1,436 7s. 6d., a sum not equalled on the occasion of any previous anniversary of the Institution.

Mr. F. J. Dove, in proposing "The Chairman," said that among the many services which Mr. Plucknett, their valued treasurer, had rendered to the Institution, not the least was his successful persuasion of Mr. Burt to become the President of the Institution. His presidency would be memorable in the annals of the Institution.

The Chairman thanked Mr. Dove for the flattering terms in which he had mentioned his name.

Mr. Barfield proposed "The Vice-Presidents and Trustees," coupled with the name of Mr. T. F. Rider, who, in responding, said he had to speak in the name of 150 gentlemen, many of whom had done good service to the Institution, while many others were still doing it, or hoped to do it, good service.

The Chairman, in proposing the health of the Treasurer of the Institution, Mr. George Plucknett, J.P., said that gentleman had been associated with the charity from its very foundation, and everybody knew the great services which he had rendered it.

Mr. Plucknett, in responding, expressed his gratitude for the handsome way in which the Institution had been supported on that occasion, for by the help of the liberal donations and subscriptions which had been announced the committee would be able to carry on the work of the Institution without anxiety during the coming year.

The Chairman, in proposing "The Architects and Surveyors," said that the builders owed much to the gentlemen of both professions. It was perfectly true that they (the builders) often found themselves completely in the hands of the architects; but, as a rule, those gentlemen performed their duties most properly and fairly. With the toast was coupled the name of Mr. Franklin, who, in responding, said he considered himself by no means an architect, although he did claim to be a surveyor. It was his decided conviction that the two professions were, and should be kept, entirely distinct, and he believed that that was an opinion which would be ratified by all builders.

Mr. Chappell, in proposing "The Committee and Stewards," spoke of the assiduity with which the committee of the Institution attended to their duties, and coupled with the toast the name of Mr. T. G. Smith, who, in responding, said that as some illustration of the way in which the committee performed their duties he might mention that when, at the beginning of the year, Mr. Fourdrinier offered to get up a theatrical performance an aid of the funds of the Institution, the committee at once guaranteed all the necessary expenses, and the result was that the entertainment brought in more than £100 to the funds of the Institution. More recently,

when the offer which had been referred to, came before them, eleven out of the required twenty donations of ten guineas each were promised by members of the committee.

Before leaving the chair, the President announced that he had received several kind letters from friends of the Institution, wishing him success on that occasion. One of them was from Mr. W. R. Rogers, of the firm of Cubitt and Co., who stated that when he was president of the Institution some years ago his firm offered one hundred guineas to its funds, provided nine other firms would give the like amount each. Now, Mr. Chappell had consented to be the president of the Institution next year, and if that gentleman could find nine firms who would give 900 guineas collectively, his (the chairman's) firm would give the tenth hundred guineas. Mr. Chappell said he accepted that challenge with pleasure, and would do his utmost to be able to claim the fulfilment of the president's promise. Personally, he might say that he should not be backward in doing his part.

SANITARY INSTITUTE OF GREAT BRITAIN.

EXAMINATIONS FOR LOCAL SURVEYORS AND INSPECTORS OF NUISANCES.

AN examination held by the Sanitary Institute of Great Britain, on November 3rd and 4th, eight candidates presented themselves. The following questions were set to be answered in writing on the 3rd, and the candidates were examined, viva-voce, on the 4th inst.

The Institute's certificate of competency as local surveyor was not awarded, but the Institute's certificate of competency as inspector of nuisances was awarded to Joseph Horrocks, W. Sortwell, and J. W. Witts.

EXAMINATION OF SURVEYORS—Nov. 3, 1881.

PAPER 1.—2 TO 4 P.M.

1.—State the conditions under which the discharge of sewage matter into streams is prohibited by the Rivers Pollution Prevention Act, and also the conditions under which such discharge is not prohibited by this Act. Explain what is the meaning of a "stream" under the Act.

2.—Is foul air more likely to be found in the sewers of a town or of a village? and why? What are the best means of preventing its formation?

3.—What are the relative advantages and disadvantages of pipe and brick sewers? How can the objections to pipe sewers be overcome? Illustrate your answer by sketches.

4.—How much sewage would pass in twenty-four hours through a sewer of 36 in. diameter, laid at an inclination which would give a velocity of 3 ft. per second, and what population would this sewer suffice for in a town with a public water supply where the rain and surface water, other than that from the roofs and paved yards of houses, is carried off by a separate system? Give your calculation in full.

5.—Draw the scheme of drainage you would suggest on the accompanying plans of a dwelling-house, and give sketches of the various traps you would employ, of the method of laying the drain and of its connection with the sewer, accompanied by a short description of the mode of executing the work you propose.

EXAMINATION OF SURVEYORS—Nov. 3, 1881.

PAPER 2.—6 TO 8 P.M.

1.—If asked to advise as to the water supply of a town, what are the chief points to which you would direct your attention, if the supply is to be derived

(a) From wells?

(b) From streams?

2.—Describe the construction of an ordinary rain gauge and the precautions which should be taken in fixing it. Give instances of the amount of annual rainfall in various places. What weight of water does one inch of rain on an acre represent?

3.—What materials are used for the construction of cisterns and water pipes, and what are the advantages and disadvantages of each?

4.—Explain what is meant by ventilation of rooms? How far does the size of a room affect the question? Given, a room 12 ft. by 10 ft. by 10 ft. high, occupied by three persons, what means of ventilation would you adopt? To what extent will they be efficient?

5.—Write a specification for the construction of a macadamised road, 40 ft. wide with 6 ft. foot-way on each side, across an estate on a clay soil, with cross section, and estimate of cost per foot run.

EXAMINATION OF INSPECTORS OF NUISANCES—Nov. 3, 1881.

4 TO 6 P.M.

1.—Mention the principal Acts relating to the Public Health, and state briefly their most important provisions.

2.—What is the order of procedure prescribed by the Sale of Food and Drugs Act in obtaining for analysis samples of articles suspected of being adulterated?

3.—Describe some simple means of ventilating sleeping-rooms which you think would be efficient. What do you consider overcrowding?

4.—What are the physical characteristics of good drinking-water?

5.—A house is found to be unhealthy; there are occasionally (not always) offensive smells, perceived both in the basement and in the upper rooms; what is the most likely cause of this, and how would you proceed to investigate it?

6.—How should the soil pipes, sink pipes, and overflow pipes of a dwelling be dealt with so as to prevent any danger to the inmates? What do you consider a proper fall for a 6 in. house drain?

7.—How would you proceed to disinfect a house in which a case of typhus fever or small pox had occurred?

8.—In the inspection of a slaughter-house, to what points would you specially direct your attention? What are the requirements of a properly constructed slaughter-house?

CHIPS.

The name of C. H. Payne, of Kettering, architect, appears in Tuesday's *Gazette* in the list of liquidations by arrangement.

The chief stone was laid on Monday of new buildings, and an extension of the hall of the Bakers' Company in Harp-lane, E.C. Bakers' Hall, which was burnt down during the Great Fire, was afterwards rebuilt, but was again destroyed, during the Thames-street fire of January, 1714, and the present hall was erected in 1719. The present additions are being carried out from the plans of Mr. Joseph Clarke, F.S.A., and Mr. Charles J. Shoppee, joint architects. Mr. E. Lawrence is the builder, and Mr. Merfield the clerk of works.

Memorial-stones were laid on Saturday week for new school-buildings at Cheadle Hulme, for the Manchester warehousemen and clerks' school. Messrs. W. and G. Higginbottom, of St. Anne's-square, Manchester, are the architects, and Messrs. Robert Neill and Sons, of Strangeways, Manchester, are the contractors.

The Hendon board of guardians last week adopted plans, by Mr. H. Saxon Snell, for additions to the workhouse, estimated to cost about £18,000 in execution.

At Tuesday's meeting of the Commissioners of Sewers for the City of London, a letter was received from the manager of Edison's Electric Light System, offering to light, free of cost, for two months, the Holborn Viaduct and Bridge, and its towers, by Edison's incandescent lamps. The letter was referred to the Streets Committee with power to act.

Mr. S. Brunson has been elected to the office of town surveyor of Northleach, Gloucestershire.

At the Manchester Diocesan Consistory Court on Friday, faculties were granted for reseating Trawden church, removing organ to west gallery, and forming a chancel; for enlarging the north aisle and vestry of St. Cuthbert's, Preston; for removal of pulpit to north side, and rearrangement of choir-stalls, &c., at St. Peter's, Oldham-road; and for internal restoration and alteration at St. Bartholomew's, Whitworth.

Princess Christian opened a Working Men's Club at Datchet, on the 7th inst. The building has been erected by Mr. J. Willis, from plans prepared by Mr. Stephen Wyborn, architect, Windsor.

In our report last week of the prize distribution at the Architectural Association, on p. 516, the competition in which no award was made should have been the Architectural Association medal, instead of, as stated, the Architectural Union Company's medal. The latter, given for measured drawings, was awarded to Mr. E. G. Dawber, a second prize being given to Mr. A. Hemingway.

We learn that it has now been finally decided to commence the Manchester Cathedral Restoration by replacing the old columns in the nave with new masonry. For these alterations or additions, it is understood, an application for a faculty will be made at an early sitting of the Consistory Court.

The town council of Hull have adopted plans, by Mr. Sharp, the borough engineer, for a pumping-station, to be erected near the Sir William Wright Dock, for the raising of the west district sewage; it will be provided with duplicate compound pumping-engines, each capable of raising 10,000 gallons per minute, with a lift varying with the tide from 20 ft. to zero; there will be three boilers, each capable of driving one engine. The estimated cost of the work, including a short railway-siding for supply of coal, and a new sewer-outlet into the Humber, is £10,000.

At a meeting held at Wroughton, near Swindon, it was decided to seek Parliamentary powers for constructing a tramway from the centre of Wroughton to a junction with the S. M. and A. line in Swindon. Mr. Edward Watson, C.E., who prepared the plans, stated that the cost of a 3 ft. single line would be about £5,000, and that if the gauge were 4 ft. 8 in. the cost would be £10,000; but they would obtain through traffic, and the earning powers would be increased threefold. It was decided to adopt the wider gauge, and to form a company.

Building Intelligence.

ARMAGH LUNATIC ASYLUM.—The works in connection with the additions and improvements at this asylum have been nearly two years in progress. Some portions are finished and in occupation. The remainder is drawing towards completion. To provide accommodation for over one hundred patients was the principal object of the work, and this was done by erecting four blocks of building, three stories high each, at extremities of present wings, those in front being similar to each other—one for males, the other for females. The chapel, a small, neat Gothic building, has been erected in the lawn in front, having a bell gable facing the principal entrance; it is built of perforated bricks from Belfast, with Dungannon freestone dressings, has open-timber roof, and its walls wainscoted, and is fitted up with pitch-pine benches. A great many further improvements have been made, such as provision for collection and storage of rainwater for washing purposes and sewerage, which includes culverting over 100 yards of the town sewer, which passed through the grounds, and was very offensive. It is in contemplation to erect a water-tower, and plans have been prepared for the same. It will be in the form of an Italian campanile, 90ft. high, having a cistern at the top, containing 12,000 gallons. The cost of the works will be about £20,000. Messrs. Collier Brothers, of Portadown and Dublin, had the contract. Mr. John Boyd, C.E., of Belfast, is the architect, and Mr. Robert Campbell clerk of works.

BELSTONE.—The little Dartmoor village church of Belstone, situate about three miles from Okehampton station, was reopened on Tuesday week. The church, dedicated to St. Mary, is a good specimen of the Early English style, is built of granite, with a square tower, and has a nave and south aisle. The porch was probably of the date of the 13th century, and, with the church, has long been in a state of ruin. Messrs. Hayward and Son, architects, of Exeter, were some time since consulted, and prepared plans. The nave and the south aisle have been roofed, the arches taken down and replaced, the floor tiled, the porch rebuilt, and the whole of the exterior and interior put in a state of thorough repair. The builders were Messrs. Petrick, of Hatherleigh.

CARLISLE.—Extensive additions and alterations have been made to the premises in English-street, recently purchased by Mr. J. Atkinson, draper, &c. The back buildings have been entirely rebuilt and the main front buildings have been gutted and remodelled. The alterations include a new shop front, in which large window space has been gained and added to the somewhat narrow frontage. The interior of the shop is effectively lighted by the lantern roof over a gallery on the first floor. The new premises, comprising shop, show-rooms, millinery saloon, workshops and workrooms, is now one of the most complete of its kind in Carlisle. The works have been expeditiously carried out in a satisfactory manner. Mr. T. Milburn being contractor for brickwork and masonry, and Messrs. Batey and Forster for carpenter and joiner's work, the remaining trades being executed by local tradesmen. The prismatic lights have been supplied by Messrs. Hayward Bros., the mosaic floor by Mr. Ebner, and the revolving shutters by Messrs. Clark, Bunnett and Co. The works have been carried out from the designs and under the superintendence of the architect, Mr. G. D. Oliver, of the firm of Hetherington and Oliver, of Carlisle.

ECCELES.—The New Town Hall, Eccles, was opened on the 3rd inst. It is of the Italian style of architecture. The principal fronts are faced with stock bricks relieved with masonry to the doorways and windows. The main entrance is in the centre of the front elevation, and over the same is the clock-tower. The accommodation on the ground-floor comprises board, committee, and waiting or ante-rooms, with offices for the clerk, inspector and collector, &c.; each are approached by spacious and well lighted corridors, laid with encaustic tiles. The first-floor contains a public-room to seat 1,000 persons (with gallery at one end) approached by a well arranged staircase with spacious landings affording access to retiring and ante-rooms; additional staircase affords separate access to the platform and retiring rooms adjacent thereto.

The principal rooms are warmed by hot-water apparatus, the remainder have open fireplaces. In the basement rooms are provided for the caretaker, also coals, heating apparatus, &c., and a strong fire-proof room with separate entrance. The building has been erected by Messrs. Moore and Sons, builders, Eccles, at a cost of about £1,600, under the superintendence of the architect, Mr. John Lowe, F.R.I.B.A., Manchester.

EXMOUTH.—On the festival of All Saints, the mission chapel dedicated to St. Saviour was opened for Divine service. The chapel is a simple structure of brick, with slated roof, and will accommodate about 185 people. It has a nave, south transept, apsidal chancel, and vestry; and the chancel can be shut off by a screen with movable shutters, if the nave is required for school purposes. There was a west porch on the design, but this had to be omitted owing to the local board requiring the ground for widening the road, but a lobby is to be put on the inside to prevent draughts. The whole of the work has been completed by Messrs. Redway, Son, and Carter, of Exmouth, from the designs, and under the superintendence, of Mr. R. Medley Fulford, architect, of The Close, Exeter.

HEDON.—The fine parish-church of Hedon in Holderness was reopened on Wednesday week after the restoration and completion of the tower. The floors of the clock-room, bell-room, and belfry have been relaid and the windows fitted with new oak weather boards, this part of the contract having been carried out by Mr. Reynardson. The masonry of the tower has been restored by Messrs. Wilson Brothers of Hull, and it is now finished by a pierced parapet and pinnacles, rising to a total height of 130ft.; the square of tower at base is 47ft. The bells have been rung by Mr. Walker, of Hull, and the chimes, which were given to the town in 1662, have been put in going order by Mr. McKenna, of Hedon. The total expenditure has been about £7,000.

LONDON.—St. Peter's Church, Vere-street, Oxford-street, has been closed for about three months, during which time it has been decorated and re-seated in oak, with new carved oak pulpit, lectern, &c., and was reopened on Sunday, the 6th inst. The whole has been designed by, and the work carried out under the superintendence of, Mr. James K. Colling, architect. The execution of the oak-work and carving was entrusted to Messrs. Cornish and Gaymer, of North Walsham, Norfolk. The decoration to Messrs. J. & J. King, of Norwich, and the glazing of the side windows to Messrs. Pepper and Co., of the Easton-road. The east window has been filled in with stained glass by Mr. Burne Jones. The church externally is a plain brick structure of very unpretending appearance, but internally it is divided into nave and aisles, having an enriched plaster ceiling supported on Corinthian columns. The architect of the building was James Gibbs, who also designed St. Martin's-in-the-Fields, to which church St. Peter's bears a considerable resemblance, although upon a smaller scale. The total cost of the work was about £2,000.

LOW FELL.—Last week several memorial-stones of a new Wesleyan chapel which is about to be built at Low Fell, Gateshead, were laid. The building will be in the Gothic style. The material used for its construction will be stone, and an historical interest will attach to it from the fact that in a prominent position in one of the walls will be placed the old stone from which John Wesley preached in the neighbourhood of the present chapel at the Fell, with a suitable inscription cut upon it. The chapel, as at present planned, will seat about 500 worshippers, but there is a space left in the rear by which it can be extended to accommodate about 300 more. Internally, the edifice will have a nave and two side-aisles. Galleries will run round three sides of the building. The estimated cost of the whole scheme is about £3,500. The builders are Messrs. Greason and Stockdale, of Gateshead. The chapel has been designed by Mr. J. J. Lish, architect, of Newcastle-on-Tyne.

PHILADELPHIA, U.S.—The corner-stone of a new Roman Catholic Church was laid upon the 16th ult. by the Bishop of Harrisburg. The edifice will be dedicated to St. James, and is well situated at the south-east corner of 38th and Chestnut-streets. Of Gothic character the general plan consists of a nave with side aisles,

intersected by a transept, the apsidal termination of the nave forming the sanctuary or altar recess; around this apse a corridor, or more properly speaking, an ambulatory passage, runs, divided from the altar recess by an arcade of red granite columns with white marble base and capitals, with pointed arches and groined ceilings. The sacristy, on the south-east corner of the building, will be octagonal in form, and the south-west sacristy is circular on the plan. The confessionals are built in the walls, recessed. The facade on Chestnut-street has a frontage of 78ft. of bold design, consisting of two massive towers, flanking the central doorway, 32ft. in width and 40ft. high. The architect of the building is E. F. Durang. It is only proposed to erect the basement this season, but to roof the edifice in next year.

SEVEN DIALS.—A new mission house for the Seven Dials district of St. Giles' parish has been erected in Shorts-gardens in connection with the London Diocesan Home Mission. The work in this place (which has existed for more than 20 years) has been hitherto carried on in a small and inconvenient room, divided from the street by a bakehouse attached to a baker's shop adjoining, and was very unhealthy through defective drainage, badly lighted, and much out of repair. This has been all cleared away with the exception of the side and back walls, and the new building now extends the whole length of the site, being about 80ft., and has a frontage to the street of simple First Pointed character in stock bricks, the arches and jambs being of red bricks and Bath stone. The design consists of a main gable finishing the end of the open-timbered roof and a bell gable at the side. The building is well lighted from the roof by dormers between the principals. The drainage has been entirely reconstructed and the premises made thoroughly healthy. The architect was Mr. W. Milford Teulon, of 18, Upper Woburn-place, and the builder, Mr. Andrew Killby, of Appold-street, Finsbury, who has done his work excellently well.

CHIPS.

The Mersey dock commissioners decided on Thursday week to seek Parliamentary powers to construct a double line of overhead railway from one end of the docks to the other.

The upper part of the spire of Honeybourne Church, near Pershore, which was recently injured by lightning, is being reconstructed under contract by Mr. Frith, builder, of Coventry.

The parish-church of St. Lesdegar, at Wyberton, near Boston, has been reopened, after restoration from the plans of Mr. G. G. Scott, M.A., F.S.A. The builder was Mr. S. Sherwin, of Boston.

The foundation-stone of an addition to the Roman Catholic church at Springburn, near Glasgow, was laid on Tuesday week. The work will cost £3,000, and is from the designs of Messrs. J. L. Bruce and D. Sturrock, I.A., of Glasgow.

The annual distribution of prizes to the students in the Science and Art Institute at Walsall, took place on Wednesday week. The report showed that in art six Queen's prizes and fourteen certificates had been gained at the examinations; and in science, twenty-five Queen's prizes, twenty-five excellents, and fifty-two proficiency certificates.

The work of re-seating the parish-church of North Elmham was commenced last week. Messrs. Cornish and Gaymer are the contractors.

A large vestry-hall and Bible class-room, added to Christ Church, Swansea, was opened on Thursday week; Mr. Thomas White, of Swansea, was the builder. Heating apparatus on the hot-water system is now being placed in the same church by Mr. John Legg, contractor, of Swansea.

At a vestry meeting held at Kenninghall, Norfolk, on the 3rd inst., it was resolved to take steps for restoring the parish-church, and a committee was appointed for that purpose.

The Clarkson memorial at Wisbech will be unveiled by the Right Hon. the Speaker to-day (Friday). The statue is of white Ancaster stone, and has been carved at the works of Messrs. Farmer and Brindley, Westminster-bridge-road, S.E. It stands beneath a Gothic canopy, and represents Thomas Clarkson in a standing position, with a scroll in one hand and a slave's fetters in the other. In the pedestal are four panels of red Mansfield stone; one is occupied by the inscription, and the others contain bas-reliefs of Wilberforce, Granville Sharpe, and a slave. The late Sir Gilbert Scott, R.A., was the architect, and the cost has been over £2,000.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—The annual meeting of this Association, for the opening of session 1881-1882, was held on Tuesday evening, the 8th inst., in the library at Queen's College. The president, Mr. Jethro A. Cossins, occupied the chair, and there was a good attendance of members and visitors, including Messrs. J. G. Bland, H. F. Talbot, G. F. Hawkes, R. B. Morgan, J. L. Ball, J. P. Osborne, W. Henman, T. Jones, W. Wallis, J. William Tonks, W. H. Kendrick, of West Bromwich, H. H. McConnell, and F. E. F. Bailey, of Walsall, Fred. G. Hughes, honorary secretary, &c. Apologies for non-attendance were received from Messrs. George Inghall, W. Hale, W. Martin, E. Pincher, E. Wood, H. Clere, Aston Webb (president of the London A. A.), and others. The annual report was read by the secretary, and was adopted on the motion of the president, seconded by Mr. Kendrick. The balance-sheet was read by the treasurer, and was approved on the motion of the president, seconded by Mr. Osborne. The president then delivered an address, in which he dwelt chiefly on the subject of street architecture. At the conclusion, a very hearty vote of thanks was accorded to Mr. Cossins for his very excellent and interesting address, on the motion of Mr. McConnell. Messrs. Morgan, Tonks, and Henman, spoke in support of the motion, and after the president had replied, the meeting terminated. A large collection of drawings was exhibited on the walls, including all the principal class designs, and a numerous selection of sketches by Mr. John Cotton and others, which were kindly lent for the occasion.

EDINBURGH ARCHITECTURAL ASSOCIATION.—The opening meeting of the present session of this Association was held last week. Mr. John McLachlan, president, read a paper entitled "Notes on Some Old Edinburgh Architects." In the outset, he remarked that it was a subject of regret that although the city owed a deep debt of gratitude to her architects, their names and memorials had been treated with scanty regard. They would search far in Edinburgh even in classes far higher than of labourers to find any one who could tell them anything of the designer of St. Giles' Crown, or Holyrood, or even Heriot's Hospital. So rapidly did the memory of architects here depart that, taking these three buildings—of St. Giles' spire nothing was known; of Holyrood antiquarians could tell them something; and of the third—Heriot's Hospital, only 200 years old, disputes were rife among the learned as to the very personality of the architect. These facts, he submitted, were humiliating to our national pride. Going yet farther back into the past than the end of last century, or, roughly speaking, the commencement of the building of the New Town of Edinburgh, Mr. McLachlan referred in detail to Mr. James Craig, who seemed to have enjoyed a large and lucrative practice in designing the various buildings in the New Town, which were erected in the carrying out of his feuing plan; to Robert Adam, who far surpassed Craig in the extent and variety of his practice, his works being scattered broadcast over the face of Scotland even to this day; to David Stevenson, the celebrated engineer, who designed the new approach to the city by Regent-road and Waterloo-place; to Archd. Elliot, who designed the Calton Jail, Regent Arch, and County Buildings; to Thomas Hamilton, who designed the Burns Monument on the banks of Doon, the High School of Edinburgh, the present access by George IV. Bridge and Johnston's terrace to the centre of the city from the south and west, the Royal College of Physicians, and the Burns monument on the Calton-hill, was one of the principal founders of the Royal Scottish Academy, and architect of many of the Free churches erected immediately after the Disruption; and to William Henry Playfair, probably the architect who had buik'd most largely in the public eye in this century and in this country.

The Kidderminster Board of Guardians received last week a report from Mr. G. Morton, architect, of South Shields, as to the proposed rebuilding of the workhouse. Mr. Morton showed three alternative plans, two for rearrangements on the present site, and estimated to cost from £18,000 to £20,000; the third for new house and school on first site at an estimated cost of £30,000.

"To a practical man with a taste for mechanics, and the bump of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Architect*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Two pence of all newsmen, or post free 2½d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.
Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 3s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and SIXPENCE for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 35s. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—H. B. and Co.—F. H.—C. Bros.—M. R. Co.—T. R. and Son—H. and R.—B. S. Co.—A. W.—H. W. and Son.—E. E. C.—P. Broz.—D. H. and J. N. M. (Both at Batsford's, 52, High Holborn, if anywhere.)

"BUILDING NEWS" DESIGNING CLUB.
S. R. C. (There is no entrance fee or subscription to join the club.)—N. M. B. (We have noted your motto. The staircase is included in the dimensions given.)—T. B. A. (Small sketch or perspective is admissible, and a competitor can send designs for both subjects. The names and addresses of all competitors are required to be appended to the back of every drawing sent in.)

Correspondence.

DUBLIN MUSEUM COMPETITION.

SIR,—What your correspondent "Fair Play" asks is doubtless desirable. May I point out something equally so, if not more?

It is that the committee of selection, having chosen the specified five sets of drawings, should have no knowledge whatever of the subsequently disclosed mottoes and authors of the same, but that such disclosure should be made by an again independent person. It is obvious that once associated, the designs will on the next occasion be at once recognisable, and although the committee are then only to report on them (the treasury selecting) the greatest amount of independence would be obtained by the following of this suggestion.—I am, &c. L. R.

TESTS FOR TRAPS.

To the Editor of the BUILDING NEWS.

SIR,—You will, of course, remember that recently not a little discussion has taken place as to the value of the various closet-traps, and that there are certain of them that I have advocated; also that, in furtherance of my ideas, I have attended various experiments with a view of testing the actual value of each individual trap.

The result of these experiments I have duly reported, and as accurately as possible; but as some members of the trade seem to doubt (not improbably from reasons especially of their own) the accuracy of my reports, I beg now to inform them that on Saturday, Nov. 19th, at 3 p.m., a

committee of practical plumbers have arranged to meet and finally test the various traps. Any interested members of the trade can attend, and I trust that you will ventilate the matter as much as possible.—I am, &c., P. J. DAVIES.

SIR,—Referring to Mr. Davies' experiments, some of the conditions of which are correctly shown on page 540, allow me to say that, to enable your readers to fairly estimate the value of the results given, it is absolutely necessary for them to understand fully the whole of the conditions under which the experiments were made. Now, this page 540 does not give: the basins are there shown fixed upon the top of the traps, and I was under the impression that this was a fair representation when I wrote my letter, which appears upon page 575. On Wednesday last I paid Messrs. Pullen and Davies a visit at Kennington, and then found that, instead of the basin setting upon the traps as shown, there was in the case of the round P a space of 18in. between the plug in basin and the waterline of trap. Now, with this arrangement, this happens to be the vital point, for according to the length of this space is determined the safety or otherwise of the trap.

Under these circumstances, I must ask your readers to suspend their judgment until next week, when I will do my best to fully explain this point.—I am, &c., DANIEL EMPTAGE, S.E.

Dane Hill Sanitary Works, Margate, Nov. 7th.

BRIGHTON HEALTH CONGRESS AND DOMESTIC AND SCIENTIFIC EXHIBITION.

SIR,—A paragraph in your last issue referring to the forthcoming Health Congress and Exhibition, at Brighton, is calculated to mislead intending exhibitors, and as it also reflects rather unwarrantably on the good judgment of the committee, we do not think it right to let it pass unnoticed.

The rates of payment for the exhibition of drawings, when coupled with the powers of rejection reserved by the committee (explained in the circulars already sent you), are a guarantee that commonplace productions will not be hung. It is, therefore, scarcely within the limits of good taste, to say that we shall "exhibit probably in the most prominent position thus paid for, works devoid of any merit at all."

As a justification for making the proposed charge, we may explain that there does not appear to us any sufficient reason for placing architects upon a better footing than other classes of artists, of whom very many in different departments of art are preparing to exhibit.

Whilst the exhibition is intended to benefit the Brighton School of Science and Art, there are doubtless many less interested motives for its promotion; but it is probably equally true that each exhibitor, however kindly disposed towards the object of the Exhibition, has some small residuum of more personal interest in view.—We are, &c.,

CHAS. E. CLAYTON } Hon. Secs., Art and
JOHN GEO. GIBBINS } Industrial Dwellings
Sections.

Royal Pavilion, November 9th, 1881.

[We simply doubted, and we still doubt, whether any architects of good standing were likely to exhibit on the terms offered by the committee. The result will probably show that we are right, and that the committee, in their inability to distinguish between architects and other exhibitors, have made a mistake.—ED. "B. N."]

A new sessions court was opened at Newent last week. It is Domestic Gothic in style, and is erected in red brick, with black brick bands and arches and local red tile roofs. The joiners' work is of varnished pitch-pine. The building comprises magistrates' rooms, solicitors' rooms, clerks' rooms, three cells and guard-room, and a public court-room, heated by a Shorland stove, and having at the south end a stained-glass window by Dauncey, of Gloucester, representing Justice with the scales. Messrs. Medland and Son, Gloucester, were the architects; Messrs. Jones Brothers, of Newent, the contractors, and Mr. Phillips the clerk of works.

A new wrought-iron foot-bridge, of 90ft. span, has lately been erected by the Corporation of Stamford over the river Welland, to replace one destroyed by the great flood of July, 1880. The total cost, including entirely new abutments and approaches, is between £700 and £800. The work has been executed from the designs and under the superintendence of Mr. J. B. Everard, C.E., of Leicester; the contractors being, for the builder's work, Mr. C. Hinson, of Stamford, and for the ironwork, Messrs. Dawson and Nuneley, of Hunslet, near Leeds. Mr. T. J. Ward, of Stamford, has efficiently filled the post of clerk of works.

Intercommunication.

QUESTIONS.

[6760].—**Sp. G. and Crushing Weight of Stones.** What is the specific gravity and crushing weight of the following stones, viz.:—Dumfriess, Corsehill, and Red Mansfield?—*VERITAS.*

[6761].—**Baths.**—Having a hot and cold water bath to put up, would some of my fellow-readers kindly inform me as to the sizes of cylinders and other particulars appertaining to same?—*R. SPOON.*

[6762].—**Geometrical Conics.**—Would some one mention the name of a cheap treatise on pure geometrical conics, such as would meet the requirements of that section of science and at examination in mathematics, fourth stage, which treats of that subject?—*C. S. S.*

[6763].—**Clay Ballast.** Will any reader kindly give me practical information as to buying clay ballast for concrete, mortar, &c.?—*M. VOS.*

[6764].—**Chimney.** I have asked several architects the following question, viz., of a chimney 15 yards high, with 3 ft. outlet at the top, tapering all the way inside in proportion to the outside, and one 10 yards high, with an inner casing 3 ft. dia. from bottom to top, which will give the best draught? I have been often told that the one with inner casing is much better. If this is correct, is the column of heated air heavier or lighter in the case of uncased chimney? I hope some of your correspondents will be able to answer the question for the benefit of many of your readers. A YOUNG BUILDING.

[6765].—**Glazed Earthenware Flue Lining.** In common with, I imagine, most other architects, I have lately considered this essential to good work. I am, however, informed by an intelligent and trustworthy contractor, who was formerly clerk of works to an eminent architect, that it proves, in a few years, a source of much annoyance, owing to the soft falling from the glazed surface in summer, whenever the least dampness occurs, and that the said eminent architect has, on that account, left off specifying it. Can any reader corroborate or contradict?—*SPOON.*

[6766].—**Heating Chapel.**—I want to construct a chapel with school beneath. How shall I heat the chapel the cheapest possible way? Answer to the above will oblige—*A. B. M.*

REPLIES.

[6760].—**Woodcarving.**—It is impossible in a short paragraph to give "Z. D." many useful hints in regard to wood carving. Proficiency therein is only attained by a lifetime of application upon the top of some natural talent and inclination for that particular sort of thing. Addis's is the best. A few dozen chisels and gouges, a bench screw, and a holdfast are all the appliances a woodcarver relies upon, and his whole "kit" does not cost more than a couple of pounds or so. "Z. D." had better make friends with some good woodcarver, and get practical lessons from him.—*HARRY HEMS.*

[6763].—**The Scott Monument.**—As to Sir Walter Scott's beautiful monument in Princess-street, Edinburgh; in December, 1835 the committee offered three premiums of 50 guineas each for designs for a national monument to this great author. The proposed expenditure was £50,000. In response, 54 designs were sent in, and the prizes were awarded in the following order:—To Mr. Birkman 1st, to Messrs. C. Fowler and R. W. Sievier 2nd, and to designs under the nom de plume of "John Morvo" 3rd. None of the plans were altogether satisfactory, however, and fresh designs were asked for. In this second competition "John Morvo" was the successful artist. It then appeared that the owner of this motto was a George Knapp, a journeyman joiner, residing in Canmies-place, Edinburgh, who, being early in youth impressed by the beauties of Roslyn Chapel, had ploddingly learnt drawing and perspective, and had become not a little expert in architectural drawing. Knapp's design was ultimately accepted in March, 1838. It was described at the time as "of beautiful proportions, in strict conformity with the Abbey, from which all its details are derived." The foundation-stone was laid Aug. 15, 1840. The contractor was Mr. David Laing. Mr. Knapp personally superintended the works for about two years; then, said to narrate, one dark foggy night, whilst on his way home to Morningside, Knapp missed his way, and, falling into the Union Canal, was drowned. He was buried at St. Cuthbert's cemetery, where a monument marks his grave. After this Mr. Bonar, the ill-fated artist's brother-in-law, carried the work on, and very faithfully completed his task. The final expense was £16,151 7s. 11d. Of this sum the following items may be recorded:—The cost of the foundations, which took down 52 ft. beneath the surface, was £1,574 18s. 6d. Mr. David Laing, the mason, was paid £9,512 18s. 3d. Sir John Steell, B.S.A., for the marble statue, received £2,000; the architect's fees were £2,571 18s. 6d.; and the clerk of works' salary amounted to £52 16s. 4d. The inauguration of the monument took place on August 15th, 1843.—*HARRY HEMS.*

[6765].—**Girder.**—Thinking Mr. McLachlan for information already given, I have submitted full particulars of girder. Draw a line diagram of the lattice girder



here given, showing the parts which should be designed to resist compression by thick lines, and those to resist tension by thin lines. The girder to be uniformly loaded from end to end at top. Which of the braces will be subjected to the greatest stress, and how is it arrived at?—*H. D.*

[6731].—**Old Crosses in West Cornwall.**—"M." opens an interesting topic when he refers to the origin and purpose of old Cornish crosses. By his reference to St. Clether and Launceston, I see he has been amongst the crosses of East Cornwall. The original query definitely confined itself to West Cornwall, and in my recent reply I kept myself to that particular region. Of course, what applies to one part of the county, in a general way, is applicable to another. The Tau cross, with the circular head, is altogether a Cornish feature. Cornwall is a very old county. Missionaries came over from Ireland, sent by St. Patrick, in the middle of the 5th century, and St. Petroc, the celebrated Cornish saint, studied under St. Patrick in Ireland. Conan was Bishop of Bodmin in 939; A.D. The last Cornish bishop was Burghold, in A.D. 1010. The old Cornish crosses were undoubtedly erected under various circumstances. At such places as Penzance and Llanidloek, they seem to mark the site of ancient and now destroyed churches. Those on the highways were endposts to religious houses or oratories, and were also praying-places. Amongst the wild moors, they must have been very useful, for there, nothing and nobody existed to direct the traveller on his way. But that they were wholly for secular uses and more guides for pilgrims, is upset by the fact that they also occur in churchyards. Stepping out from West into Mid-Cornwall, just for the sake of a fresh illustration, I may mention that at Lanivet, near Bodmin, there are two exceedingly fine old Tau crosses. These are in a particularly perfect state, and are both within a few yards of the ancient parish church. Many old chapels have been wholly destroyed, but crosses exist in their neighbourhood, and it is very possible that these latter were originally erected as incentives to devotion; as well as mute appeals to the passer-by to turn on one side, and give of his belongings to the praying folk who lived at the baptisteries or chapels in question. Thus, at St. Clare, St. Clement's, St. Paul, Trewell, Ludzvan, St. B. adget, at Lanyon; Triggamin, Higher Triggamin, Bunnan, Vellansey, Rose-an-Cr-wz, Tre-wanick, and at many other places where there are crosses, records of old ecclesiastical buildings having existed are preserved. Of course, most of the ancient wells were supposed to possess marvellous properties. At the side of Madron well, which lies on the moor, a mile or so from the church, is a stone seat, formerly known as St. Madron's Bed. Madron is spelt Madron in some old manuscripts. It was upon this that impotent folk reclined when they came to try the cold-water cure. There was also a chapel, about 100 yards away. It was partially destroyed by Cromwell, but the ruins still remain. Those who were benefitted gave alms to the poor and to the church. This was done down to the middle of the 17th century. Besides the old crosses of West Cornwall, one must not overlook the monoliths that are scattered all over the face of the county. These seem to be sepulchral pillars of an even earlier date than the crosses. Some are inscribed, as, for instance, the Men Scrya stone, at Madron, and another at Bant-y-ridge, Gwyl, At Sander, St. Eilian, St. Just, Lelant, Sennen, Paul, and Munch, there are some fine monumental pillars. The two at Bolet or St. Eilian are the largest; one is 15 ft. high, the other 13 ft. high; and handily is yet another stone measuring 10 ft. The smallest of those named above is the one at Trevar, in Sennen; it is not more than 5 ft. high. Most of the Cornish crosses and stones referred to are of coarse moorland granite; but a few, if I mistake not, are of porphyry, or of the local elvan. I believe that the date of these upright stones—certainly the inscribed ones—is about the early part of the 4th century.—*HARRY HEMS.*

[6733].—**Window Tracery.**—I know of no work on tracery above, except Bilings' "Pocket of Form" and that was brought out only to show the multitude of designs which could be produced for the simple geometrical figure of two equal circles inscribed in a large circle, the result being that it can in no sense be considered a treatise on tracery; any student of it would learn much thereby, though some of the designs may be open to objection on the score of beauty. On the other hand there are few works in Gothic architecture which do not give designs of tracery, many of which are details to large scale with the centres and joints distinctly marked; for instance the works of Fugate, Sharpe, Coling, Bowman and Crowther, besides others. None of these can be called cheap. They are mostly to be had of Mr. Batsford, High Holborn, London, W.C.—*HUGH McLACHLAN.*

[6741].—**Mounting Engravings, Tracings, &c.**—Scrap books of all sizes, descriptions of paper and binding are to be had and I expect that everyone wishing to purchase could be suited. For quick mounting of small engravings on paper as used in the journals, I would recommend fastening down the corners only with thin gum; the same might be adopted with tracings on paper. If on thicker paper or linen, thicker gum would be required. When gum is unsuitable, small cuttings in the pages of the scrap book itself for inserting the corners is a good plan, of course the material so cut must then be stout, this plan is generally seen at places where architectural and other photographs are sold, for anything so simple can be easily withdrawn. Starch is used for mounting photographs. I have not used it myself, but should consider it much preferable to paste; when either of these are used I would prefer covering the whole of the back instead of the edges only.—*HUGH McLACHLAN.*

[6742].—**Compressibility of Air in Sewers.**—I do not think it can be calculated how long it would take before the air would be disturbed in the lower end after the opening of sluice or how far the water would first travel; these in my opinion would depend quite as much on the density of the air inside the sewer and on the state of the atmosphere as on the fall and diameter of pipe. Generally I believe "Sanitation" is right, the second case would in a great measure depend on how fast the water flowed into the pipe, the air being only able to escape at the top where there was a vacuum, the water driving the remainder before it. If the water were allowed to be run through with the pipe only half full, little or no good would be done, the first result would be to compress in the upper part of the sewer all or nearly all the air which occupied it and which after the escape of the water would occupy its former position. To change the air drive out what was in it, when fresh would rush in to occupy the vacuum. I would not use gullies, but ventilate sewers by direct openings in the crown of the roads.—*HUGH McLACHLAN.*

[6745].—**Fines.**—I have understood that this would in great measure depend on the wording of the conditions, it could not be enforced as a "fine," but as "liquidated damages" where damages for non use of the building could be proved, and to the amount lost or likely to be lost by such non-use, which may be less but can in no case be more than the sum named in the conditions.—*HUGH McLACHLAN.*

[6746].—**Architect's Account.**—An architect is not usually called upon to supply a detailed bill of extras and omissions to a client, though such should be prepared. I do not think an architect can be compelled to furnish detailed bill to his client, certainly not with builders' prices, though there would be no objection probably in his doing so. An employer, at least, has the right to ask for an abstract of the accounts.—*G. H. G.*

[6747].—**Thatched Churches.**—Your correspondent will find not one, but dozens, still existing in Norfolk. Turn to p. 611 in your present issue, and he will find a paragraph respecting a new thatch roof to Thurston Church, Norfolk.—*CHAS. E. READ.*

[6747].—**Thatched Churches.**—I have one in my sketch-book unnamed. I think it was visited in the A. A. excursion, Norwich, 1884, and either at Frunch, Knapton, or Edington. I remember it was a very desolate, out-of-way place, and this church had a truncated unfinished octagon tower at the middle of the west end, rising in a clumsy fashion from a rude unbuttressed square base. Some more accurate and methodical excursionist will certainly give "G. C." information as to this church.—*T. DREW.*

[6747].—**Thatched Churches.**—The following churches have thatched roofs:—Coveney, Cambridge-shire; Tytshall (chancel only), Norfolk; Ingworth (nave), do.; Thurgarton, do.; Trimmingham (chancel only), do.; Paston, do.; Riddington, do.; Ormesby, do.; Norwich St. Ethelred, do.; Pakenhall, Suffolk; Middleton, do.; South Cove, do.; Fritton, do.—*FRED. J. FREEMAN.*

[6747].—**Thatched Churches.**—These are most common in Eastern counties. I recently did work at Salhouse Church (spelt Salhouse in the parish register, I observed), near Norwich, under Mr. John Oldrid Scott, M.A. There the roof was an old thatched one. The nave roof has just been stripped of this, and a new one of English oak put up. This is covered by reeds 15 in. thick, a most conservative and interesting restoration. The building was reopened upon Nov. 1st. There are churches at Eaton, Ingworth, Thurgarton, Trimmingham (chancel), Little Melton, Marlingford, Tytshall, St. Margaret (chancel), all in Norfolk, with thatched roofs. In Suffolk may be recorded those of Pakefield, Middleton, North Cove, South Cove (nave only), Fritton, Ashby, The Net-ham, Sapiston, Rushmere, Kingsfield, Hopton, Icklingham, Eriswell, Coney Weston, Barham, and Barnby. Coveney Church in Cambridge-shire is thatched. In another part of England is Rotherham Church, Cheshire, with a thatched nave. All the above are, or were until recently, examples of thatched churches. Restoration has lessened the number that existed a quarter of a century ago considerably. Paston, Riddington, Ormesby, Norwich, St. Ethelred, and Metford are Norfolk churches that used to be thatched, but which, if my memory serves me rightly, are now roofed in the ordinary way. Of course, the old custom of strewing the church floors with rushes was once very general. It was not uncommon during the beginning of the present century. The practice is, perhaps, obsolete now. The last place I ever heard of it being in force was at Holt Church, near Wrexham. There until the restoration some six or seven years since straw and rushes were regularly used as a protection for the feet against the damp floor.—*HARRY HEMS.*

[6749].—**Commonplace Book.**—A commonplace book is a very desirable thing to keep. The plan I adopted for some years was to get a thick quarto or smaller size, and note-book with a large index, the only objection to which was that certain blanks would invariably be left and other spaces quickly become filled up. I have since adopted an ordinary manuscript book, inserting any notes or cuttings in consecutive order, and indexing at intervals. A better plan would be to have a thick case made to hold a few quires of paper simply kept in by cords, by which arrangement a classification could be observed the sheets on one subject being put in proper order as they were written. After all, a method may become so irksome as to make the trouble of keeping notes an encumbrance upon one's time; for this reason, the simpler the method is the better and more likely it is of being kept. The value of methodising one's reading and thought cannot, however, be over-estimated. Having kept a commonplace book for some years I can speak of the value it has been. As one's reading and experience extends, the earlier collections become of less value. Although I seldom refer to my old note books, the habit of "abstracting" or "loading down" matter has been of service. It tends to make the student sift for himself the value or truth of the authors he reads, to analyse facts, and to systematise his own knowledge. For this reason I have never regretted having taken the labour, and the practice it affords in precise writing has been of great service to me.—*G. H. G.*

[6750].—**Removing Oil Stains from Paper.**—Place a piece of clean blotting paper on the stained drawings, &c., and apply a hot iron. I think you will find that this is the most effectual way of removing them.—*FRED. J. FREEMAN.*

[6751].—**English Buildings Previous to the Conquest.**—The buildings now existing which were erected previous to the Conquest are few, as most of them were entirely constructed of timber. Mr. Parker, in his "Glossary of Architecture," says:—"The scant and uncertain reference to special buildings leaves it very difficult to apply definite dates to the few existing remains which we have of buildings before the Conquest. Even in the cases of Jarrold and Monk's Wearmouth, where we have more historical data than usual, there is some difficulty in saying what part of the work should be assigned to Benedictine. At both the churches there are considerable remains of moulded balusters, which probably fulfils the description by Bede, that the churches were built *more romanis*. How far and how much of the walls were restored after the fire, and destruction on account of the ravages of the Danes, leaves it difficult to

lay down any laws as to the character of the masonry itself of this period. But for the most part all that can possibly belong to this date is of very coarse and irregular rubble-work, with rather irregular Ashlar stones used for the corbels, and in the case in point the stone of the neighbourhood and the circumstances attending their history have to be taken into account before referring to them as a type of the usual building of that time. Of nearly the same age, that is, before the close of the seventeenth century, are probably the crypts of Hexham and Ripon, all that remain of the churches founded there at that time." The doorway in vaults under the dormitory at Westminster; a building at Deerhurst, and the remains of a church at Bradford-on-Avon (which is close to the large twelfth-century church) are thought to have existed previous to the Conquest; but, as Mr. Parker says, we have no certain data for differentiating the building actually completed before the Conquest and that completed afterwards. —FRED. J. FREEMAN.

[6752.]—Zinc Roofs.—The Vieille Montagne Co.'s zinc is a good description. For flats, No. 16 ought to be used, or 25oz. zinc. Iron nails must not be used, and the sheets should allow free expansion at the joints by rolls or laps. The rules of the Vieille Montagne Zinc Co. will assist "Zinc."—G. H. G.

LEGAL INTELLIGENCE.

EMDEN v. D'OYLEY CARTE—(Court of Appeal.—Before the Master of the Rolls, and Lords Justices Baggallay, Brett, and Lindley.)—This action was brought by Mr. Walter Emden, an undischarged bankrupt, claiming remuneration as an architect, and damages for wrongful dismissal, and other relief. On the application of the trustee in bankruptcy for an order substituting him as plaintiff, Mr. Justice Fry held that the Trustee was entitled to the remuneration and damage claimed, and added the trustee as co-plaintiff. This order was affirmed on appeal. The defendant had, in delivering his statement of defence, paid £360 into court, though he did not admit the plaintiff's right to anything. The original plaintiff's solicitor in the action, Mr. Tudor, took out a summons asking a declaration that he was entitled, under the Attorney and Solicitors' Act, 1860, to a charge on the £360 for his taxed costs, charges, and expenses of, or in reference to the action as the plaintiff's solicitor, alleging that the £360 was "property recovered or preserved" by means of the action. In the court below, Mr. Justice Fry held that the £360 was not "property recovered or preserved" to the trustee, inasmuch as the action was brought with the view of obtaining the money, not for the trustee, but for the bankrupt, consequently the solicitor was not entitled to any charge. The solicitor appealed. Mr. Cookson, Q.C., and Mr. Beddall, for the appellant. The application was resisted by Mr. J. Pearson, Q.C., and Mr. Turner on the part of the trustee. Their lordships reversed the decision of the court below; but in allowing the charge, they limited it to the costs which had been incurred down to the time when the trustee intervened.

EXTRAS.—BRIDLINGTON CEMETERY ARBITRATION CASE.—Sir Henry A. Hunt, the arbitrator in the case of Brown v. the Bridlington Burial Board, has just made his award in the arbitration case between the parties. The plaintiff, John Brown, builder, claimed £6,873 17s. 3d. over and above his contract for erecting two chapels and a keeper's lodge at the Bridlington cemetery. The burials board offered £1,665 in settlement, but Sir Henry Hunt has awarded him £3,058. The amount of the original contract for erecting the cemetery buildings was £3,808; but in addition to that sum the board paid him £992 for extra works, so that with the amount awarded by the arbitrator the total amount paid is £7,858.

IN RE GEORGE DAY.—(London Bankruptcy Court.—Before Mr. Registrar Hazlitt.)—This debtor has filed a petition for liquidation, describing himself as of Whitechapel-road, and of Hol-lington, St. Leonard's-on-Sea, builder and contractor. His debts, secured and unsecured, are estimated at £60,000.

STATUES, MEMORIALS, &c.

CLEOPATRA'S NEEDLE.—All the various additional art decorations which have been in course of preparation in connection with the obelisk on the Thames Embankment are now finished. The second colossal bronze sphinx will leave the works of the engineers and contractors at Pimlico for erection immediately, the first being already in position, and as soon as the fixing of the ponderous mass of metal is arranged, each figure being about 19ft. long, 6ft. wide, and 9ft. high, the hoarding will be removed. The additional adornments now added consist of large bronze wing castings, 10ft. high, with four tablets in bronze, 5ft. high and 6ft. to 7ft. wide, on a background of granite, one on each side of the relic.

A new Roman Catholic chapel is about to be commenced at the Smyllum Orphanage, Lanark. The cost will be about £2,000. The designs have been prepared by Messrs. Pugin and Pugin, of Westminster.

STAINED GLASS.

SALISBURY.—A handsome memorial stained-glass window has just been placed on the eastern wall of St. Edmund's Church, near the organ, by the relatives of the late Mr. Everett, by whom also two of the other windows in the chancel were erected. The subject is "Praise," the details coinciding with some of the clauses in the Te Deum. All the seven windows in the chancel being now filled with stained-glass, it is hoped some benefactors will come forward and continue the same work in the north and south aisles, so that this fine old parish-church may be completed.

BERGHOLT (EAST).—During the week a stained-glass window has been fixed by Messrs. Lavers, Barraud, and Westlake, art glass manufacturers, London, in the north aisle of the church, near the other window, which is dedicated to the Hughes family. The subjects represented are "The Martyrdom of Saint Stephen," "The Conversion of Saint Paul," "Paul and Silas singing hymns in prison," "The Angel appearing to Paul on board the ship when he was wrecked." There are also single figures, representing "Abraham and Sarah," "The Virgin Mary and Joseph," "Baptism," "Jesus taking up Little Children in His arms and blessing them," "The Marriage in Cana of Galilee," "The Lord's Supper," "Christ Ordaining the Twelve Apostles." At the top of the four bays of the window Jesus is represented delivering His apostolical commission to His disciples before the ascension, "Feed my Sheep," &c.

CHIPS.

Owing to the frequent complaints which have been made during the past few months of the polluted state of the River Thames, there is every possibility that an inquiry will shortly be ordered under the powers conferred by the 31st section of the Metropolitan Local Management Act, 1858, as to the causes which affect the purity of the river near the Metropolis, and the best means that shall be adopted to prevent the polluted condition, if such a state should be shown to exist.

The lives of some two hundred persons, assembled for a special service in Christ Church, Carmarthen, one night last week, were imperilled by the fumes of the heating apparatus being fouled by damp, which, coming in contact with the fire (lighted for the first time since last winter) gave out deadly fumes. Several persons feeling ill without realising the cause, left the church, and then fainted, and at last the vicar himself had to leave the building.

On Wednesday, at a meeting of the members of the Royal Scottish Academy, held in Edinburgh, Mr. George Hay, R.S.A., was elected secretary in room of the late Mr. William Brodie, R.S.A. Mr. David Murray, Glasgow, was elected an associate from among 26 candidates, to fill the vacancy recently caused by Mr. W. F. Vallance being elected an Academician.

The Bridlington local board have appointed Mr. Dyer, of Matlock, as surveyor.

At a recent special meeting of the Newbury town council, the town-clerk was authorised to procure a provisional order "for carrying out the sewerage plan by 'Westminster,' and to schedule Greenhorn Mills and Bone Mill as alternative sites for a pumping-station."

The Warminster local board decided last week to carry out a scheme of sewerage at an estimated cost of £5,000.

The Wesleyan chapel at Kendal is about to be rebuilt from plans by Mr. William Ranger, of London.

The Dean and Chapter of Exeter have decided to light the Cathedral with gas, so that evening services may be held in the building.

The foundation-stone of St. Cyprian's mission church was laid on Saturday week in Brockley-road, opposite Deptford cemetery gates. The architect is Mr. G. S. Fenley, of Buckingham Palace-road, Pimlico, and the builder, Mr. C. Wade, of Manor-road, Lewisham; the cost will be about £1,200.

The Marylebone vestry last week ordered the demolition of five houses in Charles-street, Lisson-grove, which had been described as "fever dens." It was stated that these houses were condemned five years ago.

The corner-stones of a Wesleyan chapel and schoolroom were laid last week at West-end, Sowerby-bridge. The building will be 63ft. by 33ft., and will consist of schools and vestry in basement, with chapel above. Mr. Utley, of Halifax, is the architect; the contract for masonry has been taken by Messrs. Sutcliffe and Son, Sowerby-bridge; and that for carpentering by Mr. J. Greenwood, of Soyland. The estimated cost is £1,000.

Our Office Table.

THE Committee of the Brighton School of Science and Art lately determined to offer annually ten free studentships in science, and the same number in art, to scholars of elementary schools of the borough who have passed the Sixth Standard of the Educational Department. The studentships for this year have now been awarded, twenty boys who passed the highest standard in the specific science and art subjects of the new code at the last Government examination having been selected. The boys with their parents and a number of people interested in the advancement of elementary education, attended a meeting at the school last week to hear an explanation of the objects and conditions of the free studentships. They are tenable for either two or three years, at the option of the holders, the main conditions on which they are held being the regular attendance of the students at the various classes.

The effects of turpentine on some three hundred painters having been studied by a French physician, he now publishes his conclusions, namely, that these effects can never be so severe as to cause death, unless they be volatilised in an extremely confined space,—also, that where there are free movement and good ventilation, no liability to fatal accident exists. The vapours of turpentine coming from different sources, it appears, have not all the same energy; that of the French product, for instance, being far less injurious than the Hungarian or American. The most general form of indisposition exhibited—usually among new workmen, and directly attributable to the turpentine—are headache, watering of the eyes, cough, granulations on the larynx, and disordered digestion.

PROVISIONAL protection has been granted to Edward Haskell, gas engineer, of 280, Oxford-street; and John Pitt Bayley, architect, 18, Fulham-place, Paddington, for the invention of an "Improved Apparatus or Appliance for Heating by Gas." The invention consists of a contrivance to be fitted to ordinary coal-grates, stoves, or ranges, for heating rooms by gas, without smoke or smell, and still appear like an ordinary coal-fire. The object of the invention is to heat by means of gas arranged in a form to be fitted into the present register stoves of any shape, and consist of a metal case, perforated at the bottom, and fitted with rough rock-shaped piece or pieces of glass, to resemble live coal, between the bars of two or more tiers, one above another, and fixed to the outer case by means of catches, flanges, or rivets, and heated by means of jets or burners of gas, the outer case being fitted with a cover dropped into a socket or flange to hold the heat, the foul air escaping through three or more tubes at the back of the lid or cover into a condenser of water, the reservoir of which is constructed at the back of the bottom of the outer case.

PROF. BEILSTEIN, according to the *Pharm. Centralh. from Deutsche Viertelj.*, has made comparative experiments with disinfectants, to determine their relative value as such. He arrives at the conclusion that aluminum sulphate is an effective and at the same time the cheapest substance arresting putrefaction. If sufficient time is given for its action (two to three days) a four per cent. solution will effect more than a fifteen per cent. solution of ferrous sulphate, thereby counterbalancing any difference in price in favour of the later. Besides, a very crude article might be manufactured from clay and sulphuric acid, which would be very cheap indeed. A four per cent. solution of aluminum sulphate will kill all infusorial life, no matter how tenacious. However, this substance has no power of destroying putrid odours, and for this carbolic acid seems to be the only available article. The author inclines to the belief that this disinfectant does not merely supplant foul odours by its own, but that the phenol enters into actual combination with the skatol of the faecal effluvia. He, therefore, recommends aluminum sulphate, combined with a little phenol, as the most effectual as well as economical for rendering decaying organic substances, both odourless and innocuous.

The danger to which the following refers is so little suspected, and yet, as is here proved, so possible, that we think it deserves publicity:—On the 2nd inst., as Vice-Chancellor Bristowe

and Mr. Beckett (editor of the provincial builders' price book) were surveying an untenanted mansion in the neighbourhood of Crewes, an accident occurred, from the above cause, which might have had more serious results. The circumstances were these:—Under the flagged floor of the entrance-hall was an old pump-well which, previous to large extensions made 40 years ago, was, doubtless, outside the house. This well had been covered with oak timbers, which formed the only support to the floor above it; and, up to the time of the accident, did not show the slightest evidence of being less safe than the rest of the floor. The Vice-Chancellor was walking over it when the whole covering suddenly gave way under him and he fell to the bottom. Fortunately, his honour, in falling, got slight foothold on a cross bearer some distance down the well. This, with Mr. Beckett's assistance from above, enabled him to sustain himself until further help could be obtained, when he was extricated from his dangerous position. The Vice-Chancellor—although threatened with the double danger of falling a considerable depth, as well as from the displaced flags which overhung him—maintained great presence of mind, and, we are glad to hear, escaped with only a few slight bruises.

At a meeting of the Birmingham Town Council on Wednesday, Alderman R. Chamberlain, the retiring mayor, announced several munificent gifts to the town in connection with the proposed museum and art gallery. From Mr. J. Chamberlain, M.P., came the offer of two choice paintings by Muller—"Prayers in the Desert," and "A Street in Cairo." Mr. G. J. Johnson and Mr. M. J. Smith offered two valuable water-colour drawings by David Cox, purchased from the estate of Sir Josiah Mason; the mayor himself gave the choice of any two pictures in his collection, and Mr. H. Buckley offered another drawing by David Cox. Following these announcements was an offer of £10,000 for the provision of a new School of Art, on condition that the institution should be under the control of the council; and then the gift by Mr. Cregoe Colmore of a site in Edmund-street, containing 1,000 square yards, and having three frontages, for the proposed school. Lastly, £10,000 more was offered per Messrs. T. Martineau and G. S. Mathews, from an anonymous donor, towards the cost of providing and equipping the school.

A house fell on Wednesday in Fifth Avenue, New York, and buried all its occupants, some 18 in number, beneath the ruins. Considering the rickety look of some of the corner houses in the principal streets in London, it is surprising that we have not more catastrophes of a similar kind in this country. Many of our new houses now in course of erection, on account of the demand for shop-window space, appear to be worse than those they are displacing, and many of the old ones, as we pointed out some time since, in consequence of the removal or alteration of adjoining structures which have hitherto acted as props, are every day endangering the lives of their inmates and passers-by.

Efforts are being made to secure additional railway communication with Southampton. The inhabitants of Southampton have agreed to subscribe £50,000 towards the cost, and the burgesses have sanctioned the investment of a further sum of £50,000 in the undertaking. At the annual meeting of the Newbury Corporation yesterday it was resolved to request the directors of the Didcot, Newbury, and Southampton Railway Company to insert in their proposed Bill for extending the Railway to Winchester and Southampton powers to enable the Newbury Corporation to subscribe £10,000 towards the necessary capital. The new line will establish direct railway communication between the great manufacturing counties of the north and the port of Southampton, besides providing an independent route between Southampton and London.

The Fine Art Society opened on Monday an exhibition of the works of Samuel Palmer, who belonged for a long while to the Society of Painters in Water Colours, and who died only a few months ago. Palmer's works belong to an old school of landscape-painting in which fidelity of detail was little considered, but much attention was paid to grace of form, and balance of composition. More than one drawing in the Fine Art Society's Gallery displays

the studied grace of his rendering of sylvan scenes, and the ordered pomp of his evening skies. The later drawings—such as those which were shown at the Rooms of his own Water-colour Society, last season—do not show any change of method, if they show likewise no decline. In some respects the etchings are as interesting as the coloured works, and although the exhibition, either as regards its coloured designs or its designs in black and white, is not of a kind to attract very general attention, connoisseurs perhaps, without giving one picture higher rank than another, will like to examine the characteristics of the old-fashioned and studiously poetical work.

It is said that the London Gas Company is about to be amalgamated with the great Gas-light and Coke Company, and one of the reasons given is that if the amalgamation be not carried out the smaller company will be forced to undersell the larger. The London Company now charges 3s. per 1,000ft. for gas, and is prohibited from distributing greater dividends than 10 per cent. Any excess must, according to Act of Parliament, be given to the consumers in the shape of reduction of price. It is said that the Company is now literally bursting with wealth, and that if not "amalgamated" it will be forced to reduce the price of its supply. To avert this terrible evil another great transaction in London gas is likely to take place, with the consequence that whenever the municipality takes over the gas manufacture a still heavier burden will be imposed upon the ratepayers of the metropolis.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—Surveyors' Institution. Opening address by the President, E. Hyde. 8 p.m.

TUESDAY.—Institution of Civil Engineers. Discussion on C. Wood's paper, "Iron Permanent Way." 8 p.m.

WEDNESDAY.—Society of Arts. Address by Sir F. J. Bramwell, Chairman of Council. 8 p.m. British Archaeological Association. Opening Meeting. "The Borg ez Zifih, Cairo." By Prof. T. Hayter Lewis, F.S.A. "The Measurements of Ptolemy in Relation to the Western Portion of Britain." By Gordon M. Mills. 8 p.m.

Edinburgh Architectural Association. "The Building Stones of Scotland." By Connciller Gowans. 8.30 p.m.

Throat Irritation.—Soreness and dryness, tickling and irritation, inducing cough and affecting the voice. For these symptoms use Epps's Glycérine Jujubes. Glycérine, in these agreeable confections, being in proximity to the glands at the moment they are excited by the act of sucking, becomes actively healing. Sold only in boxes, 74d. and 1s. 11d., labelled "JAMES EPPS and Co., Homoeopathic Chemists, London." A letter received:—"Gentlemen.—It may, perhaps, interest you to know that, after an extended trial, I have found your Glycérine Jujubes of considerable benefit (with or without medical treatment, in almost all forms of throat disease. They soften and clear the voice.—Yours faithfully, GEORGE HOLMES, L.R.C.P.E., Senior Physician to the Municipal Throat and Ear Infirmary."

Lamplough's Pyretic Saline is refreshing, most agreeable, and the preventive and curative of FEVERS, RHEUMATISM, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by chemists throughout the world, and the Maker, 113, Holborn Hill. Use no substitute. See Medical Testimony.

Holloway's Ointment and Pills afford comfort, security, and oftentimes recovery to the most tortured sufferers. The Ointment, when properly used, will cure all description of sore, wounds, eczema, sprains, erysipelas, rheumatism, gout, and skin diseases. The Pills are infallible in biliary and digestive derangements, sick headache, and constipation.

Douling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to **CHARLES TRASK,**

Norton-sub-Hamdon, Ilminster, Somerset.
—[ADVT.]—

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates.

General Repairs and Alterations Executed. Experienced Workmen always in readiness, and sent to any part of the country.—[ADVT.]—

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE.
CORSHAM DOWN
CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.

(See trade advt. on p. XXIII.)

ADVT.

TENDERS.

* * * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ABERGAVENNY.—For construction of an iron footbridge over River Usk, at Abergavenny. Messrs. Dudley and de Salis, engineers, 1, Westminster-chambers, S.W. :—

Horton and Son, Darlaston	£547	0	0
Verdon and Ewens, Cheltenham	525	15	0
Dyne, Steel, and Co., Newport	405	0	0
Brettell, J. C. and C.E., Worcester*	360	0	0

* Accepted.

BANSTEAD, SUSSEX.—For engineering works in connection with the laundry and bath-house, &c., at the Kensington and Chelsea District School, Bantead, for the Managers, Messrs. A. and C. Harston, 15, Leadenhall-street, architects :—

Benham	£1,655	0	0
Clements	1,250	0	0
May	1,080	0	0
Bradford and Co., High Holborn*	991	10	0

* Accepted.

BATTERSEA, S.W.—For the enlargement of a school in course of erection in Raywood-street, Fatersea Park-road, from 1,200 to 1,400 school places, for the London School Board. Mr. E. H. Robson, F.S.A., architect to the board :—

Downs, W., Walworth (accepted on a schedule of prices).

BEDFORD.—For a detached villa residence in the Oval, Ashburnham Estate, Bedford, for Messrs. Hawkins and Ashwell, The Oval, Bedford. Mr. H. H. Bridgman, A.R.I.B.A., 42, Poultry, E.C., architect :—

Spencer, T., Bedford (accepted) £1,211 0 0

BEOPORD.—For six detached villa residences in the Lansdowne-road, Ashburnham Estate, Bedford, for Messrs. Hawkins and Ashwell, The Oval, Bedford. Mr. H. H. Bridgman, A.R.I.B.A., 42, Poultry, E.C., architect. Quantities by Mr. F. Thomson, 20, York Buildings, Adelphi, W.C.

Spencer, T. (accepted) ... £6,683 5 0

BELPER.—For the erection of a chimney at the workhouse, for the Belper board of guardians :—

Hingley, of Duffield (accepted) ... £50 0 0

[Highest tender received, Marshall, £130 5s. 8d.]

BRAWLEY-ON-TWEED.—For repairing several breaches in the ramparts :—

Messrs. M. Gray and Son (accepted).

BARWICK-ON-TWEED.—For repairing a part of Hide Hull :—

Brough, J. (accepted) ... £78 13 9

BETHNAL GREEN, E.—For laying 700ft. of 18in. pipe sewer in Hollybush-gardens, for St. Matthew's vestry, Bethnal Green. Mr. W. H. Gathercole, surveyor :—

Barnes, Bethnal Green	£541	0	0
Wilkes and Co., Bishopsgate	511	0	0
Finch, Mile End	457	0	0
Wood, F., and F. J., Mile End	418	0	0
Porter, Hackney	394	0	0
Nobbs, Mile End	368	0	0
Killingbeck, Camden Town	367	0	0
Judd, Mile End	352	0	0
Reeves, Bow	345	0	0
Armstrong, Chiswick	336	0	0

(Surveyor's estimate, £390).

BIRMINGHAM.—For the erection and completion of schools in Icknield-street, and a chemical laboratory, for the School Board :—

Horsley Bros. (accepted) ... £9,618 0 0

BRIDGEND, GLAM.—For alterations to the workhouse, for the Bridgend board of guardians :—

Morgan, J. (accepted) ... £51 0 0

BROMLEY-BY-BOW.—For the erection of a mission house at St. Leonard's road, Bromley, Middlesex, for Miss Emily Currie. Messrs. A. and C. Harston, 15, Leadenhall-street, E.C., architects. Quantities supplied :—

Smith	£800	0	0
Atherton and Latta	745	0	0
Walker	738	0	0
Holland	723	0	0
Carpenter and Poole, Pentonville*	697	0	0

* Rednead to, and accepted at, £653.

BRONDESBURY, N.W.—For construction of waggon-shed and storehouses, Dym-road, Brondesbury, for the Willesden Local Board. Mr. O. C. Robson, surveyor :—

Lifford	£646	0	0
Coulter	635	0	0
Baxter	544	0	0
Haynes	440	0	0
Crockett	440	0	0
Neave and Son (accepted)	430	0	0

CARLISLE.—For the completion of Carlisle Grammar School, for the governors :—

Accepted tenders.

Plumbing :—

Alderson, Carlisle and Glasgow ... £679 0 0

Slatting :—

Nau-on, Carlisle ... 485 0 0

Trework :—

Stunfield, D. W. and Son, Carlisle ... 42 10 0

Plastering :—

Ormerod, D. M., Carlisle ... 397 0 0

£2,043 10 0

[Amount of contracts for masonry, carpentering, &c., previously let, £7,337.]

CHESTER.—For sanitary work at the workhouse, for the Chertsey board of guardians :—

Hunt, R. J. ... £75 0 0

Brown Brothers ... 65 0 0

Forsey, J. ... 64 10 0

Nesmyth, H. J. (accepted) ... 54 18 0

CHEATERS.—For the erection of a stone breacher's shed at the workhouse :—

Forsey, J. (accepted) ... £34 10 0

CHESHAM, Bucks.—For laying 7,300 yards of stoneware pipe sewers, 15in. to 9in. diameter, and 600 yards of 15in. ditto, subsoil drainage works, and sewage disposal works, for the Amersham rural sanitary authority, being Chesham sewerage contract No. 1. Mr. James Mansergh, 3, Westminster-chambers, S.W., engineer:—

White, G., Shepherd's Bush ...	£10,861 13 5
McKenzie, Williams, and Co., ...	9,500 0 0
Moorgate, E.C. ...	9,457 4 0
Kellett and Bentley, Mansion House Buildings, E.C. ...	9,472 8 4
Smith, J. M., 1, Westminster-chambers, S.W. ...	9,421 4 7
Dickinson, J., Beckenham ...	9,371 13 6
Kyan, A., Lanchester ...	8,850 8 2
Bottoms Bros., Lavender-hill ...	8,877 16 7
Neave, J. W., Lewisham ...	8,632 13 10
Hunter, G. and Co., St. Peter's Pa. k. W. ...	6,650 8 4
Cowdery, C. and Sons, Newent ...	8,490 7 6
Ford & Everett, 10a, Great Queen-street, W.C. ...	8,370 0 0
Botterill, W. J., Cannon-street, E.C. ...	8,245 8 4
Simmons, J., Sidecup ...	8,195 13 4
Nesbit, T. and Co., York ...	8,716 14 0
Potter, H., Lower Clapton, N. ...	8,013 19 7
Fawkes, Bros., Southport ...	7,575 8 0
Currall, J., and Lewis, J., Birmingham ...	7,478 4 0
Trim, R. C., Hersham ...	7,235 2 2
Rowles, M. W., Acton, W. ...	7,226 0 0
Wilkes and Co., Devonshire sq. ...	7,139 12 9
Hill Bros., Beckenham (accepted) ...	(Engineer's estimate, £7,915 11s. 1d.)

CHISWICK.—For panneling St. Michael's Church, Bedford Park, W. Mr. M. B. Adams, A.R.I.B.A., acting for Mr. R. N. Shaw, R.A.:—

Lascelles, W. H., Finsbury ...	£904 ...	£414
Kendal & Milne, Manchester ...	380 ...	138
Holland & Sons, Mount-street, W. ...	250 ...	161

(Mr. Adams' estimate £260 17s.)
*Accepted.
A. Oak dado finished with beeswax. B. Oak dado finished in four coats of oil colour.

(For seating same church, the tender of Messrs. Pach was accepted.)

CHISWICK.—For laying house connections from the main sewers, for the parish of Chiswick, for twelve months:—

Messrs. Wilkes and Co. of London (accepted).
DALSTON, N.—For alterations and additions to premises in King Henry's-walk, Balls Pond. Messrs. Anderson and Doubleday, and Mr. John Johnson, joint architects. Quantities supplied by Messrs. Maughan and Cuxson:—

Clarke and Bracey ...	£1,132 0 0
Clemence ...	1,080 0 0
Lawrance ...	1,070 0 0
Falkner ...	1,066 0 0
Boyce ...	1,044 0 0
Macey and Sons ...	1,027 0 0
Conder ...	997 0 0

DULWICH, S.E.—For the erection of a school for 1,000 children in Heber street, Dulwich, for the London School Board. Mr. E. R. Robson, F.S.A., architect to the board:—

Wood, F. and F. J. ...	£11,775 0 0
Brass, W. ...	11,664 0 0
Higgs and Hill ...	11,480 0 0
Perry and Co. ...	11,096 0 0
Wall, C. ...	11,026 0 0
Chappell, J. T. ...	11,012 0 0
Hobson, J. D. ...	10,946 0 0
Stimpson and Co. ...	10,926 0 0
Shepherd, W. ...	10,841 0 0
Nightingale, B. E. ...	10,781 0 0
Downs, W. ...	10,742 0 0
Oldry, W. ...	10,679 0 0
Tongue, W., Plumstead (accepted) ...	10,619 0 0

[Cost of site (area 33,546 square feet) £2,450 7s. 7d.; (a) Cost of school buildings only, including closets, £8 673; (b) Cost of tar pavement and playground, £683; (c) Cost of boundary walls and gates, £583; (d) Cost of teachers' rooms, £200; (e) Cost of schoolkeeper's house, £350; (f) Raising part of building to suit fall of ground, £170; total, £10,619. Cost per head of (a) £8 13s. 5d.; total cost per head, £10 12s. 4d.]

FOREST or DEAN.—For the erection of schools at Steam Mills, for the Forest of Dean School Board:—

Coleman Bros., Church-ill (accepted).
[In lieu of tender from Duggan and Munroe, accepted at previous meeting, but since withdrawn.]
GLoucester.—For repairs to the workhouses:—

Meredith, J., Gloucester (accepted) ... £35 0 0
(One other tender at £53 10s. accepted.)

HIGHGATE.—For terrace of twenty houses, Gordon House lane, Highgate-road, N.W., for Mr. J. M. Goodall, Linden House, The Grove, Highgate-road, N.W. Mr. H. H. Bridgman, A.R.I.B.A., 42, Poultry, E.C., architect. Quantities by Mr. F. Thomson, 20, York-buildings, Adelphi, W.C.:—

Nightingale ...	£14,881	£14,711
Dove Bros. ...	14,475	14,395
Menitt and Ashby ...	14,463	14,303
Burman ...	14,452	14,280
Crockett ...	13,800	13,800
Morter ...	13,659	13,548
Manly ...	12,345	12,685
Gould and Branl ...	12,890	12,749
Tarrant and Son ...	12,873	12,741
Richardson Bros. ...	12,768	12,656
Parsmore and Son, Margate ...	12,740	12,630
Kirk and Randall ...	12,700	12,600
Perry and Co. ...	12,689	12,569
Shummar ...	12,673	12,541
Wall Bros. ...	12,475	12,347
Scrivener and Co. ...	12,368	12,232
Drew ...	12,300	12,204
White ...	12,190	12,074
Dixon ...	11,835	11,751
Toms (accepted) ...	11,827	11,683

Architect's estimate, £11,800.
A. Gross amount of tender. B. Nett amount of tender, if basements to first four houses are omitted.

HALIFAX.—For the construction of a weighing machine for the Barksland Local Board, capable of weighing 2 tons. Mr. J. Hoyle, surveyor:—

Pooley, H., and Son, Manchester ...	£68 0 0
Demison, S., and Son, Leeds ...	60 0 0
Victoria Engineering Co., Stockport ...	60 0 0
Hodson and Stead, Salford ...	45 0 0
Ellis and Ackroyd, Halifax ...	42 0 0
Lean, J., Halifax (accepted) ...	40 0 0

HAWICK, Scotland.—For building additions at the new gas works, Hawick:—

Mason's work:—	
Habness, J., Hawick ...	£2,666 0 0
Scott, J. and Sons, Hawick ...	2,579 0 0
Miller and Lambert, Hawick ...	2,550 0 0
Ferguson, A., Hawick ...	2,534 15 9
Scott, A., Hawick ...	2,470 17 0
Scott and Thomson, Hawick ...	2,400 9 0
Bell and Hill, Hawick ...	2,350 6 5
Marshall, J. and Sons, Hawick ...	2,220 0 0

Carpenter's work:—	
Hobkirk, W. and T., Hawick ...	313 10 0
Ingles, A. and Sons, Hawick ...	312 0 0
Martin, J., Hawick ...	305 0 0
Scutt, W. and Son, Hawick ...	305 0 0
Brunter, J., Hawick ...	298 0 0
Ridell and Graham, Hawick ...	291 0 0
Scutt, W., Hawick ...	288 8 8
Smith and Scutt, Hawick ...	281 16 0

Sitting, plumbing, and glazing:—	
Murray, J., Hawick ...	204 15 3
Guthrie, J. and Sons, Hawick ...	194 0 0
Grier, W. and Co., Hawick ...	185 0 0

Iron roofs for retort house, coal store, and purifier house:—

Balfour, H. and Co., Lverna ...	1,320 0 0
Melrose, J. and Sons, Hawick ...	1,230 0 0
Dempster, R. and Son, Eland ...	1,224 10 0
Building of retort bench with sixty retorts:—	
Blackie, R., Hawick ...	706 0 0
Drake, J. and Sons, Hawick ...	660 0 0
Hamilton, C. M., Hamilton ...	650 0 0
Bell and Hill, Hawick ...	632 0 0
Harkness, J., Hawick ...	630 0 0
Marshall, J. and Sons, Hawick ...	573 0 0
Park, J., Edinburgh ...	530 0 0

Iron mountings in retort house, condensers, scrubbers, &c.:—

Ashmore & White, Stockton-on-T. ...	£2,090 0 0
Robertson and Co., Berwick ...	2,050 0 0
Dempster, R. and Sons, Eland ...	2,036 0 0
Balfour, H. and Co., Lverna ...	1,990 0 0
Melrose, J. and Son, Hawick ...	1,816 0 0
Laidleine, Son and Caine, Glasgow ...	1,794 0 0
Craig, G. and Sons, Berwick ...	1,678 0 0
Harmer, Donald and Co., Paisley ...	1,650 0 0

*Accepted.
HOLLOWAY, N.—For the erection of two gates at Holloway workhouse, for the City of London Guardians:—

Whittaker, Friar-street, E.C. (accepted) ... £21 0 0

HOMERTON, E.—For the erection of a school for 1,200 children in Homerton-row, for the London School Board.

Mr. E. R. Robson, F.S.A., architect to the board:—	
Brass, W. ...	£13,474 0 0
Higgs and Hill ...	13,246 0 0
Wood, F. and F. J. ...	13,114 0 0
Oldry, W. ...	12,594 0 0
Pritchard, G. S. ...	12,568 0 0
Lawrance, E. ...	12,562 0 0
Williams, G. S. S. and Son ...	12,412 0 0
Grove, J. ...	12,176 0 0
Wall, C., Lots-road, Chelsea ...	11,400 0 0

*Accepted.
[Cost of site, so far as purchased (area 25,751 square feet) £2,229 1s. 9d.; (a) cost of school buildings only, including closets, £8,508; (b) cost of tar pavement and playground, £387; (c) cost of boundary walls and gates, £596; (d) cost of teachers' rooms, £300; (e) cost of schoolkeeper's house, £350; (f) cost of covered playgrounds, £350; (g) extra depth of foundations, £255; (h) works to adjoining property, £100; (i) filling up site, £253; total, £11,400. Cost per head of (a), £7 6s. 1d.; total cost per head, £9 10s.]

HULL.—For enlarging the fever hospital on the Citadel estate, for the town council:—

Hockney and Liggins (accepted) ... £425 0 0

IDE.—For paving, &c., Back Cavendish-road and Cross-street, Ide, for the Local Board:—

Speight, D., Leeds ...	£216 7 0
Thornton, A., Shipley ...	209 0 0
Hall, M., Dudley Hill ...	176 15 0
Thornton and Gledson, Ide ...	173 9 0
Parker, J., Bradford ...	167 10 0
Steel, J. M., Eccleshill ...	166 18 0
Myers, J., Ide ...	158 10 0
North, J. and Son, Ide ...	157 0 0
Pedley, V., Ide ...	153 9 0
Fullan, W. H., Ide ...	152 5 0
Thornton, J., Ide (accepted) ...	151 10 0
Tomlinson, T., Ide ...	145 0 0

INCE, NEAR WIGAN, LANCs.—For construction of a 15in. and 12in. sewer with tanks, &c., the first to pass under the branch canal near the Ince Hall Coal Company's Works, Middle-piece, and the other in Pickup-street:—

Winnard, W. (accepted) as per schedule.
(Lowest tender received.)

KEIGHLEY.—For alteration of the playground at the Oldfield schools, for the Keighley School Board:—

Moore, Wm. (accepted) ... £56 10 0

KINGSWEAR, NEAR DARTMOUTH, DEVON.—For laying 3in. cast-iron water-pipes at Kingswear, near Dartmouth, for the Totnes Rural Sanitary Authority. Mr. E. Appleton, C.E., 1, Vaughan-parade, Torquay, engineer:—

Shaddock, W., Saltash, Cornwall (accepted).

KINGSWEAR, NEAR DARTMOUTH, DEVON.—For supply and delivery at Kingswear, near Dartmouth, 3in. cast-iron water-pipes, for the Totnes Rural Sanitary Authority. Mr. E. Appleton, C.E., 1, Vaughan-parade, Torquay, engineer:—

Spettie, J. (limited), Newport, Mon. (accepted).

LEEDS.—For building new stables and shed in Clay Pit-lane, Leeds (mason and brick labour only). Mr. D. Dodson, 18, Park-row, Leeds, architect. Quantities by the architect:—

Accepted tenders.
Joiners:—Craven and Unpleby, Hartley Hill, Leeds.
Brick and mason:—Storey, W., Leeds.
Slater:—Havyside, T. E., Leeds.
Plasterer:—Miller, J., Leeds.

LEEK.—For new branch Bank buildings, and manager's house at Leek, for the M. and L. District Banking Company (limited). Messrs. Wm. Sugden and Son, architects. Quantities supplied:—

Warburton, S. ...	£6,827 0 0
Bradbury, R. ...	6,774 0 0
Wharton, J. ...	6,772 0 0
Southern and Sons ...	6,660 0 0
Inskip, H. and R. ...	6,485 0 0
Massey and Sons, J. (accepted) ...	6,375 0 0

LEEK LIBERAL CLUB.—For alterations and fitting-up of premises, No. 6, Russell-street, Leek. Messrs. William Sugden and Sons, architects. Quantities supplied:—

Bromage, T. S. (the whole) ...	£457 0 0
Promage (contract 1 and 2) ...	365 0 0
Knowles, W. (contract 1) ...	218 0 0
Lovatt, R. ...	199 7 6
Grace, T. ...	189 10 0
Carding, H. (contract 2) ...	195 0 0
Bailey & Morris ...	171 15 0
Mackrell ...	165 0 0
Tomkinson ...	160 0 0
Hudson, J. ...	142 14 0
Mathews, J. & J. ...	139 0 0
Johnson (Contract 3) ...	105 0 0
Stevenson ...	91 5 6
Carding, M. ...	10 0 0
Hea ...	67 0 0

*Accepted.
LEWIS.—For erection of town hall and municipal buildings, Lerwick, Shetland. Mr. A. Ross, Inverness, architect. Quantities by Mr. C. A. Hendery, Inverness:—

Aitken, Lerwick ... £3,240 0 0

LINCOLN.—For erection of a retaining wall, about 150 yards long, on the north side of Yarlborough-road, Lincoln. Messrs. Goddard and Son, Lincoln, architects:—

Dawson, T. A., Lincoln ...	£511 0 0
Berris Bros., Lincoln ...	507 0 0
Close, Lincoln ...	390 0 0
Spriggs, J., Lincoln ...	360 0 0
Horton, S., Lincoln ...	355 0 0
Cowen and Landow, Lincoln ...	345 0 0
Crosby & Sons, Lincoln (accepted) ...	299 0 0

LONDON.—For the supply of materials, and the execution of the general works in "District B" of the Metropolitan, for periods of one, two, or three years, for the Metropolitan Board of Works. Sir J. Bazalgette, engineer:—

Above schedule prices, per cent. Below schedule prices, per cent.

Williams, Son, and Wallington ...	1 year 7	—
Ditto ...	2 years 6	—
Ditto ...	3 4	—
Martin, Wells and Co. ...	1 year 5	—
Ditto ...	2 years 2½	—
Ditto ...	3 —	— (schedule prices) —
Ford and Everett ...	1 year	5
Ditto ...	2 years	5
Ditto ...	3 —	5
Luttrell, G. ...	1 year	7½
Ditto ...	2 years	7½
Ditto ...	3 —	7½

*Accepted for one year at 7½ per cent. under schedule prices, and promised to be continued for two years further if first year's work is satisfactorily performed.

LONDON.—For alterations, repairs, and additions to No. 10, Claremont square, N., and for additional buildings in rear, for Dr. Abercrombie. Mr. A. J. Beesley, architect. Quantities supplied by Mr. H. Nutt:—

(Allen accepted).

LONDON.—For pulling down and rebuilding the premises No. 10, Finsbury-square, E.C., for the "United Kingdom Assurance Corporation, Limited." Mr. F. Hammond, architect. Quantities not supplied:—

Dove Protheris ...	£1,055 0 0
Prescott ...	3,250 0 0
Roberts, H. L. and R. ...	3,083 0 0
Johnson, J. H. (accepted) ...	2,497 0 0

LONDON, N.—For the addition of 400 school-places to the school in course of erection in Bath-street, City-road, for the London School Board. Mr. E. R. Robson, F.S.A., architect to the board:—

Wall, Brothers (accepted) ... £4,390 0 0

[[a] Cost of new school buildings only, including closets, £1,242; (b) for extra foundations, underpinning adjoining property, and diverting old sewer; total, £4,390; cost per head of (a), £10 12s. 1d.; total cost per head, £10 19s. 6d.]

LOVE, S. W.—For enlargement of St. Andrew's schools, Westbourne-park. Mr. Edward Vigers, architect:—

Temple and Foster ...	£398 0 0
Thomas and Butland ...	375 0 0
Oldry, W. ...	371 0 0
Lamble ...	359 18 0

NOTTINGHAM.—For repairs and alterations to the Horse and Trumpeter, public-house. Mr. F. Jackson, architect. Quantities by the architect:—

Bell, G., and Son, Nottingham ...	£1,086 0 0
Wool Broth rs, Nottingham ...	1,059 0 0
Bailey, W., Nottingham ...	997 0 0
Mannott & Warton, Nottingham ...	890 0 0
Hind, S., Nottingham ...	800 0 0
Hind, E., Nottingham ...	772 10 0
Bradley & Barker, Nottingham ...	745 0 0
Malden, R., Nottingham ...	730 0 0

*Accepted.

NEARSDEN.—For the erection and completion of locomotive workshops, two blocks of workshops, and one for offices for the Metropolitan Railway Company at Neasden. Mr. J. Tomlinson, junr., C.E. Quantities by Mr. A. R. Brode:—

Botterill, W. J.	£31 842 0 0
Higgs, F.	28,559 0 0
Kindell, J.	27,493 0 0
Crockett, W.	27,243 0 0
Cock, R. and Co.	26,700 0 0
Matto & Bros.	26,546 0 0
Perry and Co.	26,417 0 0
Garlick, J.	26,290 0 0
Lovatt, H.	26,114 0 0
Davson, E.	25,950 0 0
Rigby, W.	25,854 0 0
Claridge, C.	25,697 0 0
Vernon and Evans	25,527 0 0
Smith, D. N.	24,838 0 0

RAMSGATE, KENT.—For additions to Seamen's Infirmary, Ramsgate. Messrs. Hinds and Son, architects:—

Smith and Son	£348 0 0
Forwalk	247 0 0
Elgar	155 0 0
Home	135 0 0
Martin	112 0 0
Duckett	131 0 0
Miller (accepted)	123 0 0

ROMFORD.—For erection of three pairs of villas in North-street, Romford, for the Trustees of Roger Reede's Charity. Mr. E. C. Allam, A.M.C.E.P. High-road, Romford, architect. Quantities by Messrs. Stones and Son:—

Hamlin, G.	£4,434 0 0
Staines and Son	4,341 0 0
Holland, J.	4,333 0 0
Scott, S. J.	4,287 0 0
Seal Bros.	4,217 0 0
Thompson, J. and Son	4,084 0 0
North Bros.	3,900 0 0
Hinds, J.	3,700 0 0
Dovasing, J.	3,540 0 0
White, H. F.	2,627 0 0

SKEGNESS.—For the erection of workshops, &c., Skegness, for Mr. E. G. Loverseed. Mr. A. H. Goodall, Nottingham, architect:—

Crawshaw, Skegness	£165 5 0
Dunkley, Skegness	163 0 0
Riggall and Hewins, Grimsby	163 11 0
Holmes, Wainfleet (accepted)	148 0 0

SKEGNESS.—For the erection of four houses, Lumley-road, Skegness, for Messrs. Sander. Mr. A. H. Goodall, Nottingham, architect:—

Clipham, Norwell	£2,378 0 0
Topham, Grimsby	2,350 0 0
Riggall and Hewins, Grimsby	2,344 0 0
Holmes, Wainfleet	2,270 0 0
Hassell, Castleford	2,159 0 0
Crawshaw, Skegness (accepted)	2,109 0 0

SKEGNESS.—For the erection of stable, coach-house, &c., to the Pier Hotel, Skegness, for Messrs. Pawson. Mr. A. H. Goodall, Nottingham, architect:—

Dunkley, Skegness	£239 12 0
Riggall and Hewins, Grimsby	239 0 0
Holmes, Wainfleet	233 0 0
Crawshaw, Skegness (accepted)	217 0 0

SOUTHWICK.—For laying down concrete footpaths, for the Southwick local board. Mr. J. G. Reah, Durham, surveyor:—

Rule Brothers, Sunderland 2s. 8d. per super yard.*	
(4,300 super. yards, at 2s. 8d. per yard, £585 6s. 8d.)	

SOUTHWICK.—For the drainage of Garpsrove-street, Back James-street, Back Grosvenor street, Back Davison-terrace, &c., for the Southwick local board. Mr. J. G. Reah, Durham, surveyor:—

Foley and Connelly, Sunderland	£239 10 0
Elliot, J., Southwick	217 7 4
Gleeson, P., Sunderland (accepted)	185 0 0
Tough, A. and J., Sunderland	169 15 2
(Surveyor's estimate, £186 9s. 8d.)	

SPRINGFIELD, HALIFAX.—For new wing. Mr. T. L. Patchett, architect:—

Highest Tenders	£115 15 10
Lowest	292 3 0
Accepted	272 13 6

Contractors:—

Mason:—Simpson, G., Sowerby bridge.

Joiner:—Atkinson, J., Halifax.

Plumber:—Holdsworth, J., Halifax.

Slater, &c.:—Collins, J., Halifax.

SPILSBY.—For the erection of eight houses, with outbuildings, on a portion of the site of old prison, for Dr. Robinson, of Sheffield bricks furnished by the proprietor:—

Clough and Co., Spilby	£1,386 0 0
Pattenbury, W. W., Spilby	1,332 10 0
Dunkley, G., Skegness	1,330 0 0
Kime, J., Candlesbury	1,311 10 0
Kidd, H., Alford	1,300 0 0
Andrews, A., Irby	1,290 0 0
Richardson, W. and J., Old Leake	1,291 10 0
Leafe, J., Boston	1,190 0 0
Hunter and Son, Spilby	1,150 0 0
Turner, J. and S., Waddelet	1,148 10 0
Walker & Scarborough, Spilby*	1,135 12 0

ST. ALBAN'S.—For the erection of street portion of new factory building on the premises of the Old College ironworks, for Messrs. John Freshwater and Company (limited). Mr. Bertram A. Raves, Welwyn, architect. Quantities by the architect:—

Savage, J. and W., St. Alban's	£733 0 0
Muskin, C., St. Alban's	690 0 0
Carlin, W., St. Alban's	696 10 0
Mead, J., St. Alban's	657 0 0
Capper, G., St. Alban's (accepted)	570 0 0

STONEHOUSE.—For building new schools in Quarry-street, for the Stonehouse School Board. Mr. H. J. Snell, architect:—

Seal, Wadebridge	£3,797 0 0
Laythorn and Good, Plymouth	2,889 0 0
Foot, J., Plymouth	2,850 0 0
Steer, T., Plymouth	2,835 0 0
Martin, W. N., Plymouth	2,790 0 0
Goodyear, G. H., Stonehouse	2,784 0 0
Leadbidge and May, Plymouth	2,770 0 0
Finch, J., Plymouth	2,696 0 0
Palk and Partridge, Plymouth*	2,568 0 0

STREETWORK, NEAR MANCHESTER.—For flagging 5,000 square yards of footpaths in Streetford, for the Local Board.		Mr. H. Boyle, surveyor.	
		A.	B.
Bland, A. and A., Bradford	£337 5 0	£388 16 8	£369 11 8
Bird, E., Chorlton-cum-Hardy	279 8 4	846 5 0	831 5 0
Clarke, G., Manchester	245 0 0	856 8 4	822 5 0
Unsworth, G., Manchester	285 0 0	855 1 8	836 8 4
Noblett and Cantell, Manchester	277 15 0	786 5 0	764 15 0
Worthington, W. H., Manchester	293 15 0	749 18 4	743 10 0
Jeffreys, R., Colwyn & Manchester	231 2 6	732 6 8	711 8 4
Bland, S., Salford	226 14 2	711 8 4	726 5 0
Smith, P., Rusholme	234 12 6	693 18 4	722 11 8
Naylor, M., Manchester	259 15 0	720 16 8	703 18 4

SWANSEA.—For the erection of a school at Dyfatty, for the Swansea School Board:—

White, T.	£1,026 0 0
Richards and Billings	4,500 0 0
Thomas, Watkins and Jenkins	4,193 0 0
Rees, T.	4,249 0 0
Walters and Johns	4,049 0 0
Morgan, D., Swansea (accepted)	3,700 0 0

SWANSEA.—For alterations and additions to the school at Brynhyfryd, for the Swansea School Board. Mr. Humphries, architect:—

White, T.	£1,100 0 0
Thomas, Watkins and Jenkins	1,095 0 0
Jones, M.	1,092 0 0
Walters and Johns	1,040 0 0
Evans, D.	990 0 0
Morgan, D., Swansea (accepted)	950 0 0
Reed, T.	900 0 0

SWANSEA.—For the erection of a truant school at Bony-maen, for the Swansea School Board. Mr. Humphries, architect:—

Rees, D., Ystadyfryn	£3,163 0 0
Morgan, D., Swansea	3,100 0 0
Thomas, Watkins and Jenkins, Swansea*	2,800 0 0
White, E.	2,800 0 0
Walters and Johns	2,775 0 0
Rees, T., Swansea	2,659 0 0

* Recommended for acceptance.

THE MIDDLE LEVEL FENS.—For the strengthening of portions of the Barrier bank of the Old Bedford River, for the Middle Level Commissioners:—

White and Broadhurst (accepted)	£3,975 0 0
--	------------

TIPTON (STAFFS).—For making, kerbing, channelling, &c., Ball Fields and Boscobel-street, in Tipton, for the local board. Mr. William Turnbull, surveyor:—

For Ball Fields Boscobel-street.	
Shortland, J., Bilston*	£253 2 0
Tranter, T., Tipton Green	240 0 0
Currell & Lewis, Birmingham	248 15 0
Smith, C., Smethwick	242 10 0
Howl and Co., Tipton	242 17 5
Cashmere and Bullas, Horsley Heath, Tipton*	198 9 0
Surveyor's estimate	213 15 8
* Accepted for Ball Fields. + Accepted for Boscobel-street.	

TIPTON.—For building a new house in Boscobel-street, for Mr. T. G. Hicks:—

Clemens and Tippet (accepted)	£1,000 0 0
--------------------------------------	------------

WANDSWORTH, S.W.—For the enlargement of school in course of erection in Fountain-street, Wandsworth, from 1,200 to 1,409 school places, for the London School Board. Mr. E. R. Robson, F.S.A., architect to the board:—

Jernard, S. J., Lonspit-vale, Lewisham (accepted on a schedule of prices)	
--	--

WANDSWORTH, S.W.—For alterations and additions to Durham House, Southfields, Wandsworth, for Mr. F. Stroud. Messrs. Humphris and Co., Cheltenham, architects:—

Adamson and Sons	£790 0 0
-------------------------	----------

Scott, H.	776 15 0
------------------	----------

Turtle and Appleton	650 0 0
----------------------------	---------

Foote, J.	610 0 0
------------------	---------

Sutton, J. (accepted)	560 0 0
------------------------------	---------

WHITCHURCH, SALOP.—For supply of cast-iron pipes, sluice valves, connections, hydrants, &c., for new water-works of the Whitchurch and Doddington local board. Mr. W. Wyatt, engineer, Ellesmere, Salop:—

R. P. Smith and Co., Whitchurch, Salop (accepted), for cast-iron piping only, per ton:—7in. £4 10s. 6d., 6in. £4 11s. 6d., 5in. £4 12s. 6d., 4in. £4 13s. 9d., 3in. £4 13s. 9d., 2in. £4 17s. 6d.	
---	--

WIDNES, LANC.—For widening Adam's bridge for the town council:—

Holme and King, Wigan	£535 0 0
------------------------------	----------

Ashcroft, W.	533 0 0
---------------------	---------

Whitehead, Son, and Berry	497 0 0
----------------------------------	---------

Winnard, W.	485 0 0
--------------------	---------

Preston, J., Wigan (accepted)	425 0 0
--------------------------------------	---------

Walmsley, M. W.	317 0 0
------------------------	---------

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

--	--

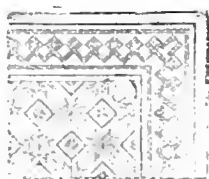
TURPIN,
22, QUEEN'S ROAD
BAYSWATER, LONDON, W

MANUFACTURER OF

The Best and Cheapest

PARQUET FLOORINGS.

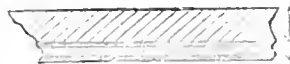
150,000 ft. super. in Stock, ready for Laying
RIGA INCH OAK FLOOR BOARDS,
1s. per foot super. (grooved & tongued).
Immense Stock always ready for Laying.



ARTISTIC JOINERY

THIN PARQUET

Turpin's Patent. 5-16 inch thick, prepared on deal back laminations, equal in wear to inch Solid Parquet. Used for Veneering and existing deal floors, and is susceptible of removal at pleasure. See Construction.



ORNAMENTAL

PARQUET.

DEAL

BACKING.

WOOD CARVINGS.

All Styles executed for the Trade at Special Rates. Skilled Artisans sent to all parts of the country.
Estimates and Designs on Application.



THE BUILDING NEWS.

LONDON, FRIDAY, NOVEMBER 18, 1881.

ARCHITECTS AND THE PUBLIC.

THE new President of the Institute at any rate manages to get the ear of the public—quite a new thing of late years, as far as Presidential utterances at Conduit-street have been concerned; and if Mr. Street's outside hearers do not all agree with him, they evidently appreciate the difference between the standpoint from which he addresses the profession and the public, and the narrower one which has contented his more recent predecessors. For the most part, however, the comments on Mr. Street's address which we have seen have not seemed to us characterised by any very intimate acquaintance with the subject or a disposition to do much else than grumble. The most noteworthy are, perhaps, contained in an article in the *Spectator*, which we reproduce elsewhere, and in a letter in Monday's *Times*, signed "Means and Ends," the writer of which thinks "that most people would gladly avail themselves of the services of an architect if he could inform them with certainty as to the cost of building a house." He then informs us that he built a house, the extras upon which amounted to 25 per cent. and the architect's charges to 7½ per cent. An architect's estimate was afterwards obtained for altering a house, but the correspondent thought the amount excessive, and ultimately he carried out an identical alteration on another house, without an architect, the builder's bill, with 3 per cent for extras, amounting to "just one quarter of the architect's estimate." Now, without giving undue credit to unsupported statements of this kind, we think the letter does to some extent represent the experience of many people in their relations with the profession. The mind of the public has become prejudiced against architects and their charges, and we are inclined to think, as we hinted last week, that this is one of the most likely reasons why the services of the profession are not more sought. Take the cost of building a house. A good and ingenious plan, one of the first necessities in building a convenient and comfortable house, is a thing that hardly need to be paid for. Any person who contemplates building has probably an arrangement in his mind's eye which will give him what he wants. It is comparatively easy to get a respectable builder to carry out any plan that may be suggested to him at the cost of labour, materials, and a fair profit. The ordinary resident who builds his own house is well satisfied if his requirements are met at a price which is reasonable. He seeks only convenience in the appointments of a well-equipped house, and if he can get these at an expenditure which bears a fair proportion to the cost of renting a house of the same size, he is well pleased. About the artistic qualities of the house he has little or no concern. If he employs an architect he gets a design in an expensive Italian, Queen Anne, or Gothic style fitted to a plan which has been the result of secondary considerations, at an extra cost of from 10 to 20 per cent. The question is whether the services of the architect are really well paid for at that price, whether the owner gets the kind of house he wants, and whether the money spent on artistic design has been laid out to the best advantage. The builder does not charge for the design—only a certain percentage on materials and labour, when he is employed without supervision.

When an architect is engaged his percentage is generally doubled by the requirements of bills of quantities and measurement and valuation of extras. It is customary also for contractors to add a percentage when they have to work to plans and a specification under an architect's supervision; and all these extra charges fall upon the client. The system of payment by percentage has unfortunately increased the aversion with which some people regard the architect. He is looked upon as an intermediary, a middle man whose service can only be to add to the cost. It is very excusably thought that the architect's interest is to increase the cost of the building by means which are not absolutely necessary to its proper completion. The practical Englishman is the last person to pay for what he may call imaginary perfections and æsthetic refinements in house-building, and unfortunately architects are not always scrupulous or careful enough to insist on the more substantial qualities being incorporated.

It is—we may as well frankly acknowledge it—a hard thing to obtain a reliable estimate from some architects; their estimates are too frequently deceptive. Can we wonder? Less than half a century ago the estimate of a building was considered one of the first duties of the architect. Careful measurement and valuations were made, and the client knew beforehand the approximate cost of his building. Now these matters are left too frequently to the surveyor, and are counted beneath the notice of the architect. Mr. Street, in drawing so favourable a picture of the state of vernacular architecture a century ago seems to have overlooked this essential change in professional practice, and to have failed to take into consideration another element which has tended to injure good building of the class he referred to. We allude, of course, to the contract system which has taken the place of the measure-and-value method. That change has made good workmen scarce, and has created a class of men little experienced in any one branch of building, but who have just business capacity enough to employ workmen of inferior skill, and to tender for work on the lump sum. The effect of competition, both amongst builders and architects, has been equally detrimental to honest workmanship and solid building. The sham fronts and false use of materials so prevalent, of which the President spoke, have naturally arisen from the desire to excel in the outward qualities of building which the competition system has promoted. The requirements, too, of this system of obtaining designs have necessitated the preparation of show-drawings, and hence a class of draughtsmen have sprung into existence who have vied with one another in the pictorial representation of architecture and elaborate ornamentation, and in nothing else.

It is a side question—but it is one, after all, not distinctly related to the dishonesty of vernacular architecture—to what degree the modern draughtsmanship of which the President spoke in such high terms is answerable for the loss of solidity and the display of extravagant ornament in the buildings of the present day. There is also another potent cause for the existence of flimsy buildings to be found in the system of leasehold tenure which exists in this country. What inducement is there to build solidly and honestly on sites which in a few years will fall into the hands of the freeholder? The old builders reared their solid and artistic buildings in anticipation of the natural term of their existence: they spared no expense in thick walls and substantial floorings and roofs, for the risk of forfeiting the property at the expiration of a few years was not contemplated. No influence has so powerfully operated to check good architecture than the parcelling out of small plots

on short leases, and this is a circumstance over which the architect has no control. The term restricts the expenditure, the class of house to be built, and its general character, and the builder who knows how to meet the tastes of the public resorts to the show front, with its tawdry ornament of stone or composition, as the only solution of the difficulty. It is, however, the duty of the architect to set the example of solid construction and good planning, even under these circumstances, and it is necessary to enforce the sound dictum of the President, that the highest art can be shown in such a practical matter as the best disposition of a ground-plan. If the public hold aloof from the employment of architects in ordinary buildings, it is not always, it must be remembered, because they ignore art, but because the architect ignores the practical elements of cost and construction, and has, by his own action, made it possible that a building can be erected without art, and at less cost.

CITY IMPROVEMENTS.

AMONG the many alterations which have been made in the City of late years, that portion of it bounded on the west by Farringdon-street and on the east by Aldersgate-street, and comprising West Smithfield, has probably seen most of demolition and reconstruction. When Holborn Viaduct was formed, a large and densely-covered area of dwellings had to be removed, and there was a hope expressed that the cleared space might be turned to the best account architecturally. Seldom has one scheme of reconstruction given the opportunity for so complete a remodelling. Much as we owe to that important alteration in having at least been the means of making two or three handsome thoroughfares, and in sweeping away blocks of insanitary dwellings, it cannot be denied that a much more perfect and thorough scheme was possible in the area dealt with by the Viaduct. There was a splendid opportunity for civic architectural display in the Valley improvement. The three diverging thoroughfares to the east of Holborn-circus—namely, Charterhouse-street, Holborn Viaduct, and New-street, opened up some capital sites, if conflicting interests had not entered. The last-named street is a poor and crooked thoroughfare which might have been planned with more skill; Farringdon market has long been an eyesore, and the awkward cutting or incline made by the London, Chatham, and Dover Railway from Ludgate-hill station on the east side of Farringdon-street, has spoilt the area of building ground on that side.

We here speak of the area on the south side of Charterhouse-street, adjoining the Metropolitan Meat and Poultry Markets at Smithfield and Snow-hill. This site has for a long time been a desolate waste of ground cut through by the Chatham and Dover line, and perhaps we could instance no other locality where the conflict of railway and civic authorities has played such havoc with property. No plan is evident, and the space seems to have been left to chance. Lately, the Corporation have covered a large part of this waste by the new Central Fruit and Vegetable—or Fish—Market, for it is as yet a matter of some uncertainty which it is to be. The buildings have extensive frontages towards Charterhouse-street and Farringdon-street, and these are three-story erections of red brick with stone dressings, the ground-story being occupied by small shops. The elevations are in a neat Renaissance style, with stone pilasters carrying a cornice in the upper story, and with a high curb roof broken by dormers of stone. The main points of relief are the three chief entrances on the north, south, and east. One of these is towards Charterhouse-street, where the sides of the houses

are played and an arched roof is in course of construction. Between this thoroughfare and Farringdon-street the corner is emphasised by an entrance-archway entirely of stone. The frontages are finished at this point by pavilion or octagonal-shaped towers with low pyramidal roofs having rather large and heavy-looking gilt pine-apple finials. The archway between is set back and is carried up as a square tower crowned by a quadrangular cupola. On each of the sides elaborately-carved dormer gables are placed, and panels are introduced over the arch sculptured with the arms of the City, and festoons of fruit and foliage. These are carved with some spirit, as also the swags of fruit and flowers on the upper faces of the flanking octagon turrets. Less satisfactory is the grouping of the shops in Charterhouse-street, which are stepped every two houses to follow the inclination of that street, thus breaking the lines of the entablature and pilasters. The latter more noticeably have a rather awkward appearance, the capitals stopping the cornice lines, and the party walls thereby rather obtrusively showing themselves above the roofs. At the south corner of the block is another entrance to the basement, the main feature of which is an octagon tower of brick, the angles having stone pilasters, and the roof of a steep, spire-like form.

There are about 40 shops fronting the streets, which will be let for retail purposes; these are plainly fitted up, the story-posts being of east-iron, forming pilasters in front, and carrying plate girders or breastsummers which support the fronts. The main area of the market, which is on a level with the Meat-market, and covers about 44,060ft. superficial, is roofed in with iron and glass, lattice iron girders and arched ribs, supported on octagon-ribbed columns, with glass louvres along the ridge and springing, being the principal features. These are painted light blue, relieved by red. The span of roof is 45ft., and a central octagon turret marks the centre. The height to the ridge is also about 45ft. The central market area will consist of shops with pitching stands for goods and waggons, and will be approached by the entrances we have described, and two others for foot-passengers, and is only interrupted by the rows of columns supporting the roof. A roadway from Farringdon-road gives access to the basement, which will be used for railway and waggon traffic. Of course it has been necessary to cover over a portion of the Chatham and Dover line, which intersects the site and passes under New-street.

Taking note of other improvements in this locality, we see the corner of the last-named street and Holborn Viaduct, a very eligible site, has been filled up. The corner was long an unsightly plot, and the new building is a block of shops and offices facing the L. C. & D. R. Hotel on Holborn Viaduct. Stone, white facing bricks, and compo not long ago ruled supreme in this part of Holborn; the new shops are of red brick, with a mask of stone pilasters in one order, and a pediment in the rounded corner, always a very undesirable and inartistic feature in such a situation. On the architectural design of this large addition to the business architecture we cannot bestow much praise. The stone pilasters look heavy and squat; their carved capitals are massive and overpowering. A rather heavily-designed stone arched entrance is one of the main features of the front, and the shops have mezzanines, the latter being designed in a Gothic manner entirely out of accord with the superstructure. The celebrated Cock-lane, noted for the ghost-story of that name, still retains a few of its old houses, though the infection of improvement has spread, as we see by an attempt at Venetian Gothic in one front of new premises, and in other instances. A proposed new street was con-

templated from St. Sepulchre's Church, through Christ's Hospital eastwards, but it is still in abeyance.

In Warwick-lane many ancient houses of the 17th century are to be seen. We notice the new deanery-house of St. Paul's, a building of red brick in the Queen Anne style. The building is set back from the street, a wall and iron gates enclosing a forecourt. The principal point of interest in the new building is an arched gateway with wrought iron gates in the centre and wings; the gables are panelled, filled in with herring-bone brickwork. In Warwick-square one large building or warehouse is being constructed, but of no architectural merit. Among the old buildings which have been demolished is the fine old brick group of the College of Physicians, designed by Wren, and half-way down the lane stood the "Oxford Arms," a curious old hostelry. A warehouse in Newgate-street is worth notice for the manner the front is treated. The lower shops are divided by Ionic pilasters in stone, which rise to the height of an entresol. These are carried up through a light red brick superstructure mainly consisting of brick pilasters between the windows and horizontal lines of walling. The arches have their tympana carved in red brickwork, and the upper story is marked by a centre gable with dormers at the sides. At the back of Ludgate-station another large warehouse has been erected of red brick and stone in a fashionable style. The block is called the Gresham Press Buildings. The ground-story and mezzanine have green painted wood framing between stone pilasters; the superstructure is chiefly of red brick relieved by a stone oriel and archway at the corner; but the treatment and details of the stonework are rather coarse. In Farringdon-street, near the Viaduct, two large blocks of warehouses have been constructed; the materials are red brick and stone, and the manner these have been introduced call for approval. They are at least partially successful attempts to impart to warehouse fronts a lighter and less gloomy effect than that of old work of this sort, without encroaching on the domestic or palatial types of design. The windows are wide and open, with sills, lintels, and pilasters of stone, in lieu of brick-arched openings in a solid brick wall, which in their exceeding severity made the fronts look almost prison-like.

THE LONDON SCHOOL-BOARD DRAWINGS.

THE annual exhibition of drawings by scholars and pupil-teachers, sent up by the various board-schools in the Metropolis, is on view this week at the Saffron-hill school in Farringdon road. We can hardly say the exhibition is quite equal to those of former years, yet the drawings are interesting as showing the progress made by the pupils in these schools. The ages of those who have contributed drawings are generally between 13 and 15 years, so that the visitor cannot expect to find any advanced work on the screens. The schools in the Chelsea division, which we may take first, exhibit some creditable work by juniors. We may point with satisfaction to the contributions from the Portobello-road school generally, by pupils from 13 to 14 years old. The drawings are chiefly freehand ornament from the flat. Some of the outlines indicate precision, and a grasp of form which would do credit to pupils of advanced years. The honeysuckle and folial ornaments are in some instances very praiseworthy specimens. We can also speak in favourable terms of the work done in the William-street school, especially that of the girls, in which the ornament shown has much precision of character. The

Saunders-road school sends two good perspective drawings, one of a hexagonal pyramid in perspective, by J. Crossley, age 16. Freehand ornament, evincing careful teaching, comes from Latimer-road, Queen's Gardens, Harwood-road, and Marlboro'-road schools. It would much assist examination and comparison if the several specimens forwarded by one school were arranged in a series and mounted, in the manner in which those from the Marlboro'-road school are done. The pupils' names are neatly written in red under each drawing, and these are executed on the same toned paper and mounted. A very miscellaneous assortment of studies comes from Victoria-road school, and we see a few comic ink copies from prints, made by a pupil of the Clifton-road school. It is very questionable whether such copies are judiciously allowed in schools; we certainly think they are not strictly artistic drawing, however clever they may be. Such a drawing as that in pencil by a pupil of Glengull-road school, Tower Hamlets, representing "Long Branch, New Jersey, the House where President Garfield died," is a praiseworthy attempt to unite art with incident, though the effort is manifestly out of proportion with the capabilities of the youthful aspirant. The same may be said of an "Italian Landscape" close to it. Brunswick school, in the same district, sends some clever outline drawings by girls. Greenwich is not distinguished this time for its art-work. The copies in chalk of heads sent by the Edward-street school, and the tawdrily-coloured illuminated text by a pupil of Powis-street school, "God our Home," are instances of art training which ought not to be encouraged in our schools. It is teaching the pupil to run before he can walk. Drawings of a pictorial kind are ill-suited to train or to promote a pupil's accuracy of hand or eye; pictures are apt to wean the attention from those essential points of good perspective and drawing which are so absolutely necessary. We find, however, several drawings of this class hung. Fleet-road school, Marylebone, and several of the Lambeth board-schools, as those of Westmoreland-road, Penrose-street, &c., have specimens in which pictures and prints have furnished the copies. Hackney is well represented in the exhibition, and the work of the schools of this district is on the whole creditable to the masters. We may mention more particulars the Turin-street school girls' drawings, in which carefully drawn outlines of vases and ornament are the chief objects. The Scrutton-street school free-hand studies are also commendable in both the boys' and girls' departments. The schools at Gainsborough-road, Rendlesham-road, Berger-road, Cadogan-terrace are the contributors of some well-executed pencil perspective and freehand ornament. Rendlesham-road sends a few capital copies of architectural ornament and pottery. Marylebone is also represented well, as in the work of Medburn-street school, Aldenham-street, Bath-street schools.

Finsbury takes the place of honour for the neat and uniform way in which the Poole Park school drawings are mounted and hung. These have been selected and are arranged in an artistic manner on large mounts. The freehand ornament and flower drawing are highly commendable to the managers of this school of both departments. In one of the large mounts, a series of studies of Greek and Italian ornament, and others of a geometrical character, have been arranged symmetrically, some of them having been simultaneously drawn from copies on the blackboard. The girls' drawings have been similarly arranged, and the shaded ornament and flowers reflect credit. Canonbury-road school exhibits a few good

drawings, so does Duncombe-road and York-road schools. Seven Dials and Thornhill-road are also among the number. Southwark and Lambeth make a goodly show of drawings; the latter are of a somewhat heterogeneous character and not well selected, though a few schools contribute good specimens. Of the Southwark schools we may mention Keeton's-road as standing well; Rotherhithe-road and Hatfield-street schools are too pictorial, and better work in the elementary standards would be more satisfactory evidence of progress.

SCOTLAND IN EARLY CHRISTIAN TIMES.*

THE second series of the Rhind Lectures on Archaeology, abstracts of which have appeared from time to time in our pages for 1880, has just been published. The author, Mr. Joseph Anderson, keeper of the National Museum of the Antiquaries of Scotland, in the present volume continues the subject of his previous lectures on the remains and relics of Early Christian times, by describing a variety of art-relics of indigenous types found in Celtic Scotland. Mr. Anderson has ably classified these relics, which consist of decorative metalwork, such as gold, silver, and bronze brooches of Celtic design; decorative stonework, comprising various groups of monuments with pictorial and conventional symbols, he also discusses the symbolism of the monuments, and the inscriptions found on undated monuments of the 12th century. Increased interest and value are given to these descriptions by numerous wood-engravings and photographic reproductions which represent every type of the art work of these interesting ages. One of the beautiful relics of artistic workmanship in gold and silver is the Hunterston brooch, found by a shepherd in 1826. It is circular in shape, about 1½ in. diameter, with a pin 5½ in. in length. The brooch consists of a flattened ring of silver half an inch wide, expanded to a crescent shape on one side. The design is symmetrical on each side of the pin. The surface of the ring is divided into panels or sunk spaces, and the corners of the crescent-shaped portion are relieved by amber settings. The panels are farther enriched by filigree interlaced forms, the character of which is zoomorphic, characteristic of Celtic art as we see it in illuminated manuscripts of the Gospels. The edges are also decorated with long panels of simple interlaced patterns, the diverging spiral and trumpet pattern been introduced. The author says, "The elegance of its design is almost equal to that of the best manuscripts," and cannot be surpassed by modern art workmanship, while the ornamentation shows a pure feeling and delicacy not to be found in metalwork of our age. The inscriptions are in the later and more local variety of the Runic alphabet known as the Scandinavian, and refer to ownership. The author proceeds to inquire whether this brooch is Celtic or Scandinavian, and examines a series of brooches decorated with the same art found in various parts of Scotland. All the examples illustrated are of this half-crescent form. The Sutherland brooches have indeed a special form, the ends of the ring of metal expanding into circular compartments, and their decoration consists of very delicate patterns of interlaced work of gilt. One of the most interesting examples of design is a fragment of a silver brooch inlaid with gold found at Dunbeath, Caithness. It is a fine specimen of Celtic work, the most perfect, says Mr. Anderson, that he has ever seen. The decoration shows panels in the crescent part, a fine cable border running round, and the centres and

borders filled with delicate filigree of curvilinear form. Illustrations are also given of the priceless Tara brooch, and others of extreme beauty in form and decoration. The author distinguishes the characteristics of this peculiar type of brooch as penannular, or a ring of metal not continuous, but having an opening between the two ends. The Anglo-Saxon brooches are disc-shaped, the Scandinavian, oval and bowl-shaped. On the other hand, these are essentially Celtic in the style of the Christian time.

We cannot afford room to follow the author in discussing the question of the area of this type of brooch. The Celtic forms are found mixed with those of Scandinavian origin in the same graves, but the presence of Christian Celtic relics in heathen burial-places in Norway is easily explained by the fact that the latter country was heathen for fully four centuries after Christianity had been established in Scotland by the followers of St. Columba, and that the Vikings were continually engaged in plunder across the North Sea.

Lecture II. describes a series of monuments of stone, consisting of finely-sculptured slabs and crosses of Celtic form and ornamentation. Some of these were discovered in an old church, St. Vigean's, in Angus, in which they had been utilised by the 12th-century builders. One slab bears an elaborate cross of interlaced work, the spaces between the cross and raised edging being filled with grotesque figures of non-descript animals. The lacertine creatures with twisted tails found in the metalwork we have mentioned are found here also, showing the art to be of the same age and character. Other fragments of sculptured stone consist of portions of cross-slabs, free-standing crosses, &c., all sculptured with ornament and figure subjects. The example engraved from Aberlemno, Forfarshire, shows a richly-sculptured cross with interlaced ornament, with convoluted and intertwined creatures of dragon-like form in the borders, in all respects like the forms seen in the Celtic MSS. of the Gospel, while on the reverse side is a sunk panel, with a symbol of mysterious import, and figures of men and horses engaged in combat. The slabs found in Perthshire, and illustrated by photographs, are beautiful specimens of Celtic ornamentation, and the plates give excellent representations of these very remarkable sculptures. At Meikle, another group was found of a similar or Transitional character, which are described in detail, and the peculiar features of these slabs are a cross on one side, with figures and symbols on the reverse, the ornament being interlaced work, spirals, and fretwork. Oblong, boulder-like stones, with symbols of simple incised lines, instead of relief sculptures, are associated with these shaped slabs, and the author discusses the area they occupy, which is the same as the decorated type. The inscribed and decorated slabs have been assigned to the period between the 7th and 12th centuries. The first limit is thought conjectural. The author thinks the higher phase of monuments carved in relief was probably developed in Ireland at an earlier date than in Scotland, and he, therefore, assigns the decorated monuments of Scotland to a later date than the commencement of the 10th century, and the incised monuments to a period immediately preceding. In another lecture, the art characteristics of these monuments are discussed at greater length, and the author compares the peculiar features, and endeavours to determine their relations to the Early Celtic art found in metalwork and manuscripts. The plates and engravings exhibit many beauties of interlaced work, fretwork, and other kinds of surface ornament, and these are analysed. Endless modifications of the rectilinear fret appear, which show affi-

nities with Greek and Oriental patterns. "No nation," says Mr. Anderson, "ever developed the capacities of the rectilinear form of ornament in the special manner we find in Celtic manuscripts and monuments." Space forbids our entering into the subject of the symbolism of the monuments, discussed in the fourth lecture. The symbolism of the Scottish monuments is possessed of a double character: it is of independent origin, but there are representations which are also variants of universal types, disguised and degraded in their passage from the higher art of the Primitive Church to the later local art of the Celtic Church, which was always weak in pictorial representations. These consist mainly of Scriptural subjects, intermingled with grotesque and fabulous and allegorical forms.

Ogham inscribed stones are also included, and the author has generally presented the various relics and types in a scientific order, which cannot fail to lend to the study of Early Scottish archaeology an interest it undoubtedly possesses when rightly understood.

THE WATER QUESTION.—XXI.

PRESSURE.

THE force and mode of action of water under pressure along and at the end of a main pipe may be worth considering in connection with its storage in reservoirs such as have been described. The pressure of still water is the weight of a vertical column of it above the place where the pressure is measured; but still water does no work, and when the column is in motion the pressure is less. The weight of water is as follows, the foundation being the Troy grain, 5,760 of which used to make a pound weight; but this pound not being satisfactory for general purposes in England, the pound weight was increased to 7,000 of those grains. An Act of Parliament made a gallon of distilled water at the temperature 62° F. to weigh 10lb., or 70,000 grains, in air of the density produced by a pressure equal to the weight of a column of mercury 30in. high; and established also, from experiments which had been made by a commission, that a cubic inch of distilled water at the temperature and pressure above mentioned weighs 252.458 grains. A cubic foot therefore weighs $252.458 \times 1,728 = 346,247$ grains, or $\frac{346,247}{7,000} = 62.321$ lb. In half a dozen different tables of the weight of mercury, compared with that of water, six different values may be seen—viz., 13.56, 13.568, 13.57, 13.58, 13.596, and 13.6. When tables differ, what is the proper weight? The difference seems to arise from comparing the weight of mercury at one temperature with that of water at another, in some cases, and in other cases in taking water sometimes at the temperature 39.2° F., when it is at its greatest density, and at other times taking it at the common temperature of 62° F. This latter is the more useful for ordinary purposes. At 62° F. mercury is 13.596 times heavier than water. The pressure of the atmosphere then is the same as a column of water $\frac{30 \times 13.596}{12} = 33.99$ ft. high, or 34ft., and the corresponding pressure per square inch is $\frac{34 \times 12 \times 252.458}{7,000} = 14.71$ lb. When the mercury rises to 30.5in. the pressure is 15lb. nearly per square inch. But as the weight of the atmosphere is often less than 30in. of mercury, and sometimes only 28.5in., it is the minimum pressure which should be reckoned upon in practice in order to guard against failure of action at all times. This is $\frac{28.5 \times 13.596}{12} = 32.29$ ft. of water, and the corresponding pressure per square inch is

* Scotland in Early Christian Times. (Second Series.) By JOSEPH ANDERSON. Edinburgh: David Douglass.

13.97lb. or 14lb. As the head of the column of water is open to the atmosphere equally with the point at which the pressure is applied, this pressure is "above the atmosphere," and although there may be a little difference between the pressures of the atmosphere at the two ends of the column, measured at the same instant, if the pressure reckoned upon be that of the minimum there will be no failure of effect.

The weights above mentioned relate to water without admixture of other matter; common water contains in solution heavier matter than water itself, derived from the ground through or over which it runs, and in practice a cubic foot is taken to weigh 62½lb. and to contain 6½ gallons.

In the case of a pipe conveying water from a reservoir to the place where it is to be used, the column of water divides itself into two portions, and the pressure at the lower end of the column is according to the height of the lower portion. The upper portion, being that part of the whole column between the top of the virtual column and the level of the water where it meets the atmosphere, is the head of water, which feeds the column as fast as it descends by the force of gravity. In a pipe of any given diameter, as 1ft., the resistance of the sides of the pipe to the motion of the water is proportionate to its length, for it is proportionate to the area of surface with which the water runs in contact; secondly, it is proportionate to the velocity of the water, for it is proportionate to the number of particles of water in contact with a given length of pipe, as 1ft., during any given time, as one second. But the head of water required to supply the force of which the column of water is robbed in overcoming this resistance must be as the square of the velocity, for not only is it thus simply proportionate to the velocity with which the water moves, but it must be replenished as fast as it runs away. If the length of pipe in contact with the water during one second be twice as great in one case as in another, then there will be twice the resistance due to that cause, requiring twice the head to overcome it, and at the same time the water will run away from the head twice as fast, and require twice the length of pipe full of water to replenish it in the same time.

The head, therefore, is as the square of the velocity. Now as the altitude of the proper head cannot be increased, but remains at the same level, nearly, whatever the velocity in the pipe may be, the only way in which the head can be increased is by taking from the length of the real column the height which may be necessary to give the required velocity—increasing the head at the expense of the real column, and thereby reducing its effective pressure. The same effect may be shown by substituting actual pressures for heads of water, in a horizontal pipe, such as a pumping main. At a point on a line of main be three sections of it be marked off, of equal length, say 1ft., in the direction in which the water flows, and let these sections be numbered 1, 2, and 3 from the point of observation. From the same point let three other sections be marked off, of the same length, in the direction from which the water comes, and let these be called A, B, and C, and let them be bodies of water. Let the diameter of the pipe be such that each body of water requires a pressure of 1lb. to be given to it to overcome the resistance of each of the sections 1, 2, and 3. Then let three operations be performed:

1. A moves through section 1, requiring a pressure of 1lb. 1
2. A and B move through sections 1 and 2, A requiring 2lb. and B 2lb. 4
3. A B and C move through sections 1, 2, and 3, A requiring 3lb., B 3lb., and C 3lb. 9

Then if each operation is performed in the same time, as one second, the pressure required is as the square of the velocity.

If feet vertical of water be substituted for lbs. pressure the illustration serves equally for a head of water.

In respect of diameter: in pipes of different diameters the resistance is inversely as the diameter. The resistance is, indeed, directly as the area with which the water runs in contact, which, in the same length of pipe is as the circumference, and therefore as the diameter, and a diameter of two offers twice as much resistance as a diameter of one; but the distance at which it acts—the radius of the pipe—is twice as far removed from the axis (the point in which there is no resistance), and this, be it remarked, in two opposite directions, so that the effect of distance is as the square of the radius, and, therefore, of the diameter; the resistance being direct in its action, and the distance at which it acts inverse, the result is that the resistance is inversely as the diameter.

These several forces and resistances are formulated thus:—

Let v = velocity per second.

l = length of pipe.

d = diameter.

h = head of water.

$$\text{Then } c^2 = \frac{v^2 l}{d h}$$

in which c is a constant multiplier deduced from experiments to be 2,500 when all dimensions are taken in feet. This is the value of c according to Eytelwein's deduction for long pipes. The velocity, then, in feet per second is $v = \sqrt{\frac{2500 d h}{l}}$ = 50 $\sqrt{\frac{d h}{l}}$; and the diameter is $d = \frac{v^2 l}{2500 h}$. This is the usual

requirement in the case of a pipe to convey water from a reservoir to the place where it is to be used, for in such case the height and length are fixed, and the velocity must be limited so that at its maximum it may do no harm to the pipe by its violence, and so that branches derived from it may be duly filled, and so that a sufficient working pressure be given.

When the pipe is several miles in length the rule is converted into a form expressing the head of water in feet per mile by dividing 5,280 by 2,500, in which l is eliminated, and $h = \frac{2.11 v^2}{d}$. If the velocity be made 3ft. per second, $h = \frac{19}{d}$, and the pressure of water running with that velocity would be, at the distance of one mile from the reservoir, less than that due to the whole height of the column by $\frac{19}{d}$.

It might seem that the pressure would be that due to the whole height less such a head as is required to produce the velocity considered as falling water merely, which would be $\frac{v^2}{64}$; but although that is so in open streams, which are in train, it is not so in pipes under pressure. In this case, as in the other, there is a certain gradient h , e, which, if drawn straight between the head of water in the reservoir and the height due to the pressure at the end of the pipe, is the gradient which that pipe would necessarily take if it ran full, but only full, that is without pressure on the highest part of its circumference; and the pressure at any part of the length of a pipe is that due to the vertical height between the actual position of the pipe and that gradient, which is the "hydraulic gradient." There being thus a gradient line in all conduit

pipes, there must be a length at which there would be no pressure, supposing the pipe to be prolonged so far from the reservoir, and there the water would simply run out of the end of the pipe with the velocity due to the gradient. This length is found as follows:—

Substituting H , the whole head, for h , the head which is due to the velocity v ,

$$l = \frac{2,500 d H}{v^2}$$

For example, let $d = 2$ ft., $H = 100$, $v = 3$,

then $l = \frac{2,500 \times 2 \times 100}{9} = 55,555$ ft. Thus

at the distance of 10 miles or so there would be no pressure in a pipe 2ft. diameter and 100ft. below the reservoir, and it could not carry the water farther than 55,555ft. with a velocity of 3ft. per second; beyond that distance the velocity would diminish, unless an actual gradient were immediately given to the pipe equal to the hydraulic gradient; but that being done, the same velocity would continue to any distance, if the diameter remain the same; the stream of water through the pipe would then be "in train," the forces acting upon it being balanced by the resistances, and it would flow under the same conditions as a river. But if pressure were required, there would need to be either a greater head, a shorter length, or a larger pipe. The conditions to be determined beforehand are (1) the quantity of water required, (2) the pressure required, (3) the height at which it is to be supplied above a fixed datum level; and (4) the height of the reservoir above the same datum.

In one of the examples previously referred to, the quantity of water for supply was found to be 3,000,000 gallons a day, after leaving to the stream one-third of the total available quantity. If the distance at which this quantity were required to be delivered were 5 miles, and the height of the storage reservoir above the service reservoir into which the water would be delivered were 150ft., the following conditions would ensue. The quantity per second corresponding to 3,000,000 gallons

a day is $\frac{3,000,000}{540,000} = 5.55$ cubic feet. If

the velocity be limited to 2ft. per second,

the diameter would be $d = \sqrt{\frac{5.55}{2.5 \times .7854}}$

$= 1.68$ ft., say 21in. The head would be $h = \frac{5,280 \times 5 \times 6.25}{2,500 \times 1.68} = 39.29$ ft., say 40ft. The

effective head would be $150 - 40 = 110$ ft., and the pressure per square inch $\frac{110 \times 62.5}{144}$

$= 47.7$ lb. at the end of a 21in. main 5 miles long.

Upon a line of conduit pipe such as this there may be taken off one or two branches. Say that one-sixth of the water is wanted at three miles distance from the reservoir, and another sixth at four miles, leaving 2,000,000 gallons per day to go to the far end. If the same velocity were preserved throughout, the square of the diameter of the pipe would be reduced one-sixth at the first branch, and one-third at the second. Thus, the first length of three miles being 21in. diameter, the second length of one mile would be 19.18, or, say, 20in.; and the third length of one mile 17.14, or, say, 18in. Each branch takes off 500,000 gallons a day, and, preserving the same velocity, the diameter of each would be $\sqrt{\frac{21^2}{6}} = 8.5$ in., or

say 9in. The effective head in the main conduit pipe at the point where the first branch is derived would be found by deducting the loss of head due to its distance

from the reservoir, three miles, which would be $\frac{3 \times 40}{5} = 24\text{ft.}$, from the difference of altitudes of the reservoir and the branch above the datum. For the second branch the deduction would be rather greater per mile, the diameter being less, while the velocity is the same, for the head is inversely proportionate to the diameter, according to the formula $chd = v^2 l$. Thus if the loss of head due to a velocity of $2\frac{1}{2}\text{ft.}$ per second in the 21in. pipe be 8ft. per mile, it would be in the 20in. pipe $\frac{21 \times 8}{20} = 8.4\text{ft.}$ per mile, and in the 18in. pipe $\frac{21 \times 8}{18} = 9.4\text{ft.}$ per mile. Adding together the losses of these three lengths—viz., for the first three miles, 24ft. , for the fourth mile, $8\frac{1}{2}\text{ft.}$, and for the fifth mile, $9\frac{1}{2}\text{ft.}$, the total loss at the end of the five miles would be 42ft. , instead of 40ft. , as it would be if the full diameter were continued to the end, and the quantity delivered were $3,000,000$ gallons a day.

ARCHITECTURAL ASSOCIATION.

THE first ordinary meeting of this Association for the present session was held on Friday evening, the President, Mr. Aston Webb, in the chair. In opening the proceedings the PRESIDENT remarked that it was usual to take the annual report and balance-sheet as read. Was that the pleasure of the meeting? Mr. BLASHILL said he had very great pleasure in moving their adoption. At the same time, he must congratulate the Association upon the great advance, the extremely great advance, in the number of members which had taken place, and on the great increase in the amount of work done by the Association.

The Annual Class Reports, instead of being read *seriatim et verbatim*, as in former years, were also taken as read, being printed and distributed in the room—an innovation which considerably curtailed the preliminary business, and allowed of more attention being given to the address. The report spoke of work done as considerably above the average in quality, but generally complained of the scanty attendance at the classes in proportion to the largely augmented numbers of members in the Association. The exception to the latter rule was the Elementary Class of Design, in which the members had increased by 50 per cent., and the number of designs executed had been more than doubled.

A list of 63 nominations of intended members was read amidst applause, and a general vote of thanks was, on the motion of Mr. Eales, hon. secretary, passed to the entertainment committee, exhibitors, and all who assisted in making the opening *conversazione* a success. The PRESIDENT mentioned that he had received from the Chairman of the Working Men's Club and Institute a letter asking that some of the members should conduct parties of working men over buildings in progress on Saturday afternoons,—a proposal which the President said would tend, if carried out, to bring about a good feeling between architects and artisans. The PRESIDENT then delivered

THE INAUGURAL ADDRESS.

This was arranged under two heads—the first part dealing with matters of immediate interest to members of the Association, the second with the more general question of architects' education and training. Having detailed the new arrangements as to classes rendered desirable by the compulsory examinations, which now guard the admission into the Institute, the President mentioned that the special courses of lectures on Design and Construction, to be given by Messrs. Tarver and Blashill, would not be in any sense of a "cramping" character. While the quality of the work done in the classes was good, it was unsatisfactory that no more than about 120 out of their 860 members were working in the classes, and the aims and objects of the Association were not at present fully achieved. The necessity to attend classes regularly and to systematise study was now more urgent than ever, for, as Professor Roger Smith had observed, the law of the "survival of the fittest" was inexorable in the profession.

Having reviewed the condition of the library, the annual excursion, and other auxiliary features of the Association, the President remarked that students were now well supplied with encouragement in the form of prizes. Besides the very valuable ones offered by the Academy and the Institute, this Association awarded nearly £70 a year in this way, including the recently-founded travelling studentship. It was to be regretted that the competitions for these prizes were not keener, and that many members who worked well in the classes were too diffident to enter the lists for the rewards. Unless there was an improvement in this respect, it would be a serious question with the committee whether the money now expended on the Association medal could not be better utilised. While criticising these matters, he also thought there was room for great improvement in the discussions at their fortnightly meetings, where the speaking was almost always left to a few senior members. Opinions, except in the matter of traps, were not now held decidedly nor freely discussed. The spirit of liberalism seemed to have spread from religion to art, and men were inclined to think that while their own views were possibly right, they should be equally ready to admit that directly contrary ideas might also be correct. Mr. G. E. Street, in his opening address at the Institute, had very kindly alluded to the Association, expressing further a decided opinion that some means might and ought to be devised for enabling "that active body" to join the Institute. The proposition was not by any means broached for the first time; but coming from Mr. Street, it demanded fresh consideration. Speaking for himself, he did not think that any one was hindered from joining the Institute or working in it by membership in the Association; indeed, he found from the "Brown Book" that six of the members of the Association sat at the Council of the Institute, whilst 51 were fellows, and no fewer than 170 associates of that body. He thought that members of the Association did take part in the affairs of the Institute whenever they could be of use; that they should speak much at the meetings of that body was hardly to be expected, or perhaps desired. Should any scheme be submitted in furtherance of Mr. Street's views it would receive careful attention; but the system on which the work of the Association had been gradually built up, had succeeded so well, and the prosperity of the Institute had also been so largely increased that, for himself, he believed they supported the Institute more in an independent position than would be possible in any other way, and that the present arrangement would become still more useful in the preparation of students for the membership examination. Each body had a work of its own—the Institute as the representative professional body before the world; the Association as the educational and preparatory society.

He would now pass on to consider in detail his second and more general topic, viz., how could his opportunities best be utilised by a student entering the profession? Ample as were the educational advantages of an architectural pupil, his training was of a most haphazard, disjointed, and altogether inadequate nature, quite unfitted to prepare a man for the intricate and ever-increasing duties of the profession. At present all the subsidiary means of education, beyond those of a practical kind supplied in an architect's office, were to be had only in the evening, when the pupil, if he had worked hard all day, could not bring a fresh intellect to bear upon his tasks. What was wanted was a college or school where a student could spend one or two years in systematic and theoretical education before entering an architect's office. But taking the means of education as they existed, the London pupil should follow some such course as this. In the first year he should attend the Elementary Class of Design, and read at home such books as he was recommended and could obtain. In the second year he should join the Class of Design, and also that of Construction, aiming at a prize in one of them; during his holidays he should spend part of the time in sketching, and publish some of the results in the A.A. sketch-book. In the third year he might with advantage attend the lectures at University or King's College, in addition to either the Class of Construction or Design at the Association; he should also compete for the measured drawings

prize. In the fourth year he should become a student at the Academy, join the Colour or Advanced Construction Class, and compete for the A.A. Travelling Studentship. In the fifth year he should work at the Academy and at one of the Association classes, probably as one of the officers, and compete for the Pugin Studentship or Soane Medallion. After this he should take a trip abroad, and on his return compete for the great prizes offered at the Academy. At the same time he has gone into a rather office for further experience, or has commenced practice on his own account. Such a curriculum would vary with circumstances, but if students laid down for themselves some such order of study and worked to it from the commencement, they would find the various opportunities more useful to them than they were at present. This question of education affected the tone and attainments of the profession as a whole, and had much to do with its influence upon the public. Another matter of interest at the present time was, as to how far the archaeological side of the art had too much engrossed attention, and how far it should form a portion of architectural education? Archaeology to architecture was as grammar to language, and without a knowledge of styles and their history and sequence, design was impossible. The originality now so much aimed at was never evolved from ignorance of what had already been accomplished. Archaeology, while a *sine qua non* to the student, could yet be carried too far, and, directly a young man made notes of detail for the purpose of "working them in," he left his position of designer for that of copyist. The great movement for church restoration led to much of this archaeology, and was, perhaps, responsible for the general want of originality, and for the present lack of enthusiasm in the art. The principal questions of the day for architects were of a negative character; "We ought not to restore any more churches." "We ought not to take out our own quantities." "We ought not to go into competitions," and the *British Quarterly* had laboured to prove that "We ought not to have too much work to do." None of these questions were likely to stir up much enthusiasm. The Anti-restoration movement was started only when restoration was almost drawing to a close. Opinions as to taking out quantities seemed very evenly balanced, for those who took them out saw no harm in it, and those who did not thought it better to leave quantities alone. The competition question had been laid to rest by an almost unanimous expression of opinion in favour of the appointment of a referee—an excellent arrangement, especially for the referee. The *British Quarterly's* complaint that pluralism was the crying evil, was certainly not the special grievance amongst architects generally. Recurring to an earlier subject, the place of archaeology in art training, he thought students required, in addition to a thorough knowledge of previous styles and edifices, a more careful study of the best buildings of our own day, and an effort to avail themselves of modern improvements and inventions as they were brought forward. For example, Sunday-schools and middle-class private schools afforded a large field for improvement and ingenuity in planning, while the adaptation of sanitary improvements to the architectural treatment of our houses was another matter yet to be satisfactorily dealt with. Water-colour sketching, and the design of furniture or carpets, however enticing, were not part of the real work of architects. There was an art of great opportunities, and no matter how small or insignificant a work might appear, if designed with thoughtful care it must possess an individuality of its own, and must be of enduring interest to others. In conclusion, the President quoted a stirring sentence from Carlyle, urging the student to be up and doing, and to work with all his might.

Mr. J. DOUGLASS MATHEWS proposed a vote of thanks to the President for his practical address. He quite agreed with his views as to the suggestion so courteously expressed by Mr. Street, for a fusion of the Institute and Association. It was not surprising that the vigour and progress of the latter body should attract attention in the more august assembly upstairs, and that they should wish it to be united to their own society. He trusted, however, that such a decided expression of opinion would go forth from the members that the idea would be dropped. (Applause.) The very success of the Association had been its perfect freedom, its

self-government and independence, and any attempt to connect them with another society would introduce the feeling of being overlooked in their work. At the same time the two bodies were in perfect harmony with each other; by their class arrangements in preparation for the examination, the Association had shown that they recognised the intention of the Institute, and wished to act so as to support it. While, therefore, preserving their independence and freedom, they showed that membership of the Institute was the intended "goal"—(laughter and applause)—no, goal of their members.

Mr. BLASHILL, in seconding the motion of thanks, said their President's sober advice as to a curriculum for architectural students must prove of great use to the younger men. Like the previous speakers, he should regret if the kindly meant suggestion of Mr. Street for a fusion were carried out. The more gentlemen connected with the Institute made themselves acquainted with the history, scope, and work of the Association, the more clearly would they see the impracticability of the proposal. At the same time, they were in true harmony with the Institute. Many years since there was some antagonism manifested, and the Association flagged as a consequence. A new committee was elected with fresh blood, the desire being more amicable relations with the Institute, and from that time, exactly one-and-twenty years since, the progress of the Association had been uniform. As one of the new members of committee appointed at that time, he had considerable interest in recalling the facts.

Mr. E. C. LEE (ex-President) supported the good advice to young men offered in the President's address, and cordially congratulated him on the prospects of the session.

Mr. LACY W. RIDGE trusted that the Association would possess her soul in perfect confidence as to the suggested fusion. It was an amiable idea likely to occur to Mr. Street as he surveyed the world for the first time from the throne of the Institute; but it would never, he would predict, come forth from the room in which it was mooted. The feeling even of the Council of the R.I.B.A. would be so opposed to making another offer that the Association need not be perturbed. It was not only true, as Mr. Webb had shown, that the Association had been an important feeder to the higher body, but it was about to organise a still greater aid in sending up young men well prepared for the compulsory examination.

Mr. J. A. GORCH said he should have liked to have heard some suggestions as to the problem of a new style. He wished to see a really satisfactory conservatory, an æsthetic cloak-room, and a perfect skylight. The curriculum sketched by the President was an excellent one, but the common complaint amongst senior architects was that the young men were too apt to make the theatre and the restaurant their places for evening study.

Mr. H. H. STANNUS thought Mr. Street's suggestion had been misunderstood. It was not a mere "amiable idea" for a fusion, but a distinct scheme for permitting delegates elected by that association and kindred bodies in Manchester, Leeds, Birmingham, Edinburgh, &c., to sit at the council of the Institute, and assist in their deliberations. That was a very different matter, and in his opinion quite practicable.

After some remarks from Mr. SYDNEY VACHER, on the desirability of framing, in committee, with legal assistance, a satisfactory model agreement for articled pupils, Mr. S. F. CLARSON put to the meeting the vote of thanks, which was carried by acclamation, and was suitably acknowledged by the President.

LECTURES ON HORTICULTURAL BUILDINGS AT THE CRYSTAL PALACE.—I.

A COURSE of three lectures on the "Construction, Fittings, and Heating of Green-houses and other Horticultural Structures," illustrated by numerous diagrams, models, &c., is being delivered on successive Wednesday evenings, by Mr. F. A. FAWKES, of 4, Queen Victoria-street, E.C., author of "Horticultural Buildings," before the members of the Crystal Palace School of Gardening and the public. Of the first lecture, given on Wednesday, the 16th inst., at 5 p.m., we publish to-day a report.

In his opening remarks the lecturer mentioned that he proposed to explain in these lectures some of the principles of horticultural construction and the modes of applying these principles to practice, and that he should leave to others the consideration of everything having reference to cultivation proper. He would first give a few general hints on the designing of green-houses; then he should discuss some scientific facts which it was absolutely necessary to know; next he proposed to look at each class of green-house; and finally attempt an analysis of some of the details of construction. If you are consulted regarding the erection of, say, growing-houses, obtain, the lecturer observed, a clear idea what and how much is required to be grown, and, if possible, the amount of money

them to be erected in a substantial, efficient manner, you find they will cost more money than is at immediate disposal. It is better to dispense with the two outer lean-to's for the present than risk the ruin of the whole range by either making all the five lean-to's smaller or else sacrificing materials and workmanship. Never attempt to cover the maximum area at the minimum cost. The variations of temperature to which horticultural buildings are exposed necessitate greater care in choice of materials and in working than almost any other description of buildings. When the houses are built the designer's moral responsibility does not end; in planning, the question of the amount of labour which can be subsequently spent in them must not be lost sight of. It is preferable to build a given quantity of glass with the certainty that it will be efficiently and carefully worked afterwards, than to build double the quantity with the possibility that it will be neglected.

Since the form, the position, the proportions, and even the dimensions of glasshouses depend upon the sun, it is of primary importance that we have clear ideas about the sun and sunlight. You are all aware that the sun does not rise exactly in the east and set exactly in the west, nor does it attain the same altitude all the year round. In point of fact, the sun on the shortest day rises about 50° east of south, attains a height of about 15° above the horizon, and sets about 50° west of south. On the longest day it rises about 50° east of north, attains a height of about 62° above the horizon and sets about 50° west of north. The sun thus occupies between the longest and the shortest days positions between the two points indicated. Thus Fig. 1 gives the angle of the sun's maximum altitude during the longest day; Fig. 2 maximum altitude on shortest day; Fig. 3, the points on the horizon of the sun's rising and setting on the longest day; and Fig. 4 similar points for the

FIG. 1.

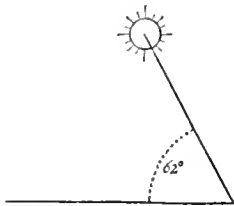


FIG. 2.

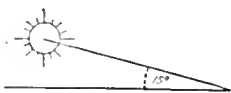


FIG. 3.

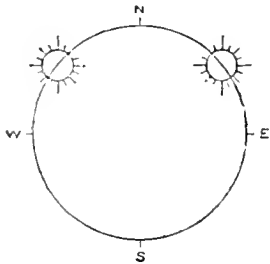


FIG. 4.

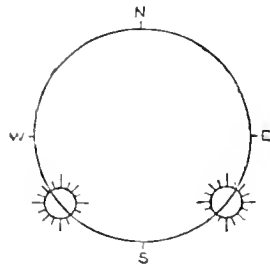


FIG. 5.

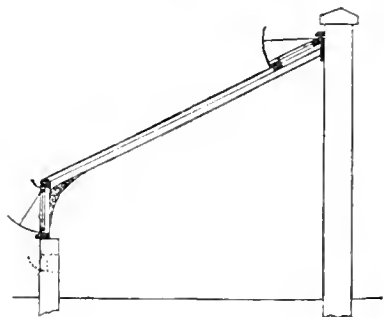
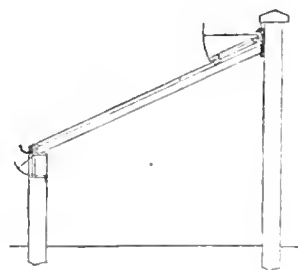


FIG. 6.



proposed to be expended on the houses. Examine all the contingent conditions, such as aspect, site, soil, drainage, levels, most suitable dimensions and combinations of houses, position of boiler, and necessity for subsidiary buildings, such as potting-shed, tool-house, fruit and seed-rooms, &c. Having grasped the situation, you can, with the greater likelihood of success, commence planning the required houses. If, after you have formulated your plans, you find the cost requires to be reduced, you have three courses open to you: you can retain the dimensions, but cut down the cost of workmanship and materials—a fatal policy; or you can reduce the dimensions of your houses, retaining the same workmanship—a better course to pursue; or the plan may remain, but part only of the work be carried out. If your plans represent necessary erections, the last is by far the best course to pursue. Suppose, for instance, that a range of five lean-to houses must be built, and that after you have planned

shortest day. In these diagrams the morning sun always occupies the right-hand side and the afternoon sun the left-hand half. Farther, when the sun's rays strike a sheet of glass, some of the rays cannot pass through, the proportion of obstruction depending on the angle at which they impinge on the glass. The more nearly the impinging rays approach a right angle the smaller is the proportion of light lost in transmission, and it is therefore important that one glass roof shall be set at as nearly right angles to the sunlight as possible.

We must now pass on to consider the forms of simple growing-houses and the reasons for their assuming these forms. The first and most natural form is the lean-to, which is shown on four of our diagrams: Fig. 5, a lean-to with

front lights, and Fig. 6, a forcing-house without these adjuncts; Figs. 7 and 8 illustrate

Fig. 7.

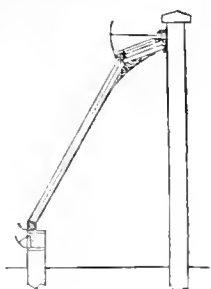
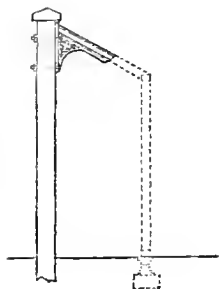


Fig. 8.



sections of wall tree covers. The lean-to is used when a wall or building already exists against which it is desired to place a house; when a wall is specially built to give protection on north and allow of houses facing the south; when the exigencies of plants need it; when the maximum length of rafter is required; or when, with an existing wall, a house having a given area is wanted at the smallest cost. Other things being equal, a lean-to is easier to heat than a span-house. The best position, of course, for a lean-to is facing south; but even then, with a

Fig. 9.

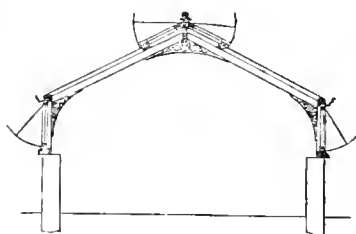
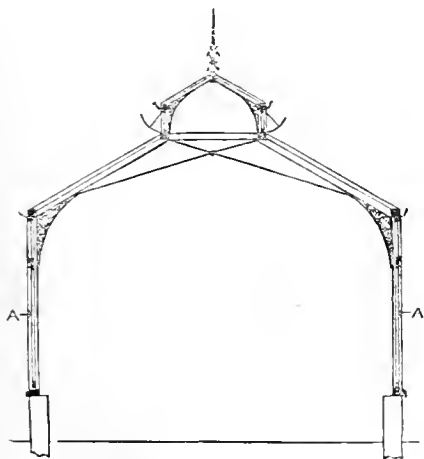


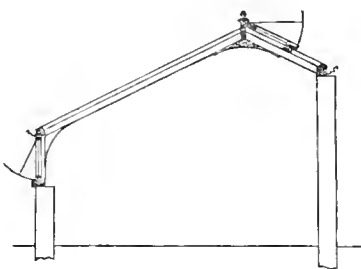
Fig. 10.



wall at rear running east and west, part of the early morning and late evening sun will be lost during part of the year. If the wall does not face south the morning or evening sunlight will be lost in exact proportion to the inclination towards west or east.

The next simple form of house is the span, of which Fig. 9, a section of an ordinary plant-house with side lights, and Fig. 10, a section of orchard, fruit, or large plant-house (the letters A A indicate casement to ventilators), are examples. This form is used where no high wall

Fig. 11.



exists or is required, for building at right angles to and in combination with a range of lean-to houses against a south wall; when the minimum height is required, so that there may be as little obstruction as possible; when plants require to be within reach, but yet as near the glass as possible; when great length of rafter is not necessary; when the length of house requires to be north and south, and each side needs an equal sunlight. The last-named position, with ridge running north and south, is thus the best for span-houses, but they are sometimes built east and west to accommodate plants requiring various degrees of light. A popular form of greenhouse with nurserymen, is a span-house about 11 ft. wide, somewhat similar to Fig. 9 already referred to. Fig. 11 shows a compromise between lean-to and span, very useful when the back wall of an otherwise lean-to requires to be kept as low as possible; or when it is necessary to let light in at the back, or when the maximum length of rafter is not a *sine qua non*; when a certain inclination of roof

Fig. 12.

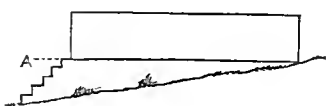


Fig. 13.

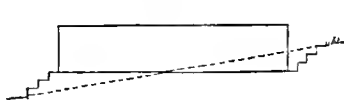


Fig. 14.

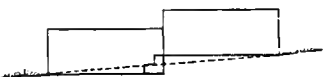


Fig. 15.

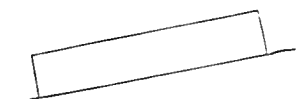
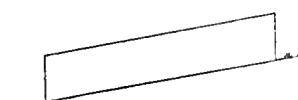


Fig. 16.



is required without altering an existing wall; or when, for architectural purposes an ornamental ridge is advisable, yet the house needs to approximate to the lean-to form. Except as meeting some of these special requirements, or in combination with other houses, three-quarter houses are somewhat ugly.

The most complex arrangement of houses may be split up into one of these three forms, the lean-to, span, or three-quarter span. The same principles regulate a single house or a number used in combination. When several houses are required they should be planned in as compact a mass as possible, with the buildings for consecutive operations placed in consecutive order, with no long undivided houses, so that the boilers are in a convenient position, and so arranged that no building suffers in efficiency through its combination with others.

The site next claims attention. Care must be taken that no trees or other objects obstruct the sun's rays. If the ground be not level, ascertain the direction of fall: if it is in the direction of the length of buildings, the site must be levelled. Figs. 12, 13, and 14, show various methods of levelling, and Figs. 15, and 16, incorrect methods of effecting the same end. The boiler should be, where possible, at the lowest end of site, so as to lessen the amount of excavation. Even supposing the ground is horizontal, the question of floor-levels must be considered, as these must be raised, if there is a difficulty of drainage, or of sinking the boiler to required depth. It may be requisite to sink the floor-line to reduce the obstruction that houses occasion; but in that case great pains must be taken with the drainage. The old plan was to sink all greenhouses, in order to retain as much heat as possible; but with greater facilities for heating this is unnecessary, and to sink the floor increases the cost of the work. Houses comprising one range should, if possible, have their floors on the same level. Parallel disconnected lines of houses may be placed, if necessary, on different levels.

The first and most important part of the construction is the proper pitch of roofs. In order to receive the sun's rays within 10° of a right angle at noon, for 16 weeks before and 16 weeks after the longest day, the roof must, in London, be inclined at an angle of 37° from the horizontal, adding 1° for each degree north, and subtracting 1° for each degree south. In most cases, however, for growing purposes, a lower pitch economises space and artificial heat, and is really more advantageous, a pitch of from 26° to 30° being very suitable. This angle of 26° is equal to a rise of about 6 in. to the foot, one of 30° to 7 in., of $33\frac{1}{2}^\circ$ to 8 in., of $36\frac{1}{2}^\circ$ to 9 in., of 40° to 10 in., of 43° to 11 in., and 45° to 12 in. rise vertical per horizontal foot. For fruit-growing along the rafters from 36° to 40° , would be a suitable pitch, for plant-growing in low houses, from 26° to 30° , and for wall-fruit cultivation, where a narrow, high pitch is advisable, from 65° to 70° may be suitable. With the same width and the same pitch, a span and a lean-to roof contain the same area.

In constructing the roof of a glasshouse three points must be remembered: 1st, obstruction to sun's rays must be avoided as much as possible; 2nd, yet the roof must be solid and substantial; whilst, 3rd, lateral thrust must be avoided. The rafters must be sufficiently deep to sustain the roof, but not so deep as to materially obstruct the light. The lecturer exhibited diagrams of several plain, cheap, forms of roofing, in which iron ties were introduced. For narrow houses iron brackets can be used at wide intervals; but for wider ones, up to about 13 ft. wide, a truss formed by tie-rods and a king-post is suitable as admitting of a very shallow rafter being used. In wider roofs two sets of tie-rods, one to prevent outward thrust, the other to protect the rafters themselves from bending, are necessary, and furnish a remarkably rigid form of roof. Internal pillars are only required in a large house or winter-garden; when introduced into a span-house of 12 ft. or 14 ft. width they evidence improper construction, and would be awkward obstructions in use. The ties for the king-post and double-trussed roofs may be wrought-iron rods, $\frac{3}{4}$ in. to $\frac{1}{2}$ in. in diameter, according to width of house, and should have eyes for bolting to the king- and queen-posts and brackets. All the brackets should be securely bolted to the woodwork. In such a structure the rafters may be from $3\frac{1}{2}$ in. to 6 in. deep; the sash-bars, 2 in. by 1 in.; the mullions, $3\frac{1}{2}$ in. by $\frac{1}{2}$ in.; and the lights, 2 in. The intermediate spaces between rafters may be of framed sashes, the side of each resting on half each rafter, or simple sash-bars may be employed to fill up the intermediate spaces. These sash-bars, although they rest on a plate at top and bottom, require

to be supported by purlins, either of wood morticed into the rafters, or of T-iron, when the mortices will be less weakening to rafters. Not only are the upright sides of some houses formed by sashes, but also the ends and partitions. The advantages are that a house can be taken to pieces, removed, and re-erected without taking the glass out. For ordinary cultivating purposes, however, the "sash" construction is rapidly going out of fashion in favour of the "sash-bar," as the latter is simpler, cheaper, affords less obstruction to light, and less wood-work to rot or harbour insects. This suggests the question, Is iron better than wood, or not? As it is desirable to employ a minimum mass of materials consistent with strength and durability, iron is far preferable, in this respect, to wood. It is also more durable, if well painted; if painting be neglected it will rust, damage the plants, and wear out. On the other hand, iron houses are more costly than wood; heat is conveyed away from the interior rather more rapidly; and unless the glass is carefully put in, it is apt to crack. For these reasons, for growing-houses, wood is preferred to iron. Copper has been used for sash-bars: it is much better than iron, but proportionately more expensive. If wood be used, it is extremely necessary that it be thoroughly seasoned, on account of the varying temperature within and without, and the exposure. If the wood is not well seasoned, cracks will soon appear, in which moisture and insects will be harboured, and the house will soon become useless.

In concluding his first lecture, Mr. Fawkes mentioned another treatment of materials—namely, a happy combination of wood and iron. If the plates, sills, mullions, in fact the absolute skeleton, be made of wood, and the sashes and intermediate sash-bars be made out of a suitable section of T L and sashbar iron—although such a combination may not be usual—the result will be a very light, strong, serviceable house, which will receive the sun's rays in a very advantageous manner.

(To be continued.)

SOME NOTES IN THE WEST.

"DOWN-ALONG" in the far west, the principal Cornish work in hand is undoubtedly the new Cathedral Church of St. Mary, at Truro. The crypt, which in its noble proportions reminds one of that of Glasgow, is fast assuming a tangible form. The eastern wall is 15ft. above the floor-line, and has all its windows and arches fixed. The other walls average 8ft. 6in. above the floor, and have the jambs of their windows in place. The staircase leading to the north and south choir-aisles, is up level to the aisle-floors, and some of the bases of the piers in the choir-aisles are *in situ*. All the piers and capitals, and most of the solid groin springer stones are up—the two easternmost piers of the great central tower are now 11ft. above the floor-line. The concrete forming the floor of the crypt is, of course, all in to its proper level. In every instance, the solid rock was found before putting in the concrete; in places this was 20ft. down. It will be remembered that Mr. J. L. Pearson, R.A., fought hard for the preservation of the ornate south and east wall of the old church of St. Mary, and ultimately carried his point. Incorporated in the grouping of the new building, this will necessarily form an interesting archaeological feature. It has been underpinned, and is now being carefully restored. This is a delicate and withal a somewhat dangerous task; but is in good hands, for there are few, if any, better qualified men in England for the post of managing clerk of works than is Mr. James Bubbs. Up to the present moment, Mr. Pearson has carried out the whole of the works, without a contractor, and under the practical and personal superintendence of his trusty representative, Mr. Bubbs. There is a staff of about 70 workmen employed upon the works, Mr. Dan Delafield being foreman. It speaks well for the good management of Messrs. Bubbs and Delafield, to record that although at the commencement, the old church and its spire, together with 21 houses were removed, everything has been done then and since without the slightest accident—during the whole progress of the works there has not been so much as one crushed finger. The Bishop of Truro is by no means a

mere theoretical man. At the consecration of a church in his diocese, recently, he said, that, as a youth, he learnt to work as a carpenter, that he had also tried masonry, and had many a time handled a trowel and put up brick-walls. "The clergy as a rule," he added, "got their knowledge of such like work from an encyclopedia, but his was a practical experience." And such being the case, he argued that he understood, and could sympathise the better with working men. All who know Bishop Benson agree in affirming that he is by no means a "bad sort!"

There are few more picturesque places in all England than Fowey. The church, dedicated to St. Finbar, was restored some few years ago by Mr. J. Piers St. Aubyn. The building contains some fine monuments: Upon one of them in the north aisle is some exceedingly handsome carved Elizabethan work. It dates from A.D. 1582, and the quaint inscription thereon may be worth while recording, it runs:—

"John Rashleigh lived years three score three
And then did yield to die—
He did bequeath his soul to God
His Corpse here-in to lie.

"The Devonshire house, yet Rashleigh's height—
Well sheweth from whence he came
His virtuous life in Fowey town
Deserveth endless fame.

Lanyon he did take to wife, by her had children store,
Yet at his death but daughters six, one son, he had no more—
All them to partake under here, because fit space was none,
The son, whose only chance this was, is therefore set alone."

As a memorial to the late Vicar (Rev. Dr. Trefry) the whole of the clerestory windows of this church are to be filled with stained glass. The work is being executed, by Messrs. Fouracre and Watson, of Stonehouse, Plymouth, and will be shortly complete. The subjects (with one exception) are Cornish saints, and some delay has been occasioned by the difficulty of ascertaining the correct history of several of the ancient worthies whom it is desired to picture. Cornish hagiology is rich and varied, and as proportionately obscure. The antecedents of even so popular a saint as St. Austell (who is to fill one window) is a theme of no little contention between martyrologists and archaeologists. Some affirm that he was a bishop named Austulus, others consider that Auxilius, a disciple of St. Patrick, is entitled to sponsorship, while Mr. Borlase, whose book on Cornish saints is no mean authority, declares a maiden named Hawystil to be the true St. Austell. Of St. Ildierna, the patron saint of Lansallos church, of which Dr. Trefry was sometime rector, absolutely nothing appears to be known.

From the tower of Budock Church, near Falmouth, three bells, dated A.D. 1664, were removed last week by Mr. Aggett, the church bell-hanger of Chagford. They are to be re-cast into a peal of six, in the key of G. Mr. Aggett will also fix an apparatus, so that the whole peal may be chimed by one person.

Mevagissey is a fishing town upon the Cornish south coast. The Burial Board recently advertised for a clerk. There were three applicants, and the economical board have just accepted one of them (Mr. R. Skinner, late chief boatman of the neighbouring coastguard) at a salary of £5 per annum!

The awful wreck of the *Schiller* is always associated with the name of the Scilly Isles. It is satisfactory to report that the Government have just decided to place a powerful steam fog horn at Scilly, as some warning to vessels nearing the land from the south west. The edifice for the reception of this horn will probably stand upon the island of St. Sampson, and it is anticipated that the works will be commenced next summer.

Talking of lighthouses reminds us of the remarkable accident that occurred at the New Eldstone last week. This celebrated erection stands upon a rock, out in the English Channel some ten or twelve miles from Rame Head. The first lighthouse there was built in 1696, the next in 1709, and the present one in 1759. The new one stands upon another rock close by. The glasswork in its lantern is complete and the fabric, therefore, in its exterior appearance is now perfected. The distance from land has rendered it necessary for the men employed to work on the rock in weekly shifts, and these working parties have, throughout the whole time, been under the personal superintendence

of Messrs. Edmond and Douglass, the engineers, who have done the duty alternately. Last week Mr. Edmond was at the rock, and on Saturday at noon, the weekly relief was effected as usual.

The out-of-the-way and somewhat interesting church at Sancreed lies half-way between Penzance and the Land's End. It was reopened, after restoration, a few weeks ago, when a curious error crept into the local papers, and was, afterwards, duly copied by some of the professional ones. It was that, according to Mr. Sedding, the architect's opinion, this church at present possessed the finest old rood-screen in Cornwall. Now, Devon and Somersetshire, as every reader knows, are rich in ancient rood-screens, but once the traveller gets westward of the Tamar, these partitioned between nave and chancel become conspicuous by their almost entire absence. At Lanivet, near Bodmin, are the remains of the lower portion of a good rood-screen. These fragments now do duty as a dwarf-screen in the tower arch. At a few other churches, similar remains may be met with. Amongst these may be mentioned Sancreed. Two old pieces of framing, one 8ft. 9in. and the other 7ft. 6in. in length, and each 2ft. 9in. high, exist there. They are curiously carved, and once, probably, formed the lower panelling of an ancient screen. There was nothing more, and hence, Sancreed can have no claim whatever to boast of any architectural specimen of the sort in the superlative degree. The most complete old screen in the West, a rare example of the groined screens of the Perpendicular period, exists at St. Ewe, near St. Austell. Having fallen into a sad state, it has, during the present summer, been carefully renovated by Mr. Harry Hems, the Exeter carver, under the immediate supervision of Mr. J. Piers St. Aubyn, the well-known architect, of London. This is the finest old rood-screen in Cornwall.

At Liskeard the new board-schools are making rapid progress towards completion. The roofs are covered in, and the interior work is in a forward state. Local stone is used for the walling, and the window and door dressings are of Portland stone and grey granite. The designs were won in competition by Messrs. Webb and Pearce, architects; Mr. Sampson Treharne, of Liskeard, is the builder. His contract price was a little over £2,000.

Talland Vicarage, near Looe, is being considerably enlarged from the designs of Mr. A. E. Skentlebury, architect, of East Looe. The site commands charming views of the rugged coast and of the adjacent Channel. The contractor is Mr. S. Dawe, of West Looe, the plumbing is by Mr. Strong, of Liskeard, Messrs. Minton, Hollins, and Co. have supplied the tiles, and Messrs. Barnard, Bishop, and Barnards, of Norwich, the various grates, &c.

The competition for the East Looe church rebuilding is not at all likely to turn out a professional plum, with the risk of putting one's thumb into the conventional pie. A good local architect, Mr. Skentlebury, lives at Looe, and being a parishioner, might well have been entrusted with the job. But that did not suit the committee. Designs were advertised for, and thirty odd sets were duly sent in. A London architect, under the *nom-de-plume* of "Britain," we hear, is awarded the prize. And what is it after all,—5 per cent. on a £2,000 job, and no travelling or any other "extra" expenses to be allowed. East Looe is 6 miles from Menheniot, the nearest railway-station, and a second-class return ticket to this latter place from Paddington costs 55s. And, letting alone the expense, a journey from London to East Looe and back involves travelling a distance of 331 miles.

We had intended touching upon several works in progress in the neighbouring county of Devonshire, but of this space does not admit. Those notes are therefore held over until next week. II.

LEEDS ARCHITECTURAL SOCIETY.

THE first ordinary meeting of the members of this society for the present session was held last week. Mr. James Barlow Fraser, F.R.I.B.A., the president, occupied the chair. Eighteen new members were nominated.

Mr. W. H. Thorp, the honorary secretary, read the annual report, which was adopted.

The President said: It is a matter for congratulation that our society has, during the five years of its existence, been constantly gain-

ing ground, by strengthening its position and extending its influence among all classes of society. This gradual development has rendered necessary an entire change in our constitution, which you have carried out with great judgment; and I believe the effect will be that all our members, as also the general public, interested in the study of architecture and the collateral arts, will take even a deeper interest in our welfare than they have hitherto done, seeing that we now specially invite our friends outside the profession to be present at our meetings; and by such intercourse we earnestly desire to assist and impart to the public a more correct appreciation and knowledge of all matters connected with architecture, and the difficulties architects have to contend with, than has hitherto been prevalent or possible. I trust that the reconstitution of our society may bring about all the results that we desire, including the means of checking many abuses which we unfortunately know do exist in the outside ranks of our profession, and which may to a certain extent be stamped out by our united moral influence. Let us make the best use of this power and exert it to the fullest extent, and I trust the time is not far distant when we may be placed on the same footing with all other learned professions; and, as a preliminary step to this greatly desired legislation, the voluntary examination conducted by the central corporate body for so long a period must have had the effect of proving to our legislature, if such proof were considered necessary, that we are in earnest, and desire most seriously the establishment of compulsory examination with a diploma. We will now take a brief glance at our profession as represented by the various institutes, associations, and societies throughout the United Kingdom, commencing with the Royal Institute of British Architects, which, as you know, has held a charter for upwards of forty-four years. There are also sixteen other societies, including and similar in composition to our own in Leeds, and having the same objects in view. The number of members of all classes, exclusive of honorary members, attached to each society, is as follows:—

Years in Existence.	Total.
47 Royal Institute of British Architects, of which 559 are London members	861
39 Architectural Association of London, of which 691 are London members	863
20 Architectural Institute of Scotland, . . .	24
23 Edinburgh Architectural Association	120
13 Glasgow Institute of Architects	50
23 Glasgow Architectural Society	47
4 Glasgow Architectural Association	30
41 Royal Irish Institute of Architects	56
37 Liverpool Architectural Society	101
13 Manchester Society of Architects	30
8 Manchester Architectural Association	66
23 Northern Architectural Association	34
38 Associated Architectural Society (includes seven associations), Lincoln	12
8 Leicester and Leicestershire Society of Architects	31
6 Birmingham Architectural Association	27
19 Nottinghamshire Architectural Society	12
5 Leeds Architectural Society	70
	2,428

Thus it will be seen the total number of members of all classes comprised in the seventeen associations, including the London, Edinburgh, and Glasgow Institutes, is 2,428. If you deduct the 302 provincial architects who are also members of the Institute, you will find the full representation of our profession by means of these societies, including assistants, is 2,126, or about one-seventh of the total number of practising architects and assistants in the United Kingdom; but if you will take the 559 London members of the Royal Institute of British Architects, you will find that they form about one-fourth of the aggregate of the sixteen associations, and only about one-twenty-seventh of the entire number of architects and assistants. We cannot consider this a satisfactory state of things, whether with a view to our mutual advancement in all matters pertaining to the profession or with regard to our representation by the Chartered Institute in London; and until our numbers are increased fourfold we cannot expect to speak with sufficient authority for the whole body of our profession. The Leeds Architectural Society ranks well,

taking the third position amongst its compeers in the provinces, Liverpool occupying the first place, and Edinburgh the second; but we must not feel by any means satisfied until our roll of members is trebled, and I do not doubt the attainment of such a position if each member will make its accomplishment a personal matter, having in view not only the welfare of our society but of the profession at large.

Turning to the doings of the past twelve months, we may congratulate ourselves that our art is still gaining ground, both in the estimation of the general public and in the class of work produced. Certainly a more refined and commendable spirit in the treatment of detail is making itself apparent, and a decided reaction has set in against the crudities and eccentricities of the extreme Queen Anne school. Not that I am by any means disposed to condemn the much abused and also much lauded style altogether. I think the vigour and piquancy inherent in the style have done much to give force and originality to the efforts of our younger architects, and specially the introduction of bright warm colours into our dull atmosphere is a matter of thankfulness. The æsthetic craze (as it is sometimes called) of recent years, although absurd enough in some of its features, has been of much practical use in calling the attention of our prosy and matter-of-fact business men and women to the possibility and desirability of combining refinement with the solid comforts of home life; and all who like myself can contrast by aid of their memories the furniture and general finish of the interiors of our middle-class homes of thirty years ago with those of to-day, will, I am sure, agree with me that a wonderful stride has been made in public taste in the right direction in all matters pertaining to domestic art. Whilst joining in the laugh against the vagaries, sublimities, and too-too-ites of the Maule and Postlethwaite school, and enjoying to the full the keen satire of Du Maurier, Burnand, and Gilbert, in describing their follies, one cannot help admitting that the sad colours and strange decorative devices adopted and advocated by their "supreme intensities" have resulted at least in some improvement over the stereotyped ornaments, crimson paper, crimson curtains, crimson carpets, and general glare and hardness thought to be the acme of respectability and luxury when we were schoolboys. No great advance has been made, and no startling innovation has, to my knowledge, been adopted in connection with sanitary science during the last twelve months; the all-important question of the health of the people, both individually, in their several homes, and as component parts of populous cities, continues, however, to receive the careful attention of public authorities and the members of our profession.

There appears to be room for improvement in the design of our railway bridges and viaducts and other structures, which are left entirely to the civil engineer, with the result that (so far as the brick and stone work, at any rate, is concerned) the same features and methods are adopted as those of forty or fifty years back. Some of the old county bridges, designed in bygone days, when the callings of architect and engineer were nearly always combined, are models of beauty and form, united with strength in construction, and it seems a pity that something of the same feeling cannot be incorporated into our present work.

The President then went on to refer to many recently erected buildings in Leeds and the neighbourhood, and concluded by insisting on the importance of frequent sketching, and attention to sanitary matters on the part of the young members of the profession.

THE SURVEYORS' INSTITUTION.

A CROWDED audience assembled in the lecture hall of the Institution on Monday, to hear the opening address of the president, Mr. Edward Ryde. The occasion was one of special interest, being the first meeting of the Institution since its incorporation by Royal charter. The president referred in terms of congratulation to the prosperous condition of the Institution, which has now become the accredited representative of the profession, and, after calling special attention to the clauses of the charter, proceeded to touch upon a great variety of subjects connected with the occupation and

ownership of land, and upon past and prospective legislation relating thereto.

I have always, said Mr. Ryde, been an ardent advocate for the extension of education; but I am bound to say that I approached the consideration of the question as applied to the admission of members to this Institution with much caution and reflection. That I did so is the more satisfactory to me now that I have formed a mature judgment that the course which the Council finally adopted, and which they have now to carry out under the charter, will be conducive of much good to the profession. The subject of education generally is a very extensive one; its consideration and development have become very popular and almost universal, and no profession can safely refuse to give it attention. As showing to some extent the direction in which general opinion is running in connection with this subject, I may mention that the International Committee of the Surveyors of Europe, sitting as a congress in Paris, in 1879, discussed, among other questions, the desirability of requesting the respective Governments of the several countries represented at that congress, to institute by compulsory enactment, that every surveyor should take out a diploma, after the manner of the surgeons and apothecaries of England, previous to being permitted to practise. But the English deputation to this congress was of opinion that its own legislature would not be likely to interfere in favour of a profession, at the instance of such profession, without some special demand on the part of the public. They further urged that, after all, too much importance must not be attached to the possession of such a diploma, inasmuch as the real qualifications of a surveyor could only be acquired after years of experience, coupled with integrity, perseverance, and intelligence. Hence, it constantly happened that surveyors of large experience were taken from one part of England to another on account of the special qualifications which they possess—a distinction which the possession of a diploma acquired in early life could not command. In no professions in England, except those of law and medicine, was any compulsory examination required, except as before mentioned. This was to be accounted for or explained in the case of medicine by the fact that the consequences of incompetency might involve questions of life and death; and the same might be said with respect to the legal profession in connection with criminal law. It would also be observed that the same rule applied in the special cases of surveyors appointed under the London Building Act, where infringements of the law relating to the construction of buildings might lead to fatal consequences. In the case of other professions, incompetency generally merely resulted in pecuniary loss, which, it was assumed, might have been guarded against by a careful selection. But the English deputation was, nevertheless, prepared to vote in favour of a diploma, which they could understand was probably more needed in France than in England, owing to the compulsory subdivision of property at the death of the owner, and the consequent necessity for a numerous class of surveyors of ascertained skill, whose services should be within reach of everybody. I cannot do better than refer to the very excellent speech made by our much-respected first Associate of Council, Mr. J. H. Lloyd, at the first meeting of the Institution of Surveyors, which speech will be found reported in Vol. I. of our *Transactions*, at page 14. I cannot describe to you the advantages of our Institution in words so happily put together as those which were then used by Mr. Lloyd, and all I can say is that any member of the Institution who has not read that speech would, I think, find pleasure in doing so. Taking that speech as my model, and pointing to the Charter which we have obtained as the result of the labours of the Institution down to the present time, I think I may fairly assume that the effect of the Charter has been to transform our Institution from a private society into a public body, having a fixed and well-settled constitution, with by-laws which cannot be altered without the previous approval of the Privy Council. Although it is not made compulsory, for a period defined in the charter, for a surveyor to pass an examination prior to his election as a Professional Associate, it is open to the Council to frame rules so as to enable him to submit himself for examination at once; and in the same way the

admission of Fellows may be facilitated. It is satisfactory to find that a considerable number of young men are availing themselves of the educational clauses of the Charter. Many have already joined the Student class, and many others are preparing to do so. They see the advantages which a certificate so obtained will give them over others who do not possess it, and the use which it will be to them in establishing themselves in life, whether they look to get appointments or clerkships in the offices of others, or start in practice on their own account. To employers, moreover, the advantage of the certificate will be most useful as a distinguishing mark between those who have been brought up to the profession and those who have not. If I am asked what I consider to be the best course of education for a surveyor, I may reply that I consider any of the subjects which are contained in the educational course of the Institution desirable; but it is impossible for any one man to qualify himself for practice in every branch of the profession. A surveyor and land-agent should have a thoroughly practical knowledge of agriculture, including a knowledge of agricultural chemistry and geology; he should also make himself a good accountant and bookkeeper. He should possess a knowledge of measuring land and making maps, a knowledge of timber and the art of measuring it, and above all things he should acquire, in as practical a manner as possible, a knowledge of the best systems of managing estates. The recent depression in agriculture, and the troubles which have befallen the landed interest generally in recent times, have rendered this last qualification more important than ever. However much the practice of agriculture may have been retarded, recent difficulties have shown more than ever the necessity for the services of skilled land-agents. It has been very much the custom during the last quarter of a century to assume that estates can be managed by gentlemen who have not had suitable previous training. It seems to me that that state of things must now be brought to an end. A land-agent responsible for the management of a large property must be able to determine by his own experience the exact amount of rent which a farmer can afford to pay under every circumstance which can arise. Moreover, the complaints of a tenant must, on the one hand, have proper attention, and, where necessary, must be met by relief or remedial measures; on the other hand, if every complaint of a tenant is to result in a reduction of rent, or some other advantage to the tenant, and disadvantage to the landlord, it will soon be found that there will be universal complaints, and that the landlord's interests will suffer. Again, an agent must be able to discriminate between a beneficial expenditure of capital and one which is not beneficial. On some estates it may be very advantageous to expend large sums of money in rebuilding farm buildings; on others it may be a great waste of money; as, for example, in the case of land near London or any other great centre of population, which, after a few years from the present time, will become building land. If a surveyor has intended to devote himself more particularly to the business of a building-surveyor, or, in provincial towns, to that of an architect and surveyor, he will, of course, turn his attention more particularly to the valuation of buildings and building lands than to agriculture and the management of country estates. Some knowledge of architecture, however, will be useful to a surveyor in any branch of practice; but I am now assuming that my address is made to surveyors, and that architects, strictly speaking, are without the limits of our Institution.

Referring to the Irish Land Act, Mr. Ryde said: The effect of the Act upon land subject to leases has yet to be ascertained; but it seems very impolitic to disturb a written contract. Take, as an illustration, the land in New Oxford-street. When that street was made, the land was let to builders who erected upon it the houses which now stand there. Those builders took building leases, and agreed to pay fixed ground-rents. The street was not a success; the houses when built would not let at remunerative rents, and eventually I believe it became necessary, in order to get them tenanted, to accept a rent for the house and land in some cases not in excess of, and in others only a little in excess of, the

ground-rents. In that case the lessees lost nearly the whole of the money which they had spent upon the houses, yet it would have been a monstrous thing to say that on that account they should be relieved from their contracts, and that the owners of the land should bear all the loss. It often happens that houses built under exactly similar circumstances turn out to be of great value, and very large profits are made by the builders who erect them; but nobody would dream, in those cases, of saying that the builders should give up the profit to the owners of the land.

THE LIVERPOOL ENGINEERING SOCIETY.

THIS Society, comparatively young, having been started in 1875 by a few pupils of Mr. Geo. Fosbery Lyster, Engineer-in-chief to the Mersey Docks and Harbour Board, has just brought out their first volume of Transactions. The volume before us contains nearly 300 pp. of closely-printed matter, and several plates of illustrations. Many of the papers are abridged, or only briefly noticed. The first paper is by the editor, Mr. Wilfrid S. Boulton, Assoc. M.Inst.C.E., and describes the closing of the river entrance of the low-water basin at Birkenhead, and its conversion into a wet dock. The walls built were intended to be of stone, but Mr. Lyster, the engineer, decided to use Portland cement concrete blocks, and the result is stated to be highly satisfactory. The walls form one hard, homogeneous mass, though the foundations are of "slurry." The paper is illustrated by sections of the wall, and the box for making the face blocks. The author furnishes detailed particulars of the staging, sheet-piling, excavation, the bearing piles, the method of making the concrete, &c., and tables of the proportions of the materials used in the backing and face blocks. These were 6ft. by 6ft. by 3ft., and the face blocks were made of eight to one hard stone concrete, and the author recommends the use of concrete in bulk, as better and more economical than blocks. Another paper by Mr. Anthony G. Lyster on the system of sluices at the New North Works, Canada Basin, Liverpool, is instructive, and Mr. C. Graham Smith's contribution on the landing stage and piers, at Birkenhead, shows the value of the water-jet system in driving piles. Among the longer papers we find a useful one by "Wrought Iron Girder Work," by the same author, an abstract of which we gave in our vol. for 1877; the "Status and Prospects of Engineers;" some valuable "Notes on Portland Cement Concrete," by Mr. Wilfrid S. Boulton; a paper on "Transatlantic Lines and Steamships," by Mr. Arthur J. Maginnis, M.I.N.A.; the "Permanent Way of Railways," by Mr. Alex. Ross; "Town Sewage and Refuse" by Mr. John S. Brodie; the "Design and Construction of Sewers," by Mr. C. Graham Smith; "Storing Water," by Mr. T. Duncanson; the "Use of Cast Iron in Engineering Structures," by Mr. John S. Brodie, M.I.C.E.; "Notes on Sewers and Sewage," by Mr. Edward H. Allies; "Railway Junctions, Gradients, and Curves," by Mr. Alex. Ross; "House Drainage," by Mr. E. H. Allies. The shorter notices give the gist of the papers, and the conclusions of the authors. A fully illustrated paper on "Hydraulic Machinery," by Mr. Alex. Ross, will be found of interest, and Mr. R. F. Pitt advocates piece-work as enabling men to make higher wages than by day-work. Mr. Allies's contributions on sewers and house drainage, and Mr. O. G. Pilkington's paper on "Sewage" treat pretty exhaustively on this branch of engineering. The abridgment of many of the papers increases, we think, the value of the volume as a permanent record of progress. Lecturers and readers are often inclined to be tediously prolix, and these contributions become more valuable for reference when they are divested of the superfluous words necessary to a spoken address. The volume has been carefully edited by Mr. Wilfrid S. Boulton, and forms a convenient octavo. It is published by the Society, Royal Institution, Colquitt-street, Liverpool.

BETON IN REPAIRS OF MASONRY.

THIS is the title of a paper read by Mr. O. Chanute, vice-president of the American Society of Civil Engineers, at the 13th annual

convention of the Society. The author gives an account of the uses to which beton has been applied on the Erie Railway within the last few years. Beton, as our readers know, is an hydraulic cement mixed with sand and a small quantity of water. The first instance mentioned of the use of beton on this railroad is in connection with the restored piers of the Portage viaduct over the Genesee River, a structure 850ft. long, 23ft. high above stream. The wooden viaduct was burnt down in 1875, and the stone piers were found to be much injured by the fire. These were from 10ft. to 30ft. high. To save expense it was determined to encase those piers exposed to the wash of the river, and the contract was made with Dr. Goodridge, president of the New York Stone Contracting Co., for that purpose. The piers were encased with 21in. of beton, as were also the ice-breakers at the ends. A coat of beton 2in. thick was laid on the piers to protect them from infiltration. A saving of 34,000 dols. was effected by the contract, according to the amounts given, the cost of the work having been about 6,000 dols., while the cost for rebuilding the piers in stone is estimated at 40,000 dols. Mr. Chanute says, the result has been very satisfactory, as the piers have withstood the strains of a lofty superstructure of iron which has replaced the old timber trestle framed piers carrying the railroad.

The paper further describes the renewal with this material of various stone culverts, abutments, and piers on the same line which have suffered by the elements. The Warsaw Culvert, on the Buffalo division, threatened, from frost and other causes, to fall into ruins. It was 146ft. long, 14ft. clear in opening, and was below an embankment 60ft. in height. The stones were crumbling or entirely decayed away in parts. To have dug it out and rebuilt it, would have cost 36,000 dols. A new facing of beton was put on for 2,200 dols., and the method adopted is simple. Centres were placed within the arch with plank lagging, a section at a time, leaving a space of 4in. between the planks and face of arch, and beton was then rammed by hand to fill up the cavity and crevices. The beton lining was continued down the walls to the rock foundation, and after this the centres were removed and the next section was treated in the same manner. The following spring the culvert was examined to see if water had percolated between the old arch and the lining; but no damage was discovered, and the lining has withstood the severest winter. The Clifton Culvert was similarly treated. It had been originally built of red sandstone, but had peeled, and was in a very dislocated condition; a 4in. ring of beton was rammed into all crevices and joints inside, and beton buttresses were built at the ends. In 1877 the Bergen tunnel at Jersey City, driven through trap rock, was found full of seams and faults; the brick arching of some portions had peeled off and become disintegrated by alternate freezing and thawing, and it was decided to arch over a section 139ft. long where the rock was shattered, and to relime with a thin coating of beton another section 30ft. long, in which the bricks had been most injured. Iron centres and wooden lagging were erected, and the beton rammed in the space and crevices as before. The work was done at night, not to interfere with the trains. In order to drain the infiltration, drain-tubes were left in the beton by inserting hollow blocks. The work has stood well. These successes led to the repair of a number of culverts on the Buffalo division which had got into a bad state, like the one at Warsaw. These varied in length from 147ft. to 46ft., and were of spans varying from 10ft. to 6ft. The bench walls were broken-backed, the arches distorted, and the parapet walls were thrust out. The engravings given show linings of beton, buttresses of the material in one case at the ends, new inverts and foundations. These were all erected or repaired with beton, on John C. Goodridge's patent. Another instance of encasing piers is recorded, at the West Paterson Bridge over the Passaic River. The piers were erected upon cribs on a sandy bottom, and these had shown signs of settlement, and shaking by the trains. They were enveloped in a shell of beton, from 4in. to 12in. thick. Wooden frames were placed, planked inside, round the piers, allowing the requisite space, and this was rammed full of beton.

The author has full confidence of the result. The beton is capable of standing a tensile strain of 300lb. per square inch, which is greater than

the stress in the pier would demand. The paper enters into particulars of further repairs contemplated at Portage, and the idea of putting an apron or floor of beton over the bed of the Genessee river, which has been worn away by the disintegration of the clay shales, caused by the scour. By this means it is hoped the excavating action of the water near the piers of the bridge will be averted. Alluding to cost, which has varied according to the difficulties experienced, the author states, it has been from 60 cents. to 1.00 dols. per foot cube, or from 16.20 to 27 dols. per cube yard. No formula is given of the composition of the beton. A Portland cement made at Boulogne, in France, has been used in all the works, and American cements have failed. The author justly concludes that beton might be more largely employed for the repair of structures, the rebuilding of which would entail expense or interruption of traffic, at a cost of 10 to 20 per cent. that of new work.

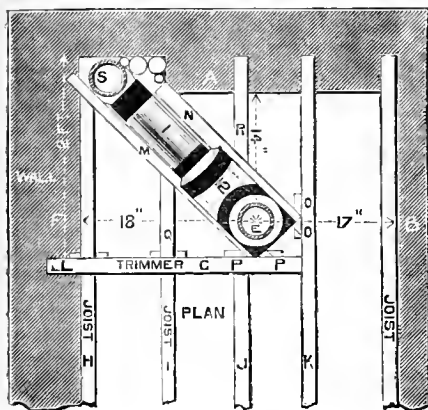
PRACTICAL NOTES ON PLUMBING.—XX.*

By P. J. DAVIES, H.M.A.S.P., &c.

INSIDE WORK, OR SANITARY PLUMBING.—FIXING CLOSET-TRAPS.

BEFORE fixing the trap for a water-closet apparatus it is advisable to use. For a valve-closet the distance from the wall A, Fig. 125,

F I C. 125.



to the centre of the trap-dip should be 14in. Speaking generally, closets are very narrow, frequently not more than 3ft. wide—5ft. is considered a barn of a closet. When the closet is from 3ft. to 4ft. wide, the trap should be fixed 1in. out of the centre to the right, as shown at 17, or between B and E. This is to allow the handle and dish of the closet to come within the flap of the closet seat. This also applies to pan-closets; but for the pan-closet the distance from the back wall, A, to the centre of the dip should be only from 12½in. to 13in.

For Jennings' Closet, and some other special makers, you will find it necessary to examine the outgoes and trunks, and so ascertain the proper distances. In a future chapter, I will give the exact distances for those most in the market.

Fig. 125 plainly illustrates the method of trimming the joist for the trap. The trimmer, G, carries the joist, H I J. One end of this trimmer, in this case, has a bearing upon the brick wall at L, the other end is trimmed into the joist, K. The trap is supported upon two bearers, M N; and as can be seen, the ends of these bearers rest upon the brickwork, the other ends are trimmed into the trimmer, or are sometimes made to rest on a fillet, as shown at A A, P P. Q and R are two bearers to support the boarding for the floor and closet-seat to rest upon, &c. This trimming is the general method adopted throughout England, and should be well noticed and remembered by all carpenters. The trimmer should always be kept far enough back—say 2ft.—from the back wall, as shown at F.

* All rights reserved.

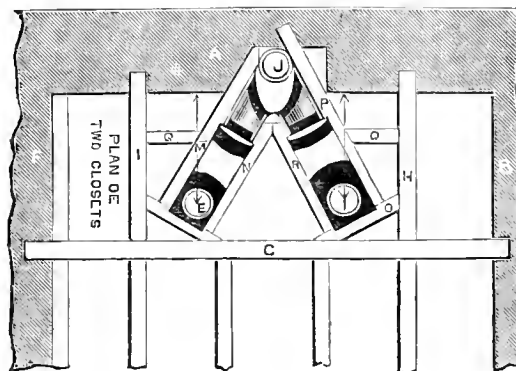
TWIN CLOSETS.

London builders are certainly very much to blame for not, when building houses, providing proper children's closets. I have fitted the whole of the closet and plumbing work for some scores of builders, many of whom were and are in a large way of business, and only one man has consented to have children's closets fixed; and furthermore, to show how much this branch of the trade is neglected, I only know one out of the many dozens of closet-makers

plenty for the bottom of the safe to stand away from the wall, because the top can easily be bent over against the riser, if required.

The safe should be properly soldered down to the dip of the trap, and *sunk* as at A B, Fig. 128, in order to allow the solder to be wiped level or flat with the bottom of the safe.

The angles of the safe may be soldered, bossed, or dog-ear'd up; the last-named will not have as neat an appearance as when bossed, but if properly done will answer every purpose.

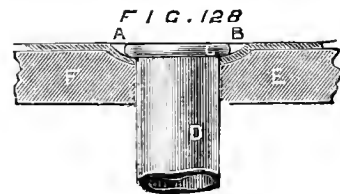


F I C. 126

who make a valve-closet for juveniles—viz., Warner and Sons, brassfounders, The Crescent, Cripplegate, London, a drawing of whose trap I shall furnish later on. Fig. 126 illustrates by plan the method of fixing the traps for twin-closets, and also the trimming of joists, &c. In closets having plenty of room, the traps may be fixed at equal distances from the side walls, E B; but where the closet is narrow, the small closet should be on the left-hand side and nearer to the wall; then the large closet-trap may be fixed the same distance from the back of the brickwork, as from E to A. The traps are trimmed in much about the same manner as in Fig. 125, excepting the end of the bearer, P, Fig. 126, which I have shown run into the brickwork, and is now in the way of fixing other pipes up the chase, but which may be supported by another shallow trimmer, Q, so fixed that it does not come in the way of the under-side of the soil-pipe, &c.

The elevation of the plan, Fig. 125, is shown at Fig. 127. S, the soil-pipe; (1) the out-go

Workmen who choose to dog-ear the corners must be careful not to beat the lead too close together, as, although the work may look neater,



it must be remembered that substantiality is essential, and the close beating will destroy the angles.

CHIPS.

The fifteenth annual convention of the American Institute of Architects is being held at Washington this week, beginning on Wednesday last. Particulars of the papers to be read and subjects to be discussed have not yet reached us.

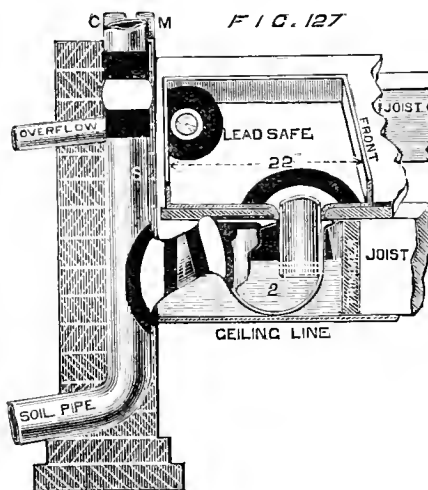
The construction of the Maidstone and Ashford extension of the London, Chatham, and Dover Railway will be commenced within the next fortnight at the Maidstone end. Mr. Hopkins is the engineer, and the contract has been taken by Messrs. Lucas and Aird.

A cabman's shelter was opened at Chesterfield last week. Mr. Hanby, of Hagland, was the builder.

About two and a half years since the town council of Brighton, in pursuance of the North-street improvement scheme, demolished a block of buildings which had previously screened the Chapel Royal, and thus exposed to view from North-street a façade which was never intended to be seen, and has been regarded by the townspeople as an eyesore. Two designs for decorating the blank surface were proposed, and met with no public favour, but eventually a design for a new façade in red brick and a clock-tower, made by Mr. Arthur W. Blomfield, M.A., was approved. Both tower and wall have been carried up to the old parapet level, but the works will be stopped at the end of this week unless further funds are subscribed, some £400 being needed to complete the undertaking.

At the Carlisle Consistory Court on Wednesday week, plans by Mr. John Cory, of Carlisle, were approved, and a faculty decreed for alterations to Holy Trinity Church, Carlisle, including reseating and re-flooring, and providing new pulpit, reading-stools, litany desk, choristers' stalls, font, and heating apparatus, and enlarging the vestry, the cost being estimated at £750.

The additional buildings just added to St. Edward's Orphanage, West Malvern, were opened on Thursday week. They include a schoolroom, accommodating 120 boys, and classroom, and over these a dormitory for 80 boys. Mr. F. W. Hunt, of London, was the architect, and Mr. Smith, of West Malvern, the builder.



of the trap to the soil-pipe; (2) the trap. By the side of the soil-pipe are fixed the smaller pipes, that can only be seen at the top near M and C. This also illustrates the lead-safe of the closet and overflow. The overflow should not go into the soil-pipe unless under very especial circumstances, and then great care must be taken to insure the trapping being thoroughly perfect. The safe should be large enough to admit the closet, but not so far in front that it will come in the way of the closet-seat riser. It should never project beyond the front of the basin, which is generally 23in. from the back wall, so that 22in. will be

CONTENTS.

Architects and the Public	647
City Improvements	647
The London School Board Drawings	649
Scotland in Early Christian Times	649
The Water Question—XXI.	649
Architectural Association	651
Lectures on Historical Buildings at the Crystal Palace—I.	652
Some Notes in the West	654
Leeds Architectural Association	654
The Surveyors' Institute	655
The Liverpool Engineering Society	656
Beton in Repairs of Masonry	656
Practical Notes on Plumbing: XX.	657
Chips	657
Our Lithographic Illustrations	658
Smoke Abatement	658
The Apprentice Question	671
Dr. Allman on Art and Art Schools	672
The Proposed New War Office and Admiralty	672
Our Vernacular Architecture	673
Ventilation of Dwelling Houses	673
Architectural and Archaeological Societies	674
Building Intelligence	674
Competitions	674
To Correspondents	675
Correspondence	675
Intercommunication	676
Local Intelligence	677
Statues, Memorials, &c.	678
Stained Glass	678
Water Supply and Sanitary Matters	678
Our Office Table	678
Meetings for the Ensuing Week	679
Trade News	679
Tenders	679

ILLUSTRATIONS.

COMBINED POST AND TELEGRAPH OFFICE, MADRAS. "THE RISE," SESSINGHILL, SEASIDE, IPSWICH. OLD HOUSES AT IPSWICH AND RYE. NEW CHURCH OF ST. MARK, FARNBOROUGH.—STEAM LAUNDRY, BATTERSEA PARK.

OUR LITHOGRAPHIC ILLUSTRATIONS.

COMBINED POST AND TELEGRAPH OFFICE, MADRAS.

THE new combined post and telegraph office, Madras, covers a considerable area of ground. It is 352ft. long, and 162ft. broad, open on the east, south, and north sides. With the exception of the central hall, the building is in three stories. The ground-floor, devoted to servants, stores, kitchens, &c.; the first floor to office accommodation; and the third floor, over the wings, to residences. The only building materials available in Madras are a hard gneiss and red brick with terra-cotta. As neither the red brick nor the gneiss are good in colour, all architectural effect, when plaster is discarded, must be obtained by the massing of the light and shadow, and the flicker of tracery. The horizontal bands will be in glazed terra-cotta of intricate pattern, but low in tone, so as not to kill the gneiss dressings. The style may be termed "Hindoo Saracenic" as regards details, and although adaptations of specimens widely separated geographically, great care has been taken to preserve artistic unity in the whole design. The high-pitched roofs and dormers are in the Travancorean palatial style; but below the eaves of the roof all work apparently of wood (and really of wood in the original style) has been changed to stone, as sanctioned in the very beautiful example at Benjapoor, which meets with universal admiration, and from the study of which the projecting eaves have been designed. The arches, columns, and all other details are in cut stone, in the Ahmedabad style of art. The lighter stonework forms a pleasing and legitimate link with the wooden dormers above. Few architects who have not actually practised it, can imagine the difficulty of dealing with deep loggias all round a building when circumstances compel the roof to be shown. The simple and general way of overcoming the difficulty, is to make the roof of the verandahs flat, and to pitch the main roof. The result is eminently suggestive of a Swiss chalet surrounded by a cage of Gothic, Classic, or whatever it may be; the style never appears to extend, and does not actually do so in many cases deeper into the buildings than the outer skin or cage. Solutions to other problems connected with building in India have been attempted, but these are not likely to interest the general reader. The estimated cost is about £100,000, exclusive of internal fittings.

THE RISE, SESSINGHILL.

THE villa shown in our illustration, now in course of erection, is one of several Mr. J.

Pether proposes carrying out on his building estates at Sunninghill and Bagshot, there being a good demand for this class of dwelling in the neighbourhood, owing to the well-known reputation of Ascot being one of the healthiest parts of England, as well as for its sporting associations. The house is being built of deep red bricks from Bracknell; the walls are hollow up to the line of the weather-tiling; the exterior face will be weather-pointed with ash mortar, a sparing use of terra-cotta and moulded brick being introduced for ornament. The plan was so arranged as to have the windows of the best rooms command the views of the Surrey Hills and surrounding country. The whole of the internal woodwork of principal apartments will be in pitch-pine, varnished. The stables and coach-house are to be erected at a lower level, to the left of the residence. Messrs. Byrne and Crombie, of 303, Strand, and Windsor, are the architects.

OLD HOUSES AT IPSWICH AND RYE.

THE illustration of the "Neptune Inn," at Ipswich, is from a drawing in brown ink, which was exhibited in the Royal Academy this year. Like several other old houses in Ipswich, it is an interesting subject to the student of English Domestic work. At the back of the house there is a room with a good oak dado, with linen panels well carved, and several other rooms in the house are worth a visit; the earwing has, however, been greatly defaced with paint and varnish. The inn, like the private house illustrated on Sept. 9 last, from Mr. Arthur Keen's drawing, is situated in Fore-street, St. Clement's. The houses at Rye are examples of a few of the remaining old picturesque gable houses left in that town. The subject is close to Mermaid-street and the old church.—Tues. J. B. HOLLAND.

ST. MARK'S CHURCH, FARNBOROUGH.

THIS church is intended for the population brought together by the Aldershot North Camp. The foundation-stone was laid by the Duchess of Connaught on the 26th July, 1880, and the first portion, consisting of nave, chancel, and narthex, was consecrated on the 27th September, 1881. The church, when completed, will seat 583, at a cost of about £5,000. The architect is Mr. J. E. K. Cutts, of London, and the builders Messrs. Martin, Wells, and Co., of Aldershot.

STEAM LAUNDRY, BATTERSEA PARK.

THE works of the London and Provincial Steam Laundry Company, situate in the Battersea Park-road, about half-way between the Battersea and Queen's-road stations on the London and South-Western Railway, are the largest of the kind ever yet opened. They cover a space of upwards of an acre and a-half of ground, afford employment to 20 male and 150 female operatives, of whom 32 are provided with lodgings on the premises, and are capable, when working up to their full power, of dealing with from eighty to ninety thousand "pieces" of various descriptions per week. The buildings are from the designs of Mr. Ernest Turner, architect, of 246, Regent-street. The contractors for the building are Messrs. Scrivener and Co., of Fitzroy-road, N.W.

CHIPS.

THE new sea-wall at Seaford, Sussex, was completed on Saturday, and on Monday evening Mr. J. Swanwick Lee entertained the workmen engaged on the work at supper, when the contractor, Mr. J. S. Seel, presented the only man who had been engaged on the work throughout, William Russell, with a silver watch. The engineers of the undertaking, by which a large tract of land will be retained and protected, are Messrs. P. S. Lee and W. Webb Turner.

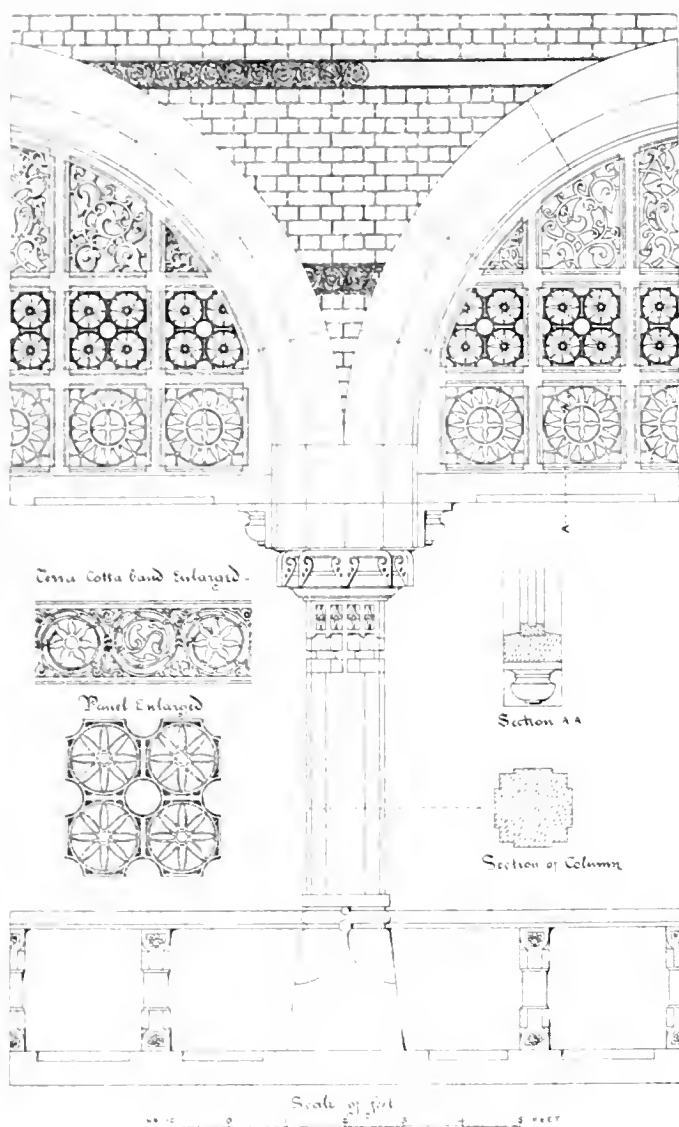
THE retiring Mayor of Kidderminster has announced his intention to present new gates and palisades to the parish church, to be manufactured by Messrs. Hill and Smith, of Brierley-hill; at the same time the bells are to be rehung and a set of chimps provided.

A new cemetery is about to be formed at Stoke-next-Guildford upon a site 8 acres in extent, adjoining the South Western Railway. It will be laid out, and the buildings will be erected from plans and designs of Messrs. Peak, Lunn, and Peak, architects and surveyors, of Guildford.

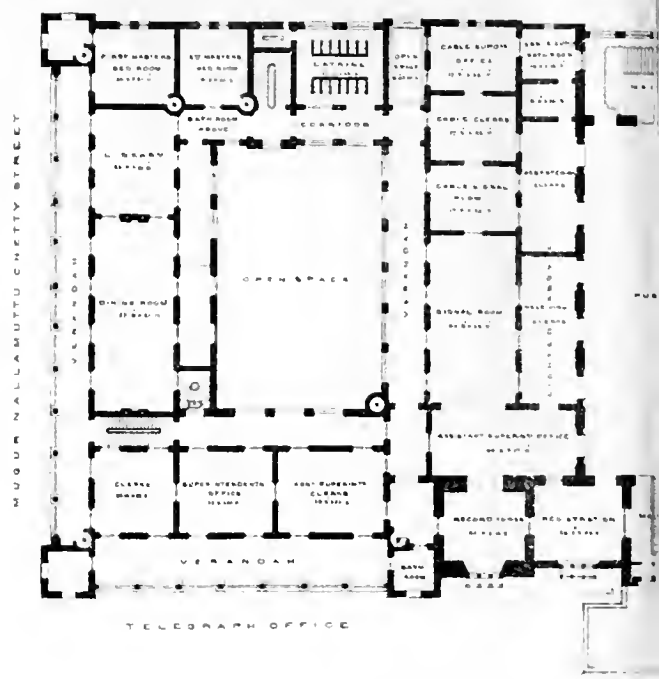
SMOKE ABATEMENT.

IN opening, on Wednesday evening, the 128th session of the Society of Arts, Sir Frederick J. Bramwell, F.R.S., M.Inst.C.E., referred at considerable length to the scientific problems of the day, and amongst these to that of the abatement of the smoke nuisance. This was a question which must increase in importance and in interest with the growth of our large towns. In London there are, he remarked, four millions of persons spread over an area (that governed by the Metropolitan Board of Works) 117 square miles in extent, involving, therefore, even if the 117 square miles were in the form of a regular circle, a diameter of 12½ miles, or a radius of 6½ miles. Under these conditions, one sees how extremely difficult it is for the inhabitant of the centre of such an area to have a clear atmosphere. Whichever way the wind blows, he must receive the products of combustion of 6½ miles of a more or less densely populated district, and probably of certain manufactures. As regards manufactures, however, the Smoke Act in London works so well that a very little of the nuisance arising from smoke is due to the chimneys of manufactories. It is a common observation that if a manufacturer emits smoke from his engine chimney, he must be losing a large quantity of fuel in an unconsumed condition, and that he is not only annoying his neighbour, but is at the same time injuring himself. The fact, however, is that the weight of the solid particles of the smoke is almost inappreciable as compared with the weight of the fuel burnt—only a fraction of 1 per cent. The means employed to prevent smoke from engine-boiler fires are, it may be said, almost universally a very free admission of air above the fuel. In this manner, if there be heat enough in the furnace, it is easy to insure the combustion of smoke, but it is by no means certain that this combustion will not be effected at the risk of passing through the fire and through the flues a far greater weight of air than that really needed to properly consume the combustible materials, and that in this way a loss of heat may readily occur, greater than that which would arise from the sending a few pounds per ton of coal burnt, of unconsumed particles of carbon, into the air in the form of smoke. If these facts were always present to the speakers and writers on the smoke question, we should not have such repetitions of the statement of "the folly in a pecuniary point of view of those who do not voluntarily burn their smoke." With respect to domestic fires, admitting that close stoves properly constructed were more likely to consume the smoke than open firegrates, and also that with them less fuel was needed to heat an apartment, he observed that where there is an open fireplace there is of necessity ventilation. The natural man, he continued, especially if he is a poor one, sparingly fed, insufficiently clothed, objects to ventilation, because he fears draughts. Give him an open fireplace and he must have as much ventilation as will allow the smoke to go up the chimney. I look upon our open fireplaces, wasteful as they are of coal and productive of smoke, as great sanitary agents in dwellings, especially of the poorer classes; and I will appeal to any one who has had experience of the atmosphere of Continental rooms in the winter time, when the windows are closed and a close stove is employed, as to whether such an atmosphere is not far worse than that which prevails in rooms where open firegrates are used; and I think I may without fear of the nature of the answer ask whether, on the whole, the appearance of the inhabitants of London, smoky as their atmosphere may be, does not compare favourably with that of those who live in cities with a far clearer atmosphere, but in rooms where, owing to the use of close stoves, there is no efficient ventilation? These considerations alone should make us pause before we determine, for the sake of clearing the atmosphere, on giving up open fireplaces, and on resorting to stoves having good combustion. But there is another consideration, which I think should not be lost sight of, and that is the cheerfulness and companionship of an open fire—advantages which, I think, few Englishmen would willingly give up. Nevertheless, if those who turn their attention to the subject will bear in mind this fundamental question of proper ventilation, and take care that it is not tampered with, all of us would rejoice to see an improvement in the clearness of the London atmosphere.

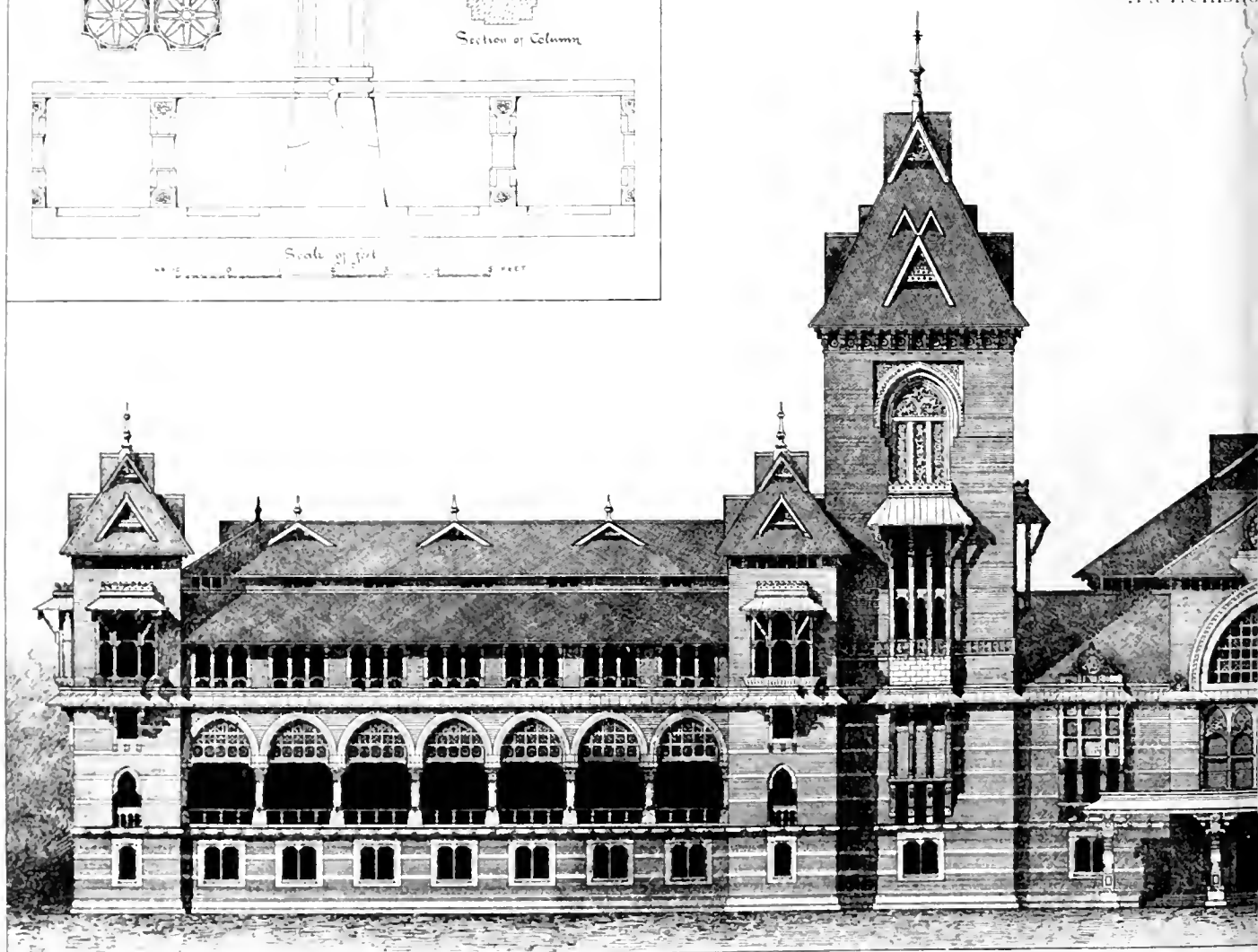
Details of Columns and Arches



SCALE OFFER

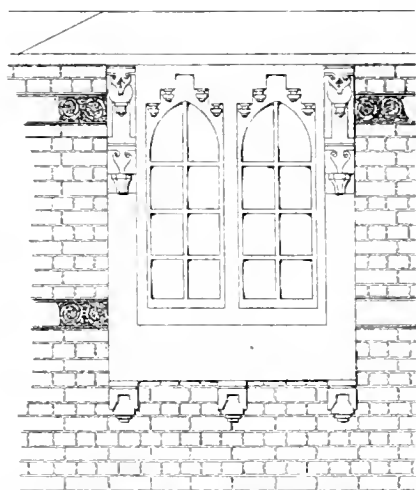


COMBINED POST AND
M A D
MR. E. CHISHOLM

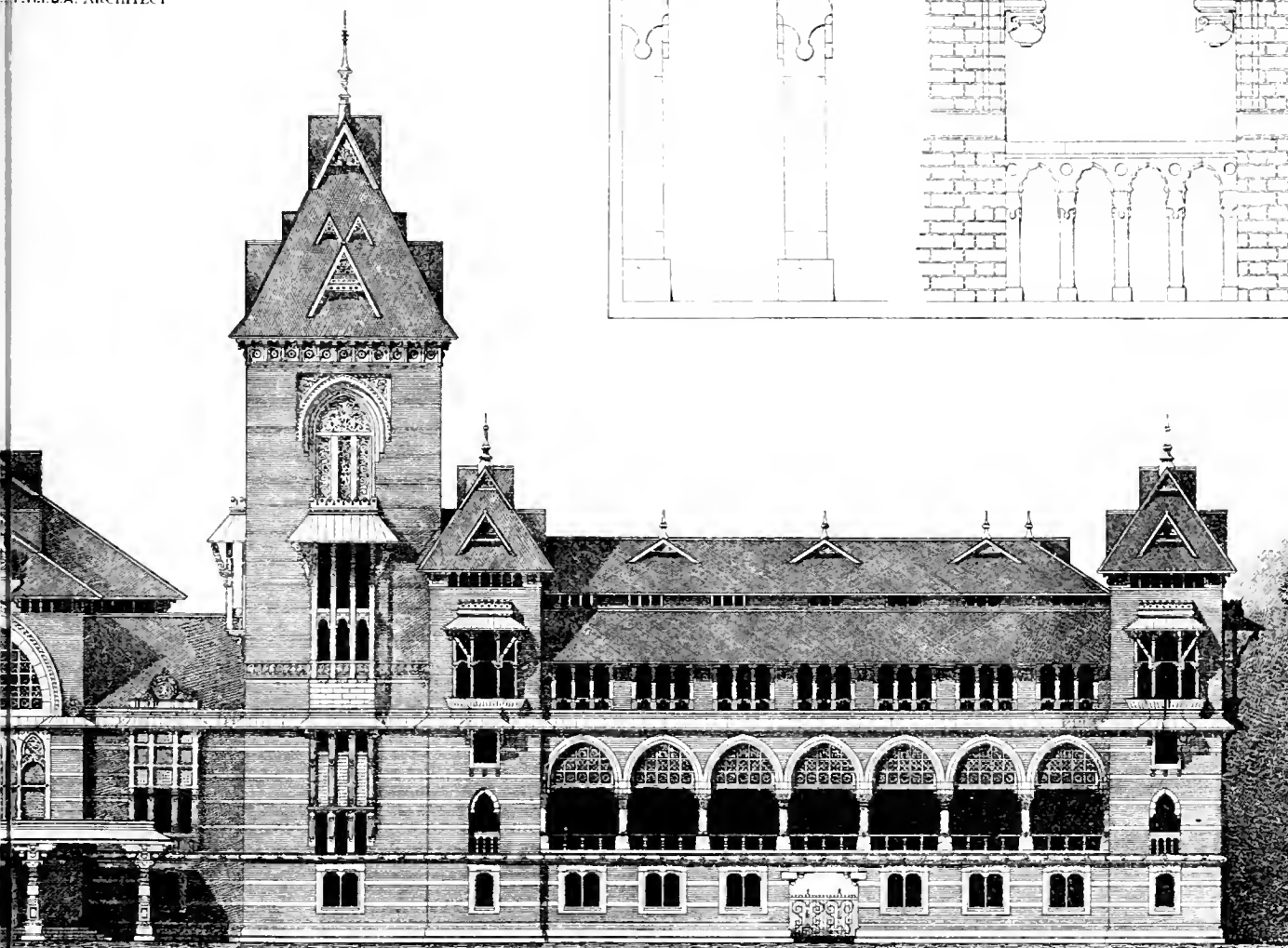
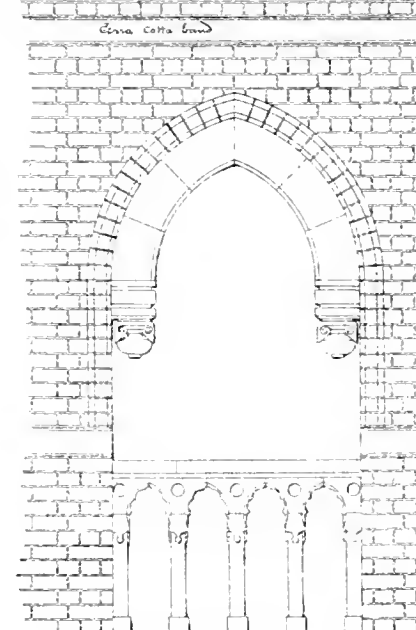




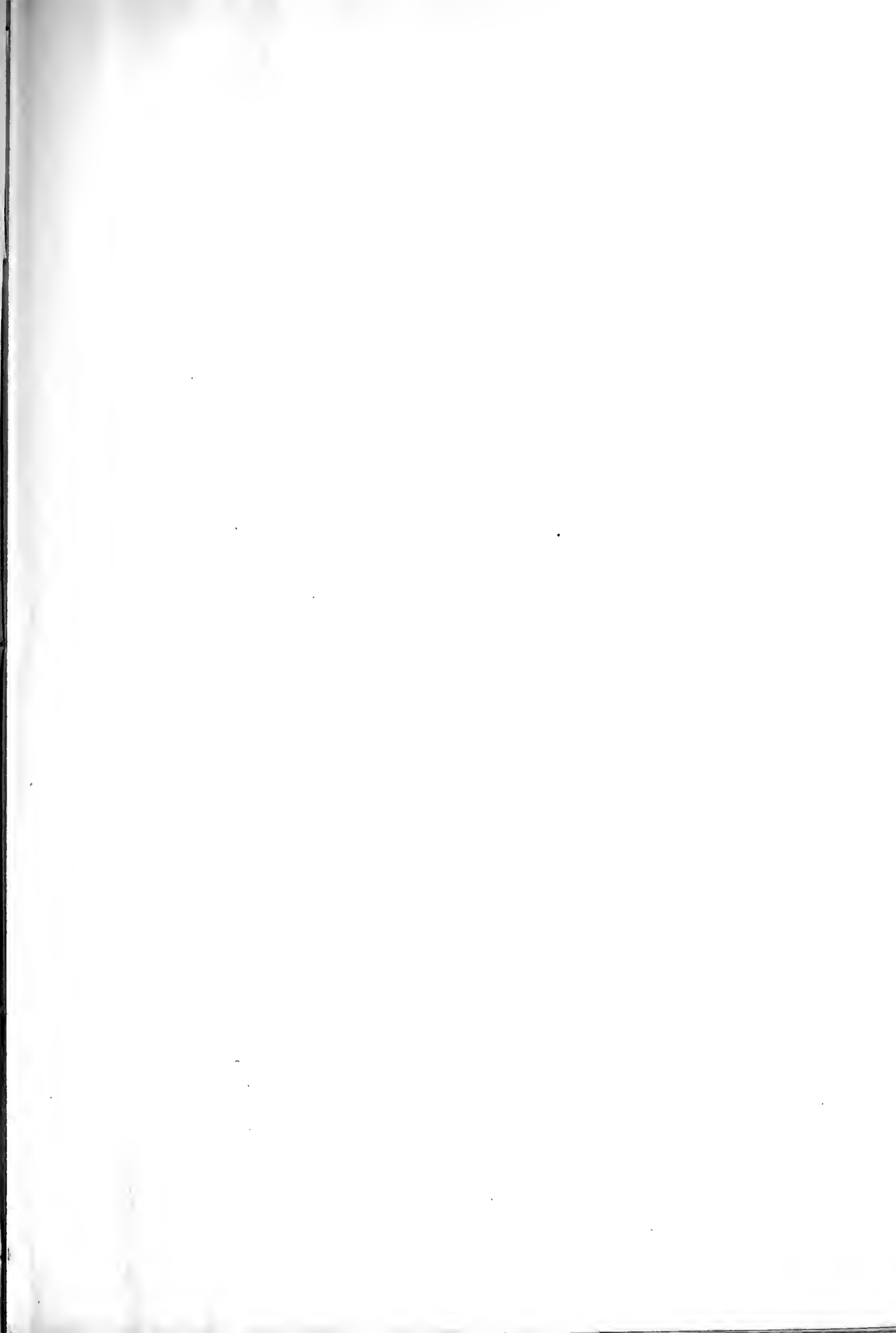
This architectural drawing shows a section of a wall and a corbel. On the left, a corbel is shown in profile, supporting a horizontal ledge. The corbel has a decorative, carved appearance. To the right of the corbel, a vertical section of a wall is depicted, showing a brickwork pattern. Two decorative, carved elements are integrated into the wall section, one above and one below the corbel. The drawing is a black and white line illustration.



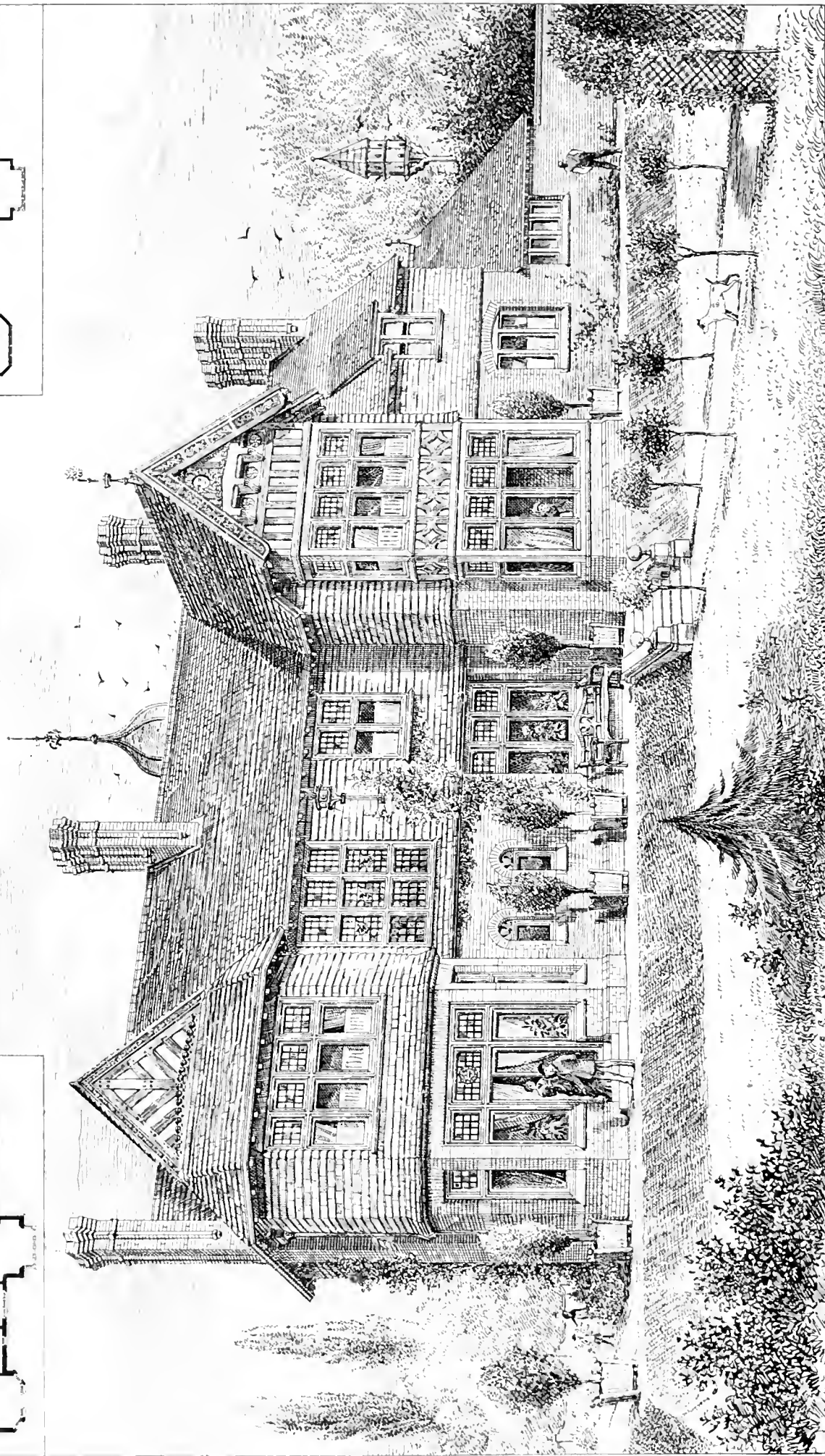
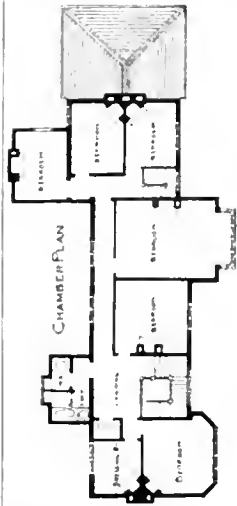
Porcelain buston





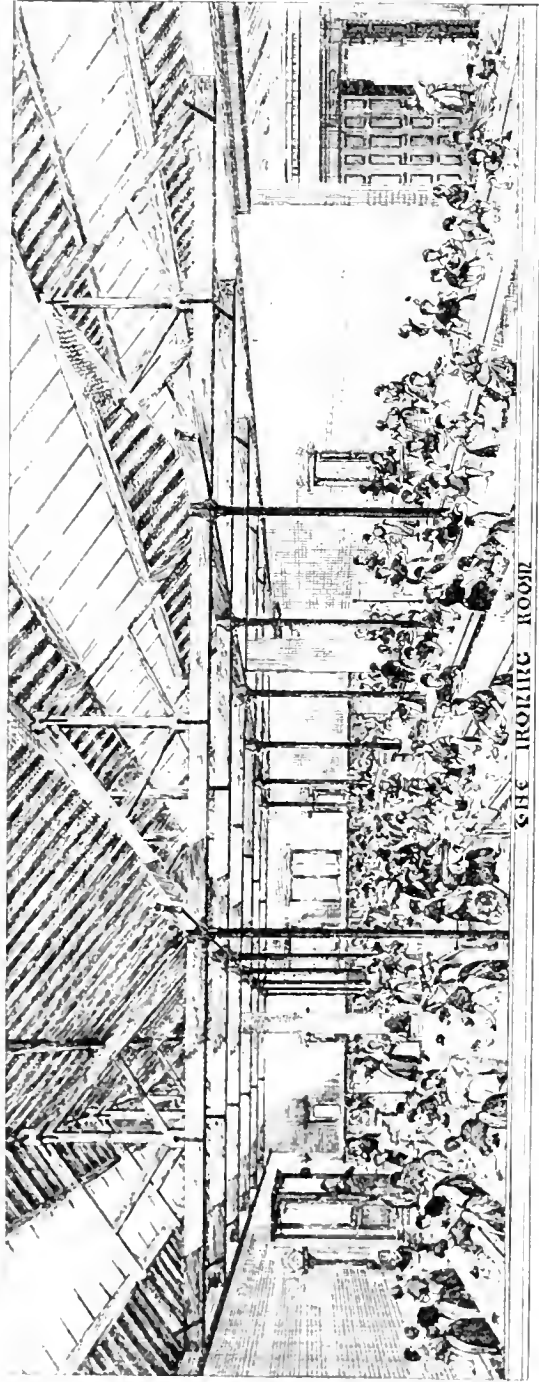


THE BUILDING PEWS, NOV. 18, 1881.

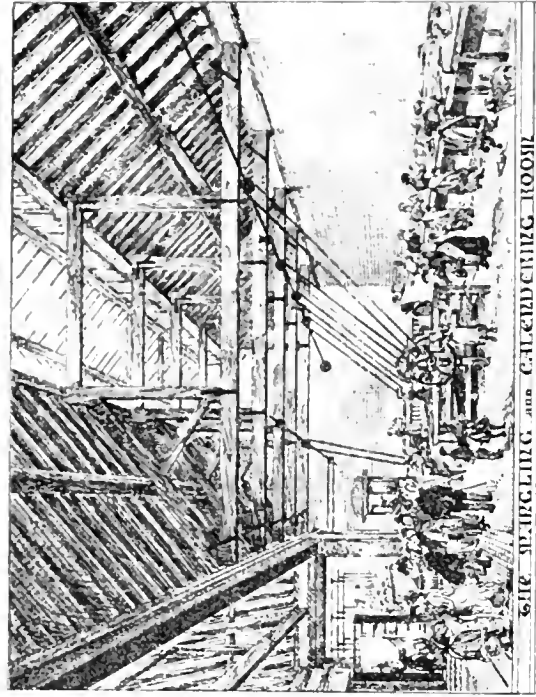


THE RISE SUNNINGHILL NEAR WINDSOR
BYRNE AND CROMBIE ARCHITECTS

Photo Lithographed & Printed by James Ackerman, 6, Queen's Square, W.C.

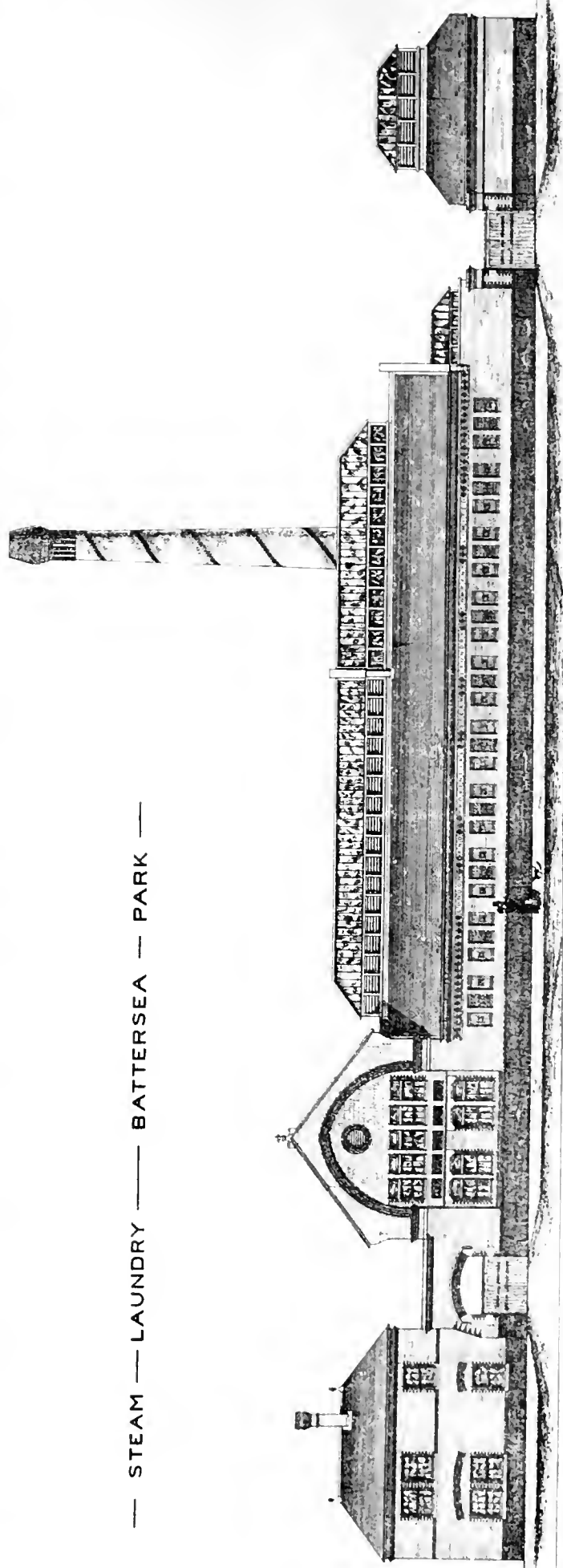


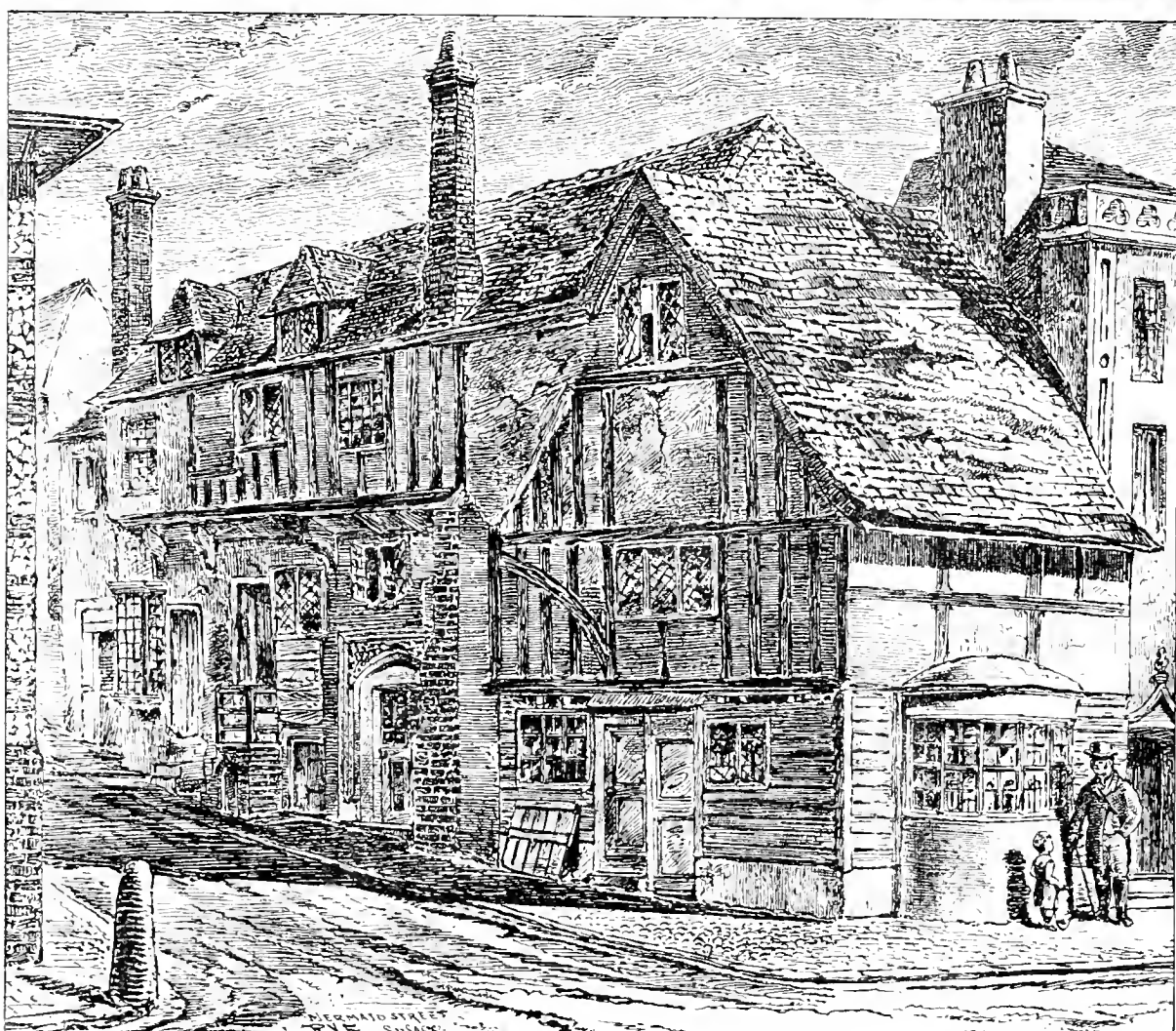
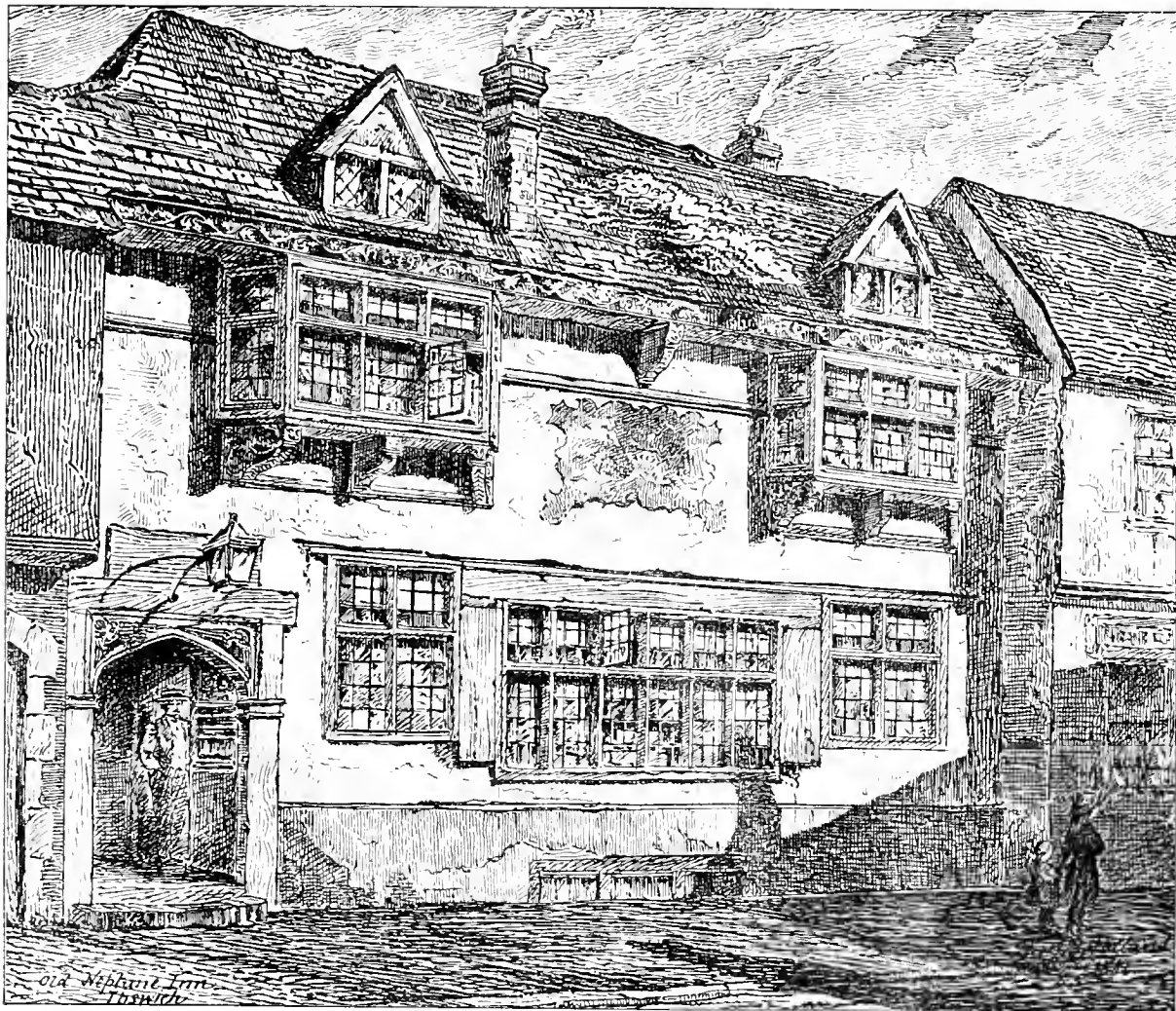
THE IRONING ROOM



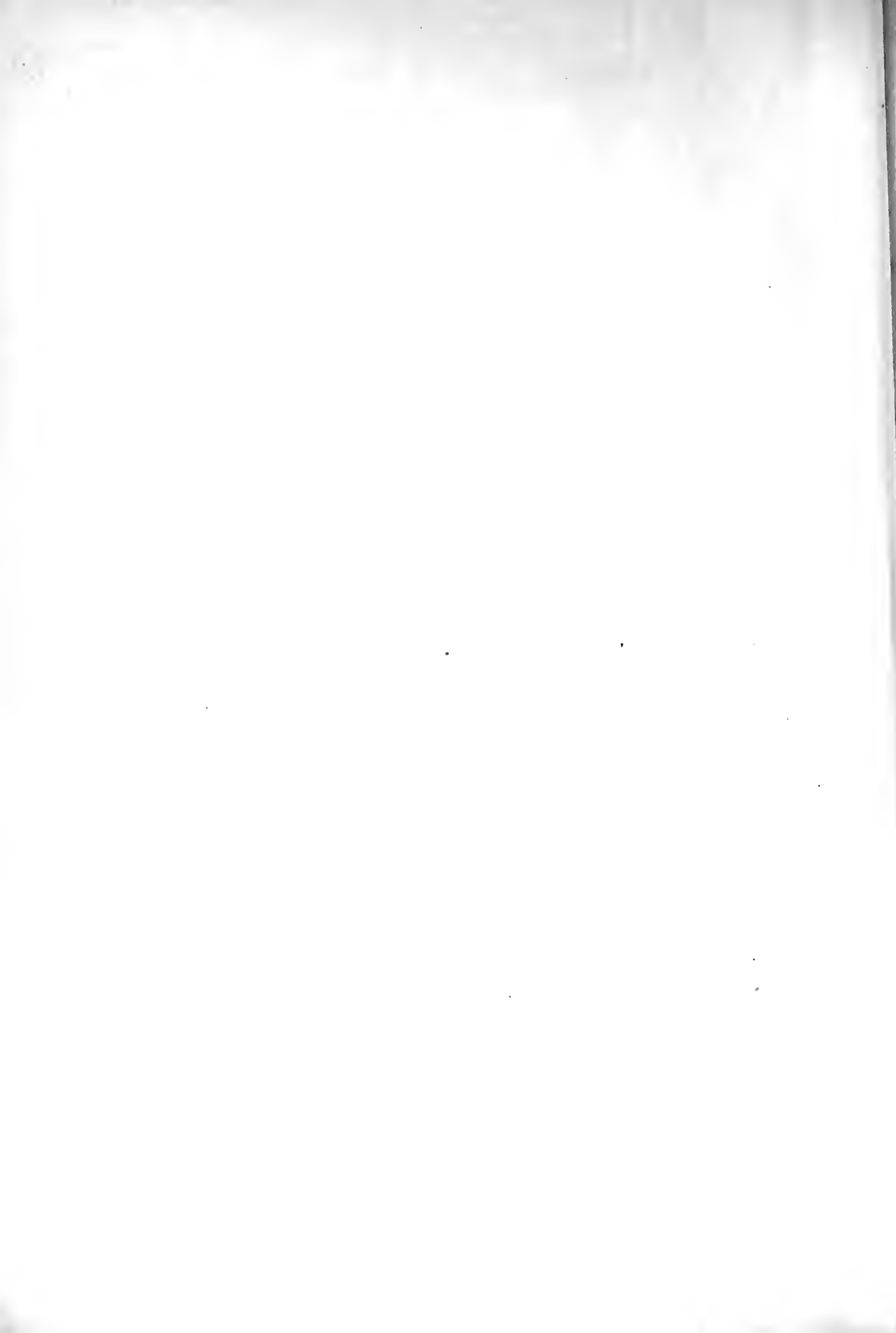
THE DRYING AND HANGING ROOM

— STEAM — LAUNDRY — BATTERSEA — PARK —





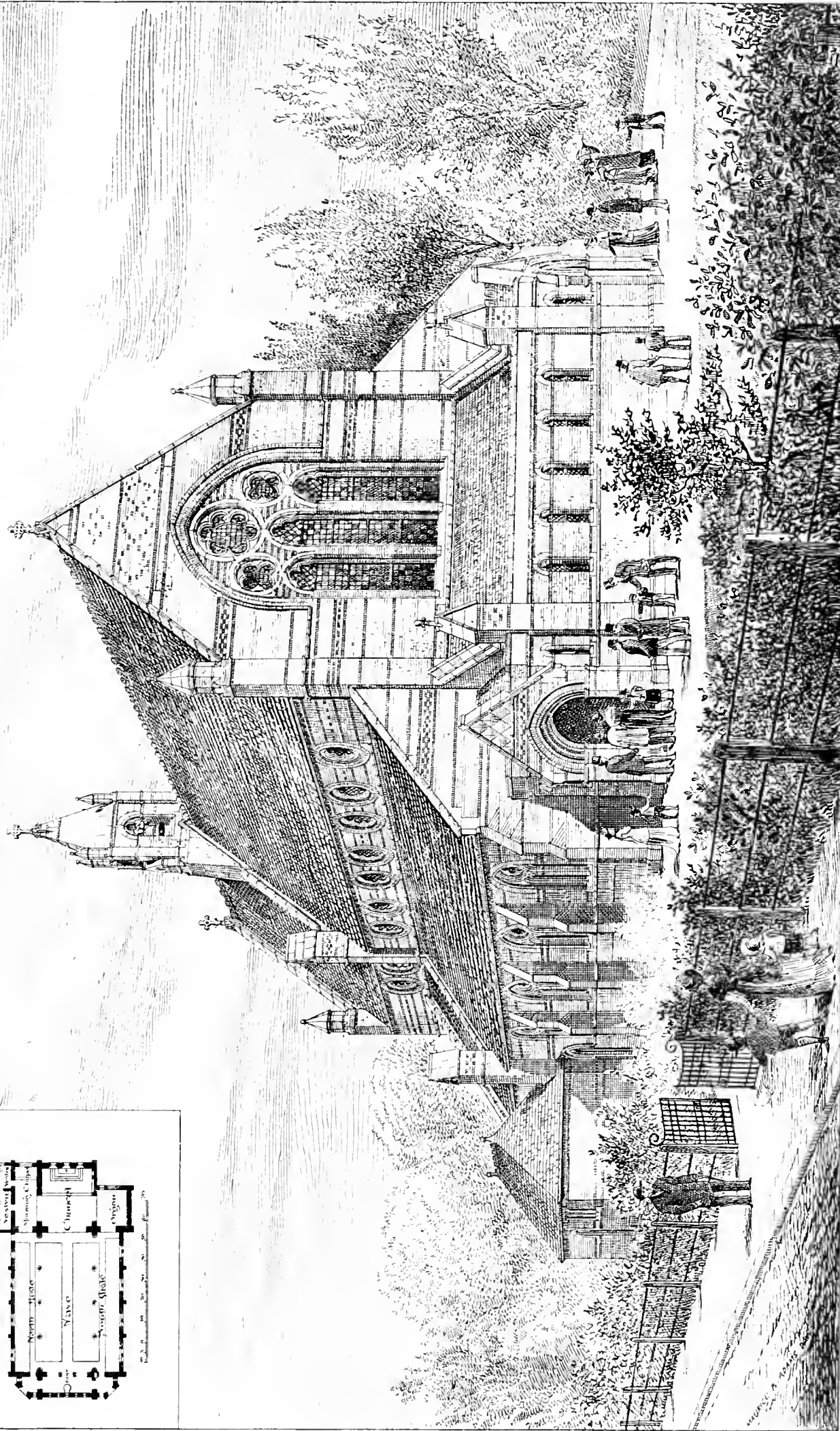
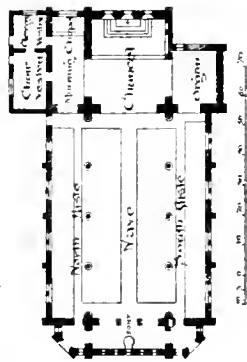
This, with engraving and printing by James Alderman 6, Queen Square, W.C.



THE BUILDING DEWS, NOV. 18, 1881.

NEW CHURCH OF ST. MARK · FARNBOROUGH · HAMPSHIRE · N. West View · *Edward H. Cuths Archt.*

Plan





THE APPRENTICE QUESTION.*

I HAVE been induced to write the following pages from a feeling that the subject is one which is of importance both to employer and employed. I know that it is a thing to which the latter are somewhat opposed; but I am hopeful that, at all events, I may convince some among the more sensible of them, for whose opinion I entertain respect. The subject I propose to discuss is that of apprenticeship. It will, I am sure, be conceded by both master and man, that a mechanic cannot be an efficient workman unless he has been taught; and in my opinion the best way of teaching is by means of the old-fashioned plan of apprenticeship. At one of the interviews with the workmen in 1872 I broached this matter, and, I must confess I was greatly surprised to find that the delegates were so unanimously opposed to it. I was the more surprised because these men were shrewd, and some of them even had been apprenticed to their trades. I have made inquiries among the men as to their objections to the apprenticeship system, but have never yet heard any good grounds for such objections. There seems to be an indefinable dread of a something, an objection resting on no apparent basis. I cannot understand what can be the feelings of a really efficient workman who thoroughly understands his trade, when working next bench or banker to a man who knows next to nothing, and who has frequently to ask for assistance when setting out his work. This is, unfortunately, too often the case, because too many of the men now in the trades have not been properly trained. Can this efficient workman be satisfied when he goes to the pay-table, and receives the same wage as the "duffer"? I am afraid the real reason is that the "duffers" are the majority, and, therefore, carry things with the high hand in their lodges, and the respectable efficient man is nowhere, and has to grin and bear his chagrin. Some societies restrict the number of apprentices. No doubt such a rule may be necessary, as there may be unscrupulous masters, but I take it that but very few would find too many apprentices a paying business. In fact, I do not believe that the work performed by apprentices ever pays; but as a master owes something to the trade and his fellow-men, it is not too much to ask him to make a temporary sacrifice, especially as in the long-run, he or his successor will derive some benefit by reason of better and more efficient workmen. I have heard it argued that seven years is too long a time for youths to serve; but on mature consideration I am of opinion that very few trades can be thoroughly learnt even in that time. Owing to the great demand of late years for labour, it has become difficult to discriminate between good and bad men, and a foreman is often sadly puzzled to set the work to the men according to their capabilities. Through this great demand for men to carry out large building operations throughout the country, many young men begin their career at what is called "field ranging," that is, on the houses built by speculating builders. These youths get a smattering of knowledge of their trade, and as soon as they themselves consider they know enough, come to work for the large builder and contractor, and owing to this want of discrimination they get lost in the crowd, and pass as good men. From information which I have been able to gain as to the customs prevailing in other countries, I find that in Sweden apprenticeship and enrolment in a guild were compulsory, but as the most advanced principles of Free Trade were adopted, these customs were abolished, to the great disadvantage of the community, and now there is a strong feeling that the old custom should be revived. In Holland, which is more conservative, the custom still exists. In France, boys are apprenticed, but for a shorter term than ours, but better opportunities are afforded by the establishment of technical schools, where a youth can gain instruction in the higher branches of his trade, and in one which is most important, and which is quite overlooked by us—viz., the nature and the character of the material he is using. The ignorance of some of our workmen is truly lamentable. For instance, one sees frequently a painter thinning varnish with turps, thus mixing two liquids of totally different characters;

and again, a plasterer gauging Portland cement and plaster together, one a slow-setting material, and the other a quick one, thus neutralising or destroying the effects of both. The French go so far as to apprentice coachmen, for I noticed lately in Paris a char-à-banc full of men, who were receiving not only instruction in driving, but in what is most useful, their nearest way about the city. In Germany, bricklayers are not apprenticed, but joiners, masons, and painters are, but usually for only two or three years. The guardians or parents pay from £10 to £20 premium, and for that sum the master keeps the boy in board and lodging, but does not give any wages. At the end of the term the lad generally stays on, and receives a small wage. Most of us know something of German workmen, and must have noticed that they are very conscientious in their work, and appear to take great pains—their heart seems to be in it. One reason for this is, that men in Germany are paid only according to merit, except in North Germany, where Social Democracy is rampant, where they are trying to emulate our splendid principle of paying all—good, bad, and indifferent—alike. The system of technical education is also carried out, if anything, to a greater extent than in France. Looking, further from home, I read that the Japanese have taken the question in hand. "The Chamber of Commerce of Tokio, in its sitting of the 6th of December last, was occupied for a long time with the question of contracts between masters and apprentices. It unanimously decided that a petition should be addressed to the Government, praying it to fix by law the number of years that the apprentice should give to his master, in order that the latter, sure of the time for which he could count upon the services of his pupils, might have an interest in giving them a complete instruction in his calling. Though before the restoration of 1868, it seems that there were no precise rules upon the matter, engagements were, nevertheless, made by private contract, which so effectively bound the apprentice to his master for a stated period, that practically it never happened that the pupil left the master, from whom he received lessons and advice, before the end of his apprenticeship. To this wise measure is attributed the progress of the country in many arts and industries. But since this custom has by degrees fallen into desuetude, the apprentice, who may find the smallest pecuniary advantage by leaving his master, fails not to do so on the morrow; and the latter, in the face of such versatility on the part of his pupils, protects himself by forgetting to divulge the more important secrets of his art. Hence arises the scarcity of good workmen, and the general decadence of their arts and trades. The embroideries upon silk stuffs (Kin-ran), which at one period made the 'glory and the fortune' of the country, have become very rare, and are now almost priceless; not so much in consequence of the costliness of the required material as the difficulty experienced in obtaining skilled embroiderers. The Chamber of Commerce, with a view of remedying this evil, and still more to create a constant progress in their industrial arts, has recognised the necessity of fixing an apprenticeship which shall bind the pupil to the master for a certain number of years, to be determined according to the nature of the art or trade which the apprentice shall undertake." I have mentioned the foreman. The foreman is a factor in the matter who requires great consideration. I may say he is the most important factor; for however willing a boy may be to learn, and however anxious the master may be for him to get on, without the goodwill and assistance of the foreman, it is impossible. I would suggest, that if the master receives a premium with the boy, he should allow the foreman to participate. This would induce him to take an interest in the lad. Some employers allow their foreman to take apprentices; this is not in my opinion a good plan for the master, because virtually he is not master; nor for the boy, because the foreman is not always in constant employment, and if he receives a profit on his wages, it is a system, to my mind, which is most objectionable. I believe that the good men would gladly hail any means that could be devised for improving the state of their trades, were they allowed freedom of action and opinion. But this they know they cannot expect, as long as the majority is composed of those who, knowing their own imperfections,

aim at keeping wages and time at one dead level, for good and bad alike. This has been the action of the trade unionists, and I fear will be so until the trades are improved. The only way that I see to attain this great object, is to teach youths in a proper and systematic manner, viz.,—by apprenticeship for a term of years. By securing the boy for a term of years, you get over the difficulty which I have already named, of their running off when they are vain enough to think they know their trade. This is a difficulty which always has, and I suppose always will exist. The improvement of our workmen has, I am aware, occupied the attention of many who have their welfare at heart, and it is only by improvement that we shall be enabled to keep our place among the other nations in the markets. We have heard much of technical education. My own idea is that we want to begin at the foundation, by properly training workmen, who belong to those trades which are mainly carried on by manual labour. Of course, I refer more particularly to the trade to which I belong, viz.,—that of building; but these remarks apply equally to other trade. Feeling very strongly the importance of the subject of apprenticeship, I have for many years advocated it among those with whom I have been thrown. Feeling also that the scheme proposed by the large City companies must take some years to develop, and that the smaller companies could not be expected to do much towards that scheme, and I must confess not having much confidence that technical education would be the right means of improving the lower class of trades (if I may use such a term as "lower" for those which are purely manual), I suggested to the Guild, of which I have the honour to be a member of the Court, to devote some of their income to educating lads in their trade. To this end, the Worshipful Company of Tylers and Bricklayers, after very careful and anxious consideration, determined to give premiums of £25 each to masters who would take boys for a term of years. The court has annually apprenticed three boys, two out of their own funds, and one through the liberality of one of their members, with the most satisfactory results. I have brought the matter before other guilds, and now hope that they may see their way to follow such a good and useful example. The National Association of Builders of Great Britain have recently taken up the matter, and in a circular issued to the trade, the late respected president very rightly points out the necessity of introducing a superior class of boys and youths, and recommends employers to apply to the teachers of schools, for boys fit to be apprenticed. No doubt the improvement in the education of our poorer brethren has had much to do with deterring boys from learning manual trades. They prefer to go into offices; but now that all boys will be better educated, and there can only be room for a limited number in offices, a proper level will be found, and it will be considered no degradation for an educated boy to work with his hands. I regret to say that there are many employers who refuse to take apprentices, not caring for the bother or for the first loss. This, to say the least of it, is a selfish feeling, for these people ought not to expect to have men ready to their hand, trained by others. It is also a short-sighted policy, because the supply of good men must, on account of the great demand, be limited, and employers are daily paying full wages to inferior men. This, perhaps, they do not think of. On the other hand, there are many employers I know, who, declining to take apprentices, allow the sons of their foreman and old hands to learn their trade in the shop. This, of course, answers the same purpose. The difficulty of getting a good class of foreman, free from the influence of trade union, would by means of apprenticeships be materially reduced, as an employer would have a better chance of training and bringing forward under his own eye, boys who in time would take that responsible position. In concluding these remarks I would add that, in my opinion, the wage question is very important. Formerly nearly all apprentices lived with their masters, now it is rarely so; therefore, the boy should receive such a wage as will keep him, or nearly so. The Tylers' and Bricklayers' Company stipulate that during the first three years an apprentice receives very low wages, but that

* A paper read by the president, Mr. STANLEY G. BIRD, at the last half-yearly meeting of the National Association of Master Builders of Great Britain.

when he begins to know something of his trade, and ought to be useful, he shall then receive such a weekly sum as shall be an inducement to him to exert himself, and that in the last year he shall receive about one-third less than the full current wage paid to workmen. This is the due of the young man, who at twenty-one is naturally full of pride, and is, or ought to be, capable of doing a good day's work, and who would feel galled at receiving a small nominal wage of, say 18s., while the next man, who perhaps is not so good, receives nearly £2. He loses heart in his work, and he also loses self-respect. Again, perhaps, just when he is useful, if he has not the inducement of good wages, he thinks himself better than he really is, and, travelling being cheap, takes himself off to some distant town, and there gets full money. I have said that nowadays boys do not, as a rule, live with their masters; but I do not mean to say that the responsibility of a master ends day by day when the lad leaves his work; I think that he should endeavour to induce the boy to devote his play-time to healthy and useful amusements, by encouraging him to attend during the winter time drawing-schools, which are now to be found very generally in most localities, also lectures, and mechanics' institutes. During the summer time let him try cricket and boating. All these give a good tone to the system, both morally and physically, and last, though not least, let him join a rifle corps; he will then begin to feel the importance of taking his place as a citizen; he will be taught habits of obedience, punctuality, neatness of dress, order, and method; he will be set up in person, and begin to feel some self-respect, besides having a good deal of priggish nonsense knocked out of him. As concerns the trade in which I am interested I do not think it is practicable, but in others I would suggest the holding of exhibitions of the works of apprentices. It would certainly show what they could do, and cause a very praiseworthy emulation. Prizes might be given, and in some cases the freedom of the companies bestowed as the highest reward, as is now done by the Turners' and Painters' Companies.

DR. ALLMAN ON ART AND ART SCHOOLS.

AT the first annual meeting of the Poole School of Art, held on Friday evening, Dr. J. G. Allman, F.R.S., Ex-President of the British Association, distributed the local prizes and the Government certificates gained by students in the newly-formed school, and afterwards delivered an address in which he said:—Our new school has for its object the cultivation of both art and science. This is a wise association. Art and science are united in an inseparable sisterhood, in which each lends her aid to the advancement of the other, and it is satisfactory to see that in both departments we have had so goodly a display of successful work. I shall confine myself to-night to art as the subject for a few words of counsel and encouragement. There are two aspects under which art, as taught in our schools, admits of being studied. It may, in the first place, be studied in its application to the manufacturing industries of the land, and in the second place in its higher aspect, viewed independently of all extrinsic relations, as the simple expression of natural beauty and truth. The former is known as design in the special sense of this word, and its value in a great manufacturing country like ours cannot be over-estimated. It is indeed becoming more and more evident that if in a large proportion of our manufactures we would hold our place amid the world-wide competition against which we have to contend, we must rely upon the principles on which the study of design is based. The advantage which in this respect Continental manufacturers enjoy over ours was long ago apparent, and the country becoming awakened to the danger of exclusion from the markets of the world, it was deemed advisable by Government to establish throughout the land, Schools of Design, where the application of art to various manufacturing industries might be taught. The success of these schools can no longer be questioned, and we may now compete in the artistic element of our manufactures with any country in the world. The effect of such studies

is twofold. They have enabled the manufacturers to originate forms of beauty and combinations of colour which are founded on inviolable principles, and therefore command the ready acceptance of mankind; and further, they act in improving the general taste—in intensifying the appreciation of beauty and the repugnance to all that is low and vulgar in form and colour. But art may be regarded in its higher aspects independently altogether of its applied relations. This is art in its noblest form; it is that which finds expression in the works of the great painters, sculptors, and architects. It has grown with the growth of manhood, and become developed with the development of the human mind. We shall perhaps be impressed still more profoundly with the dignity of art if we bear in mind that it may be regarded as a faculty essentially human. A capacity for art, even in its simplest manifestations, is one of those characters which, like articulate language, essentially distinguishes man from the lower animals. Most of the faculties which are regarded as characteristic of the human intellect may be found in a rudimentary condition in the lower animals. But the power of imitating form, by drawing or by modelling, is one of which no trace exists anywhere but in man. And yet among the very earliest indications of man's existence we find unmistakable evidence of such a power. This evidence carries us back to a period when European man was coeval with the now extinct mammoth and cave-bear and hippopotamus—a time when the reindeer, whose area is now confined to the precincts of the Arctic circle, must have roamed over the plains of southern Europe. It is found in rude drawings discovered in the caves of Perigord, in the south of France, along with rough flint implements, undoubtedly fashioned by the hand of man. Among these drawings is a portrait of the mammoth himself, engraved upon a piece of his tusk, and having the principal features of the living beast handed down to us with a rude but graphic fidelity, which testifies to the enormous antiquity of the delineative faculty in man. I, therefore, look upon this faculty and that of articulate language as the grand points of distinction—the essential differences by which the intelligence of man stands forth boldly and definitely separated from that of the very highest of the sentient beings by which we are surrounded. If art in its simplest and least developed form may thus be regarded as an exclusively human faculty, we may well expect it to advance with social progress and with human culture, until in its higher phases it becomes a refining and elevating power, intensifying all that is best and noblest in our nature, and in undying antagonism with all that is low and mean and vicious. The power exerted by art over the moral faculties of man must be mainly sought for in its tendency to bring us into intimate communion with nature, and under all the ennobling and purifying influences which flow from the fair and wonderful world which surrounds us. To give truthful expression to sources whence such influences spring is the aim and end of art. To attain this end long and careful study of form is essential. At the base of this lies a knowledge of drawing. Unless you can draw with accuracy and ease it is vain to think of excelling in any department of art. Our art-schools afford admirable opportunity of acquiring facility in drawing; but it needs industry and patience, and a determination to resist the temptation of passing to higher grades before you have obtained a complete mastery of this, the most important of all the conditions of success. For the truthful expression of nature there must be a careful delineation of specific form. There must be no evasive generalisation—no conventionalisms, which, however admissible, or even demanded, in the department of design, are utterly at variance with the requirements of those higher phases of art where the truth of nature is, above all things, paramount. We have this been recognised by our great landscape painters, who are always greatest when they depart least from the simple truth of the natural forms which surround us. Do not, however, mistake me; do not imagine that when I say that a truthful rendering of nature, even in detail, is the aim and end of art, I would counsel a servile attempt at mere imitation. The great landscape painter is the interpreter, not the mere imitator, of nature, for with all our efforts at imitation of

form and colour, how far, far short do we fall of the utterly inimitable original! Mere details of form and colour will in themselves never make a great picture. Years may be spent in an attempt to depict all the details of a piece of natural scenery; every curve in the outline of a cloud, every boulder on the hill-side, every spray in the ramification of a tree may, after infinite labour, find its place upon the canvas; and yet the result may be poor, and weak, and expressionless, with no power to awaken in us one high emotion, or satisfy a single longing after the true and beautiful in nature. Far different is it with him whose works are destined to endure and become a power throughout time. He knows that in the world which surrounds us there lies a deep meaning hidden from the uneducated eye, but which reveals itself to the painter, who, by long years of study, has made himself worthy of the gift, and which, no less than obvious form and colour, must find its expression in his picture. It is this faculty which makes the painter; and if any of you have decided on making painting the business of your lives, you must never rest until you have attained to it. But for this, there is no life of idleness before you; year after year must be spent in deep and earnest study, and in constant communion with nature. You must become familiar with her in all her moods; in sunshine and gloom, in storm and calm; in all her varying aspects, from the first green buds of the young year, when the raiment of early spring is cast over the forest, to

The last red leaf, the last of its clan,
That dances as well as dance it can,
Hanging so light, and hanging so high
On the topmost branch that looks up to the sky.

Then only will you be prepared for the high mission which awaits you, for the privilege of becoming the interpreter of nature to your fellow-men, of revealing to them the beautiful, the true, and the good of God's bright universe, and thereby making them wiser, and better, and happier.

THE PROPOSED NEW WAR OFFICE AND ADMIRALTY.

IT is proposed to concentrate the scattered departments of the War Office and the Admiralty in one homogeneous block of buildings. For the accomplishment of this design Parliamentary powers are to be sought in the coming Session.

The scheme which is now being prepared seems to bear the stamp of efficiency. In the first place, it brings the War Office into juxtaposition to the Horse Guards. The latter place is to remain where it is. But from the Horse Guards up towards Charing-cross, as far as Biddulph's Bank, a clean sweep is to be made. The building which serves as the office of the Paymaster General is to be cleared away. The edifice which affords a harbour of refuge to the Lords of the Admiralty is to be improved off the face of the earth. A group of four houses following next in order are likewise to be removed, thus creating a long line of frontage, which will be divided equally between the War Office and the Admiralty. But while the eastern front will be thus conspicuous, the block of buildings which it is proposed to erect will stand on a site opening up advantageously in other directions. The ground to be cleared includes not only that occupied by the line of buildings already described but also a large space at the rear, at present known as Spring-gardens, New-street, and Spring Gardens-terrace. Already the Admiralty Offices have extended so as to comprehend nearly all this region. When a Committee of the House of Commons reported on the subject four years ago it was stated that as many as twenty-eight of the adjacent houses were occupied by the Admiralty in addition to the main building. All this is to be altered, and by the concentration of the two great Departments of the Army and the Navy a range of buildings, forming part of one design, is to cover the area now broken up into ill-formed streets and scattered offices. One outlook will be towards the Parade appertaining to the Horse Guards, taking the line of the Admiralty garden wall, while the west front will follow the line of the present Spring Gardens-terrace, and what is now the western end of New-street. The private gardens in front of

the terrace are to be thrown open to the public as a sort of appendage to the adjacent park. The entire area thus secured for the public service is obviously large, and will afford ample accommodation for the various departments comprehended in the scheme. Some anxiety will doubtless be felt as to the style of architecture. The *Standard*, with its usual anxiety to impart exclusive information, assures us:—"It will certainly not be that of the New Law Court." For the present we are told that the architectural features of the new building are to be subordinate to its main purpose as a great public office. No better principle could be enunciated. There is always elegance in fitness; but without doubt the commanding site thus obtained, presenting itself to public view on three sides, offers a tempting opportunity for the exercise of architectural taste." The *Standard* enunciates sentiments and principles with the facility of Joseph Surface himself. Let us hope that the architect who is selected to erect the new building may suffer less injustice and vexation than most of his predecessors who have served the Government.

OUR VERNACULAR ARCHITECTURE.*

MR. STREET'S speech to the Royal Institute of British Architects was a bold as well as a thoughtful one, and thoroughly creditable to him, as one of the chiefs of his profession; but it fails to convince us. We admire and applaud, without being satisfied that the speaker has touched the root of the great evil he denounces, or has suggested a practicable remedy. By a felicitous though unscrupulous little clutch, Mr. Street has appropriated a word from the terminology of the philologists, and calls the art of building without professional or scientific help, "vernacular architecture." "Indigenous architecture" would be nearer the truth, but "vernacular" awakens a more correct association of ideas. The infinite mass of English house architecture is, Mr. Street says, "vernacular," is due to the builder and the mason and the carpenter and the plasterer, all labouring by rule-of-thumb, and without any scientific or artistic supervision of any sort. Street after street is run up without any architect, till there are entire quarters large enough, if they only had histories, to be called cities, in the construction of which no trained professional has ever been consulted. The builders, who vary from great contractors, with science at their command, to little bricklayers working with borrowed capital, build them as they choose and can. Such building is almost invariably very bad, and this, says Mr. Street, must, in some degree at all events, be the fault of the trained profession. Architects cannot, as the law now stands, force builders to consult them; but they ought, by their example, to have taught the builders, to have given them ideas and an ideal, to have raised in them a general opinion, which would have made departure from the first principles of good architecture as discreditable as in many trades bad work is. Sound notions, in fact, ought to have filtered down from the profession to the trade, if the profession had done its duty, for they did once filter down. "Vernacular" architecture is no new thing; it must always have existed, and did exist; it is the badness of such architecture which is the novelty. A century ago, the English builder frequently built without help, but he had learned his trade from men who had been trained by the architects of that day; and his ideal, therefore, was a simple, solid building, entirely devoid of ornament, but full of utility, and certain to endure. Now builders build houses so thin that every word is heard through all walls, and so weak that the inmates rock in their beds when the wind blows high, and spend all their spare money on "so-called ornaments to the stucco fronts only of the houses, which are costly to put up, costly to keep in repair, and hideous in their ghastly unfitness for their place. They have compo keystones, ornamental railings and balconies, a few lumps of terracotta, elegant cornices and window-dressings, and highly suggestive chimney-pots." That is, Mr. Street thinks, the fault of architects, for if the builders who use their aid were trained to solidity, drilled into it through never seeing

anything else, they would, in their turn, train other and smaller men in the same idea, till adequate solidity was accepted as a *sine qua non*, as the builder's necessity, as a quality the absence of which would be held unworkmanlike and discreditable. Builders would be cut by builders for scamped work, as officers are cut by officers for ungentlemanly conduct.

Nothing could be sounder or more beneficial than such a speech, and we only wish Mr. Street could preach a course of sermons upon that text to all the builders of England; but we fear he would only make them wretched, without permanently amending their behaviour. If bad art and bad work and ugly ornament constitute badness, builders are very often bad; but there is an involuntary element in their badness, for which Mr. Street scarcely makes sufficient allowance. They can, if they like, abstain from stealing gravel—a direct theft, for which we hope yet to see a builder or two in Portland Prison—they can supply the seasoned materials they say they supply, and they can build perfect drains, instead of laying down, as they often do, pipes without connections to them; but whether they can build solidly may be doubted. They themselves say they cannot,—that the conditions now imposed by circumstances are too numerous and too inexorable, and that to demand solid building from them is to demand that they cease to build altogether; and they have a colourable case. All possible circumstances which could induce a decent builder to build houses so weak that they rock in a storm, appear to have arrived in this country together. In the first place, the freeholders of the soil, who have the first word in the matter, do not ask builders to build well, but almost insist, as a condition of employment, that they shall build badly. The freeholder of the last century, anxious for profit on his city estate, either sold the land to the builder altogether, or granted him a long lease at a comparatively moderate quitrent, and under a well-understood, though tacit agreement, that the lease would be renewed at a moderate, or, at all events, endurable rate of increase. The great Cavendish property, the present "Portland Estate," was all treated in this way, and for more than a century tenants were treated with a rare lenity and consideration on all questions of renewal. The builder, therefore, with a hundred years of tenancy to sell, besides a possible perpetuity, had every inducement to build solidly, and look to his purchaser for such profit as he expected; while the purchaser expected solidity, as much as he would have done had the house been freehold. Expenditure on the house might be scamped in places, but the "shell," the walls, and the beams, and the doorways were sure to be intended to last the century, and, as a matter of fact, have lasted, as witness Harley-street. Now, the freeholder, especially in the suburbs, possessed with the idea of a rapidly-increasing income, refuses long leases, picks out builders content with short terms, and very often succeeds in finding men who will "put up" houses, and even large houses, on leases of thirty-five years. It is hardly in human nature to build with true solidity on such a tenure as that, and the difficulty of doing it without heavy loss has been increased by other causes. All building materials have largely increased in price, not only brick, but timber, more especially timber for beams, and most especially timber for beams of more than a certain solidity. Then recourse has been had to poor timber-work, cut by machine, and manufactured or imported wholesale, while the price of all labour has increased enormously, till the effect of the triple process has, speaking roughly, been to alter completely the old proportionate cost of solidity and thinness. If the wall is doubled in thickness, and the beams are doubled in strength, and the doorways and windows are doubled in durability, the cost is not doubled, but tripled to the builder, who has to pay not only for more material and for more labour, but for material of a kind that grows scarcer, and more labour at a higher price; while he loses, as against his rivals, by the whole cheapness of the machine-made and imported rubbish. At the same time, he does not find that he can recoup himself in his prices. Wealth has increased, no doubt, quite as fast as the cost of materials, but not the wealth of the classes he builds for, much less their inclination to spend that wealth in purchasing solidity for a few years by a sacrifice of their capital. They would give double

money to be housed for ever in solid buildings, but they will not give it to be housed a little more comfortably for only thirty-five years, in the middle of which they will probably be desirous to move further afield. Among the classes living on earnings, the pressure of rent is so severely felt, that as they cannot buy freeholds, they insist on keeping rent down, and it is kept down by the sacrifice of solidity, which they do not greatly value, which the builder, with his short lease, greatly dreads, and which the freeholder, who never spends anything, but makes the next leaseholder do all repairs, cares nothing whatever about. As to the compo messes, and stucco window-dressings, and ornamented chimneys, the fault lies with the public, which will have them, though it knows perfectly well all the while that the cost of ornamentation must be taken out of the cost of what is properly "building."

Suppose, under these circumstances, that Mr. Street's sound and wholesome advice were successful, and that the builders were gradually convinced that solidity was indispensable, what would be the result? Clearly, either that the new houses would cost exceedingly much more, to the despair of tenants, who would declare that they could not pay such rents, and would not lock up capital in premiums; or that building would stop, and the people crowd together into the existing dwellings. That process is going on now to an enormous extent, particularly in the solid streets of the third rank, the houses in which are slowly parcelled out in floors, occupied by two or even three families, under an agreement which leaves one of them still the nominal owner of the house. That is not a good system, but it is one which, if houses are all to be solid, would very soon receive an immense impetus, till London gradually assumed the characteristics of a Continental capital. The remedy, we fear, is not in rating the builders, who will obey orders, like any other tradesmen, and build solidly, if they are only paid, but in a sweeping away of settlements which will allow owners either to sell sites, or to agree to the Scotch device of perpetual leases. The Scotch, who, except in Glasgow, are not cramped for room, and who have stubborn ideas of economy, will not build on a lease for less than perpetuity, and consequently their houses are for the most part fairly solid. Till we can get this change, there will be little improvement, and even then another will be required, which Mr. Street will probably not like. Architects are not bad people, and most of them have some artistic feeling, but still they are human beings, and while they are paid by a percentage they will never be heartily desirous of securing cheap solidity. They like the solidity well enough, but they like also to be paid; and a house which costs £10,000, costs the architect no more time or energy than a house which costs £5,000, while the architect's honorarium is very nearly double. Let the architect contract to supervise the builder as the builder contracts to construct the house, and his temptation will be steadily towards the cheap solidity which will ultimately make his name. As it is, the more the private customer spends, the better it is for the architect; while the builder, who ought to employ him always, is afraid of the cost.

VENTILATION OF DWELLING-HOUSES.

ON Wednesday evening, Mr. Henry Masters, architect, read a paper on "Ventilation," before the Bristol and Clifton Junior Architects' Society, at the Fine Arts Academy. Mr. Masters commenced by stating that his subject would be treated more in a practical than a theoretical manner, and apply more to the dwelling-house than public buildings. In his experience, he had seen more failures than successes, and felt regret that ventilation could not yet be considered an exact science. He pointed out some of the difficulties met with in the practice of ventilation, such as the exhaustive power of the domestic fireplace and chimneys in the room to be ventilated, as well as its power in other apartments; and also the influence of temperature, each of these powers acting in such a manner as sometimes to cause the air to go the contrary way to that wished. He then described Dr. Reid's method—exhaustion by a fire at the bottom of a

* From the *Spectator*.

especially-constructed chimney-shaft, and admitted air through a net of ice, and its application to the Houses of Parliament. Mr. Bernhard's system of zigzag pipes in an air-chamber, and as practised by the late Mr. Hazard, of Clifton, was explained, and its merits and defects commented on. Sir Humphry Davy's scheme of parallel pipes and cow-korn-exhauster was next described, also Dr. Arnott's attempt to ventilate a room by the heat of its inmates. Dr. Chowze's inverted air-siphon ventilator was illustrated, and the causes of its failure. Mr. Masters then pointed out the absolute necessity of air being kept in motion to insure good ventilation, and that the air should be obtained from a pure source, and cautioned his hearers to beware of obtaining it from marshy or damp ground, or the locality of bad odours. Nature abhorred a vacuum, and the cause of our rooms being so healthy as they were was due in some measure to the badly-fitting doors and windows and the exhausting power of the open fire and chimney endeavouring to form vacua. He also explained the tendency of air at times to pass down the one side of a chimney and up the other, which was a common cause of smoky chimneys. The approximate quantity of air required for each person occupying a room to insure freshness was given, and the difficulties in supplying this quantity, or any quantity, without draughts. The lecturer next described the inconveniences of the open fire, whereby the front of the body was scorched by radiation, and the back chilled by cold draughts. Reference was made to the air-chamber grates, and the care required in their selection so that the air should not be deprived of any of its oxygen in passing through them. Various modes of ventilating an apartment were described, and their good and bad points pointed out. The proper position for the admission and exit of air to and from an apartment was illustrated; some practitioners preferring it to enter at the top of the room, and drawn off from the bottom, and some to enter at the bottom, and drawn out at the top. The so-called Tobin's tubes patented by Mr. Whitehouse, architect, in 1794, were described, and their defects pointed out. The difficulty the architect will find to satisfy his clients in the matter of ventilation was touched upon. Sherringtonham's, Boyle's, and other ventilators, were referred to, and their points explained. Mr. Masters then described the mode he had adopted to ventilate local factories by exhaustion shafts and horizontal perforated tubes. Mr. Griffin's hinged door shutter was explained, and its merits of simplicity referred to, a patent having been recently obtained for it, although an old invention. He cautioned his hearers to be on their guard against certain ventilators in the market, and pointed out their very limited application and his early experience with his invention, the Archimedean screw ventilator. A few remarks were made upon a suggested mode of ventilating tunnels, if divided by a partition, whereby the train in its progress through would force air before it, and exhaust air behind it. Mr. Masters warned his hearers not to suppose his remarks, or the reading of books, were all that the young architect required to master the subject of ventilation, and he advised them to think the subject, well out, and test by experiment, and to get experience by studying the successes and failures of others. The paper was illustrated with a number of models and experiments.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

MANCHESTER ARCHITECTURAL ASSOCIATION.—The second meeting for this session took place in the old Town Hall on Tuesday, the 15th inst., when a discussion took place on "Sketches and Sketching," in which many of the members took part, and exhibited drawings—those by Mr. T. Rattee-Davies, calling for special notice.

NORTHERN ARCHITECTURAL ASSOCIATION.—At a special meeting of the Northern Architectural Association, held on Tuesday afternoon, in the Old Castle, Newcastle-on-Tyne, Mr. John Tillman, F.R.I.B.A., of Sunderland, was elected president for the ensuing year.

A new Corn Exchange at Truro was opened for business on Wednesday week.

Building Intelligence.

ACCRINGTON.—A new Conservative Club is now being erected in the centre of the town by local contractors. Externally the dressed asblar is from the Ringby Quarries, near Halifax, the wall-stones from Hipperholme in the same locality. The inside joinery is mainly of Baltic timber, selected pitch-pine being used for panels. Heating is to be effected by hot-water pipes on the low pressure system, and the ventilation by vertical flues in the walls discharging through the window-sills. Arnott's ventilators are also used. The cost of the building, excluding the site and furniture, will reach £200. The architect is Mr. Henry Ross, of Accrington, who is superintending the work.

CARDIFF.—New workhouse buildings at Cardiff, which have been erected at a cost of £23,000, are now ready for occupation. They include an administrative block facing the street and surmounted by a clock-tower 76ft. high; a dining-hall and kitchen; men's block to right and women's block to left of entrance-hall; laundry and wash-house; smiths' and shoemakers' rooms and an oakum-shed behind. At the rear of the administrative block is a disinfecting-room fitted with Leoni's apparatus. The dining-hall is 85ft. by 43ft., and is furnished with combined dining-tables and seats. The kitchen is 30ft. by 40ft. and is fitted up with five boilers and a large cooking-range; at the opposite end to the range is the scullery. Both the large blocks of buildings are three stories high, and are planned as day-rooms on ground-floor, with dormitories above, reached by stone staircases. The men's block is 117ft. by 40ft., and the women's 123ft. by 40ft. The fireplaces in dormitories are of glazed brickwork, and ventilation is effected by Tobin's tubes carried up separately in the chimneys. The laundry is 180ft. long and of various breadths. The total accommodation, including the refuge, is for 830 persons. Messrs. James Seward, and Thomas, of Cardiff, were the architects; Mr. Clark Burton was the contractor, and Mr. Williams, of Canton, near Cardiff, was the clerk of works.

MILNTHORPE.—On the 19th of last month Kitching's memorial hospital and reading-rooms were opened. The hospital has been built by Mrs. Bindloss, wife of the Mayor of Kendal, and will be kept up by that lady at her sole expense. The building has been erected as a memorial to her late father, Mr. John Kitching, M.R.C.S., L.S.A. Eng., who was a native of Milnthorpe, and practised at 61, South Audley-street, Grosvenor-square, London, for upwards of 30 years. The hospital will accommodate about 20 patients. On the same day was also opened the new reading-rooms for the use of the inhabitants of Milnthorpe, built by the late Mrs. Thompson Bindloss, of Castle-green, near Kendal. These buildings have also been erected as a memorial to the late Dr. Kitching by his sister. The Institute comprises reading-room, coffee-room, library, and a large handsome lecture-room; over these are billiard and bagatelle rooms. All the above buildings were designed and carried out under the personal supervision of Mr. Eli Cox, architect, of Kendal.

NEWHAVEN.—A new mission-church was consecrated at Newhaven on Monday, by the Bishop of Chichester. It is in the Early English style, and measures 96ft. in length and 48ft. across. It is built of brick, and consists of a nave and aisles included in one span of roof, with semi-octagonal apse at eastern end. The windows throughout are simple lancets with patterns of coloured brickwork in the heads. Above the west gable is a timbered bellcote. Internally the nave and aisles are separated by pillars and an arcade of massive woodwork—a similar arrangement to that which prevails in the parish-church at Newhaven. The open-timbered roof is strongly framed and braced to resist the heavy gales of the locality. The accommodation is for 500 worshippers, and the cost of builder's work, including spiral-stair, was £1,576. The church was designed by, and has been erected under the superintendence of, Mr. E. P. Loftus Brock, F.S.A., of Montague-place, Russell-square, W.C. Mr. J. Morris, of Ashurst Wood, East Grinstead, was the contractor.

STACKSTEDS.—New Church-schools were opened at Stacksteads, near Rochdale, on Saturday week. They are Gothic in style, one story in height, built in hard hammer-dressed stone, with tooled dressings of Rossendale stone; the high-pitched roofs are covered with Welsh slates in two colours. The boys' schoolroom is 52ft. by 30ft., and has two classrooms, each 18ft. by 14ft. 6in.; the girls' schoolroom is 60ft. by 30ft., and can be thrown into the boys' room as a T-shaped assembly-hall. There are two girls' classrooms, each 18ft. by 14ft. 6in.; the infants' room is 40ft. by 30ft., with 18ft. square classroom. Advantage has been taken of the slope of site to provide a parochial room, 30ft. by 18ft., and stone cellars beneath part of the schools. All the internal school-walls are plastered and provided with dados of Portland cement with moulded wood capping. The woodwork and exposed roof-principals are of pitch-pine; Shillito and Shorland's school grates are introduced, and also extraction shafts and louvre ventilators. The schools accommodate 700 children in three departments, and have cost, including parish-room grates and chimney pieces, and furnishing of lavatories and cloak-rooms, £3,400—under £5 per head.

COMPETITIONS.

BARROW-IN-FURNESS.—About fifteen sets of designs were sent in for the new board-schools at Barrow and Roose. At the first meeting of the board to decide, the plans of Mr. Holton, of Dewsbury, were selected for the Barrow schools, and Mr. Eli Cox's, of Kendal, for those at Roose. At a subsequent meeting the board could not agree, so they were referred to Sir James Ramsden, and he gave the final award to the first-named gentleman.

BIRKENHEAD.—A meeting of the friends and subscribers to the Wirral Hospital for Sick Children was held last week at the music-hall, Cloughton-road, Birkenhead, for the purpose of examining the competitive designs sent in by architects for the new building which it is proposed to erect in Woodchurch-road. The first prize was awarded to the designs of Messrs. Harvey, Pennington, and Bridger, and the second to Mr. John Clarke, and it is probable that one of these will be selected by the committee.

EVESHAM.—The town-council of Evesham recently advertised for plans for the addition of ante-rooms and lavatory to the council-chamber of town-hall, offering five guineas premium. At their meeting on Wednesday week the three plans sent in were exhibited in the room, and the premium was ordered to be equally divided between Mr. Reddale and Mr. F. W. Gardner. It appeared from the proceedings very uncertain whether either of the plans will be executed.

KENDAL.—Mr. Eli Cox, architect, of Kendal, was last week awarded first prize for the best set of plans for some extensive public buildings which are intended to be erected in Kendal. The site chosen is in the centre of the town, between Finkle-street and the present market-place. The designs show rows of shops facing both streets; the new markets will be in between these. The approaches from each street will be through four ornamental stone archways, of ample width and height, inclosed with wrought-iron gates. The interior of the market will be divided into four sections—viz., for fish, poultry, vegetables, and butchers' stalls. The section for fish is an notable feature, so arranged in the plans by the architect, that there will be no smell in the other part of the buildings from the fish, as this portion is inclosed with glass and wood partitions, and ventilated on the top by patent revolving ventilators. The style of architecture is Renaissance. There will be a tower facing each public street, in the centre of the buildings, surmounted by ornamental cast-iron gilded crestings, with the coat of arms of the borough introduced into the masonry below the tower-roofs. The architect's estimate for the buildings, including site, is £16,000. At the final meeting to award the premium the borough surveyor was asked to assist in the selection, when Mr. Cox's plans were chosen unanimously. The prize designs are now on view in the Town Hall.

"To a practical man with a taste for mechanics, and the humps of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the huge numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Two-pence of all newsmen, or post free 24s.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.
Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33s. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

RECEIVED.—M. and Co.—L. and N.W.R. Co.—H. and O.—J. K. and Son.—C. H. and Co.—G. W.—G. W. Ry. Co.—C. H. S.—J. P. E.—A. S. and S.—R. R. A.

M. (You are right in the main; but if you had seen most of the others you would be thankful for small mercies, and look favourably, as we did, on a comparative if slight advance out of the ordinary run.)—SILENCE. (The series now appearing by Mr. Davies, or Mr. Buchan's book, published by Lockwood and Co., which also first appeared in these pages.)

"BUILDING NEWS" DESIGNING CLUB.

T. B. A. and OTHERS. (There are no fees in connection with this club. Small sketches may be sent.)—W. B. S. (Any one may join. The sectional parts of walls may be blacked.)—TOM. (The drawings are returned after the review has been published.)—SILENCE. (The subject for next time will be duly announced. "Silence" and many others are referred to the rules of competition, published in the BUILDING NEWS of Nov. 4th, p. 606.)

Correspondence.

THE DUBLIN MUSEUM COMPETITION.

To the Editor of the BUILDING NEWS.

SIR,—A letter—concise and pertinent—appeared in your last issue, which has attracted considerable attention; it is full of point appropriate to the occasion.

"Fair Play," the author, must leave the matter in the hand of the "Committee of Selection."

How that committee shall be constituted is not yet known to the competitors; it is hoped that conjecture can be the only present guide.

"Fair Play" has a few sympathisers; one at least who, while expressing his sense of the fairness of the lines that are set for competitors to follow, having felt some difficulty in interpretation of the requirements, yet has some timid hopes that his fellow competitors will be true to the honourable calling—one of trust—which they profess, and that they will refrain from adopting any of the usual artifices of competition.

"Fair Play" is sternly faced by some facts; one, that handwritings are usually recognisable by local friends; another, that the style of "getting up" drawings is known in a "set." Another, that previous to the announcement of the competition, designs were made, circulars were issued, interviews held with "eminent" representative of art and science, some of them not unlikely to be nominated upon the "Com-

mittee of Selection," by local architects who probably are competitors; and, further, that something of a similar description has occurred since the announcement of this competition.

"Fair Play" will, I trust, join me in the hope that the "Committee of Selection" will leave the issue to qualified and disinterested judges to report on the merits of the designs, taking the lines laid in the instructions to competitors, and on the suggestion that the decision shall be left to three members of the Royal Institute of British Architects—these to be nominated, say, by the president, or if he be a competitor, by the senior vice-president.—I am, &c.,
A LOVER OF "FAIR PLAY."

9th November.

PRELIMINARY SKETCH COMPETITIONS.

SIR,—Observing in two at least of the important competitions now before the profession that the terms of the final competition—"in which the author's sketch design, and no other, shall be fully matured"—render imperative the mere development of the preliminary sketches, the distinctive characteristics of which it is to be presumed will have led to their selection in the first instance, what chance, I would ask, will No. 10 or even No. 6 (the maximum and minimum numbers which may be selected in the Glasgow competition) have of overtaking Nos. 1, 2, or 3 in the final competition? With the chances so much against those at the lower end of the list, it would be only reasonable to give those of them who might so elect the option of accepting a smaller sum—say £50, for the labour incurred by them up to that point (those so accepting to withdraw from the final competition) and with the difference increase the amounts to be paid to those who choose to go on to "the bitter end."

Under the terms I have quoted, and considering the diversity of merit to be found in the first six or ten of competition designs in general, it would seem but a mockery and delusion to ask five or six architects to contend for a prize which is virtually awarded, and to expend time and labour on developing designs which in the ordinary course of things can be of no possible use; for, with the restriction mentioned would not the result of the competition be pretty well determined by the merits of the preliminary sketches?

I also observe that the remuneration offered for the final drawings in the Glasgow competition is at the rate of one shilling and one-fifth per cent.; in Dublin three shillings per cent.; and at Birkenhead about three shillings and sixpence per cent.; and this for drawings which will involve quite as much, if not more, trouble in their preparation than ordinary contract drawings.—I am, &c.,
A. B. C.

DWELLINGS FOR THE POOR.

SIR,—The provision of good and cheap dwellings for the poor in populous neighbourhoods, is one of the most momentous problems of the present day, and, although from the statistics which you gave last week, as furnished by the Dwellings Committee of the Charity Organisation Society, one would be disposed to take a somewhat gloomy view of the practicability of a satisfactory solution; it may perhaps be somewhat reassuring to know what has been, and can be, done in a provincial town.

It was stated (on the authority of Mr. Gatliff) that the cost of erecting dwellings may be taken at £52 per room, also that the Victoria Dwellings Association had provided accommodation at £171 per family, the Peabody trustees at £262 to £315 per family, and the Corporation of London at £305 per family.

We do not know whether pantries, w.c.'s, and wash-houses are included amongst the rooms which are said to cost on an average £52 each; but assuming that the wash-houses only are included with the living and bedrooms, and that the cost of the w.c.'s, pantries, &c., is thrown into the general amount, blocks of dwellings have been, and are being erected in Plymouth under our direction, in which, under similar conditions, the cost is only £32 per room (including cost of formation of roads also), and accommodation is provided at from £76 to £104 per family. In these buildings, too, there are no single-room dwellings.

Allowing for the difference between prices in London and those in Plymouth, we think this

shows a more hopeful aspect of the question, more particularly as some of the buildings have been opened, have immediately been let at about one-third of the London rentals, and pay a dividend of 5 per cent. clear.

The buildings are of a substantial character.—We are, &c.,
PLYMOUTH.
HINE AND ODGERS.

LIME AS A PRESERVATIVE OF IRON.

SIR,—Lime, per se, does not prevent the oxidation of iron. If iron is properly protected from contact with atmospheric air and moisture, oxidation cannot occur. If lime is therefore placed upon the surface of iron in the form of plaster, its absorption of carbonic acid from the atmosphere reduces it to a hard coating of carbonate of lime, impervious to air, and as long as the coating is intact, oxidation of the iron is prevented; but as soon as any portion of the coating is broken, oxidation actively occurs, and throws off the remaining portion of the lime; moreover, if the lime becomes moistened, it is useless as a protector of iron. The writer knows several instances in which lime appears to have increased corrosive activity, and as for mortar, it is a mistake to place it in contact with iron, if the former is exposed to atmospheric contingencies.—I am, &c.,
A.M. Inst. C.E.

TESTING TRAPS.

SIR,—I notice a letter in your last issue from Mr. Emptage, to which I must take some exceptions.

Firstly, he couples my name with Mr. Pullen's, and, as that gentleman and myself are not in any way connected, I fail to see on what grounds he has taken such a liberty.

Secondly, he makes an assertion to the effect that there are 18 in. between the plug in basin and the water-line in trap. Now, this is a deliberate and wilful pervarication of the truth.

Thirdly, as this gentleman has told me that he is not a plumber or engineer, I would like to know what weight can be attached to his opinions, and why I should be pestered week after week to answer his letters? The experiments that have been made at Mr. Pullen's, have been witnessed by many of the best practical plumbers, &c., in London, which, I should think is much more trustworthy than if, as he requests, at the finish of his last letter, that your readers would suspend their judgment, awaiting his explanation next week. He must remember that he has, first of all, to explain away the falsehood. In conclusion, I emphatically assert that everything in my article on page 510 is perfectly correct; and, again, only to-day, I have tested all the traps with a valve-cloth seated directly on the top of each individual trap, as were also the basins in my former experiments. The action proved to be precisely the same.—I am, &c.,
P. J. DAVIES, H.M.A.S.P.

P.S.—It is just possible that Mr. Emptage may, like many others, be under the impression that I am personally in the manufacture of the U-trap; this, however, is quite a mistake, as I never manufactured a single trap, excepting for my own contracts, nor do I intend to supply them. I have, in one of my articles, given full instructions and measurements as to how the U-trap should be made, and those who want them for themselves can get them elsewhere.

SIR,—Allow me, for the benefit of your readers, to say that I have watched the correspondence between your able author of "Practical Notes on Plumbing" and others, and to also endorse the facts given, that the basins were, when I saw the experiment made (I was there, but gave the name of Wilson), fixed direct upon the traps. I measured the distance from plug to water-line in U- or round U-trap, and this is from my pocket-book taken at that time. "Dent U-trap top of scaffold; basin fixed over U-trap, total height from floor-line, 15 in.; depth of basin, 12 in.; from plug to water-line, 6 in." So that Mr. Emptage last week is wrong when he writes the basin to be 18 in., the trap momentum out each time.

Many thanks for Mr. Davies' splendid articles on plumbing; they make one fancy being at work when I read them.—I am, &c.,
PLAY FAIR.

SIR,—I was greatly surprised at Mr. Emptage's assertion in your last issue, that the distance from the plug of closet-basin to water-line of Beard and Dent's trap was 18 in. I flatly contradicted him on this point, as when I saw the tests a fortnight ago the basin was fixed at the ordinary height; however, to make assurance doubly sure, I again visited Mr. Pullen on Saturday afternoon, and found that the height from plug to water-line, when the basin was

fixed at its proper height, was 9in., and when placed direct on the trap 6in.; and, moreover, than that, with a valve-chuset fixed at the usual height on one of the Beard and Dent's trap, and with a 1 1/2in. air-pipe off the heel of the trap, it still washed out and left the trap unsealed. I hope, for the sake of Mr. Emptage's patrons, that the experiments at the Dame-hill Sanitary Works are carried out with more care than he appears to have given to these tests.—I am, &c.,

R. SMITH,
Secretary Plumbers' Society, St. Martin's-lane,
43, Bermondsey-square, S.E., Nov. 11th.

TESTING TRAPS.

SIR.—Mr. Emptage has made a great mistake in the measurement between water in ∞ -trap and the plug in basin, it being only 6in. instead of 18in.—I am, &c.,
160, Cromwell-road. A BUILDER.

SIR.—As a plumber of twenty-five years' experience, I was very much astonished at the statement of Mr. Emptage, about the height of the closet-plug above the water in the testing of Beard and Dent's trap. I measured it myself, and found it 9 1/2in. instead of 18in., as he states.

I think it would be better for Mr. Emptage, before he rushes into print, to learn to be accurate, and also gain a little more experience before he arrogates to himself the style and title of "sanitary engineer."—I am, &c.,
J. BARNEY.
25, Alfred-street, Grange-road, Bermondsey, Nov. 14th.

SIR.—I am somewhat surprised at the statement of Mr. Emptage, in your issue of the 11th, that the distance from plug in basin to water-line of ∞ -trap was 18in. The gentleman must have been drawing on his imagination for his facts, as the greatest distance was carried out 6in. from water-line of trap. I trust he will be more accurate in future, and as he is welcome to visit our establishment again to correct his measurements, he will do so and make his correction as public as his curious statement, for contradictions of assertions in this manner are far from pleasant.

I must also remind him that his meeting Mr. Davies at our works was not sufficient to warrant his connecting that gentleman's name with our firm. I only know Mr. Davies to be a thorough plumber, whose only connection with us is the unity of ideas, the result of training in sanitary matters from our youth upwards.—I am, &c.,
J. PULLEN, JUN.,
(Of the firm of Pullen and Son).

73, Penton-place, Waltham, Nov. 14.

P.S.—I cannot close this letter without reminding Mr. E. that I personally asked him if he knew of any other test to which we could apply the traps, and he answered, "No"; and to another inquiry if he was satisfied that our tests were fair to all the traps, his reply was, "He considered we had done everything fair."

SIR.—I have received a letter from Mr. Davies, calling my attention to a statement made in my letter upon page 611—viz., that there was a drop of 18in. between the valve and water-line of ∞ -trap. On reference to my pocket-book, I find it so stated. Upon consideration, however, I am inclined to think it is an error, as the valve and branch piece being both fixed, the drop must have been about equal with all the traps—viz., about 1 1/2in. I regret very much the error, which was quite unintentional.—I am, &c.,
DANIEL EMPTAGE, S.E.

Margate, Nov. 16th.

[Perhaps in future Mr. Emptage will have some consideration for our space, and be careful before writing.—ED.]

The new building erected by the Corporation of Stafford, from designs by Mr. J. B. McCallum, the borough surveyor, for the purposes of a Museum, Free Library, and School of Art, was formally opened on Thursday week. The building is situated in Eastgate-street and adjoins the Borough Hall. The library and reading-room occupy the ground floor, and the first floor is taken up by the Wragge Museum, leaving the second floor for the Art and Science School. The dimensions of the rooms are 37ft. by 37ft. The frontage is composed of red brick, with ornamental designs in terra-cotta, supplied from the Brereton works of Mr. Arthur Gee, of Stafford, the contractor. The work, which includes some scrolls and medallions in terra-cotta, has been completed by Mr. Gee at a cost, exclusive of site, of £2,000.

The three-light east window of south aisle in Great Shelford parish-church, has just been filled with stained glass as a memorial. The subject is our Lord delivering the Sermon on the Mount. The work has been carried out by Mr. W. H. Constable, of Cambridge and London.

Entercommunication.

QUESTIONS.

[6767].—**Fixing Weather Tiling**.—What is the proper method of fixing weather tiling to brickwork? Also, what is the usual one? Information in reply will oblige.—W.

[6768].—**Fifteenth-Century Plate-Armour**.—What are the accepted terms for the main portions of armour worn in the 15th century?—A STUDENT.

[6769].—**Early-English Woodwork**.—Where are the best old examples of this period to be met with? Mr. J. R. Collings, in his examples of "English Medieval Furniture," gives many illustrations of stonework of that period, but not a single instance of wood dating from the 13th century.—A STUDENT.

[6770].—**California and Colorado**.—I would feel much obliged to some reader for information about California and Colorado. Would a young man who has had a good architectural training, is well up in construction, can take levels, and fairly up in land surveying, have a fair prospect? I shall be thankful for any information, but it be ever so small.—TEX.

[6771].—**Deadening Sound**.—I have recently built a pair of villas with 9in. brick party walls, through which sounds are heard very distinctly. Would thin lead under the finished wallpaper assist in deadening the sound, or is there any other simple and economical method of curing the defect complained of?—MANCUNIAN.

[6772].—**Timbers in King-Post Roof**.—In Livingston's "Building Construction," in a table of scantlings of timbers for a king-post roof truss, I find: Span, 20ft.; tie beam, 9in. by 4in.; king post, 4in. by 3in.; pl. rafter, 4in. by 4in.; struts, 3 1/2in. by 2 1/2in., &c., and a note: In practice the width of the K.P., tie beam, and struts generally made the same as that of the tie beam. Would one of your correspondents kindly let me know which of the two sizes are considered the width?—R. F. S.

[6773].—**Deflection of Lattice Girder**.—How should the safe deflection of a lattice girder be calculated? Suppose it is being tested to a fifth of its breaking weight, what should the greatest deflection be? I shall be glad of the name of a good work bearing on the subject.—TUBAL.

[6774].—**Bank**.—Will some of your correspondents kindly furnish me with the requirements of a head office for a Corporation bank, and the position at that the various officials should have to each other?—MINT.

[6775].—**Transferring Oak Carving to Paper**.—Would a correspondent advise me the best mode of transferring oak carving on to paper?—NORTHEAST STUDENT.

[6776].—**Moss on Wall**.—Will some reader kindly say by what means I can remove the moss from the walls of a church in the country? There is a lot of ashlur blue whinstone, with dressings of white cut sandstone. Is there any chemical wash that would answer?—Z.

[6777].—**Measuring Chimney Breasts and Stacks**.—Could any reader kindly say how the brickwork to chimney breasts and stacks is measured in Yorkshire, whether measured for labour only or labour and material? Whether the breasts be built solid or not?—MOWBRAY.

[6778].—**Drain**.—I have a plot of ground where, in wet weather, the water stands to within 4ft. 6in. of ground line. As it floods some basement floors to the depth of 1ft., and is impracticable owing to other buildings to lay a drain direct from the cellar, would it be practicable to lower the water-line by sinking a well at a distance of 40ft. from cellars, and lay a drain with sufficient fall to main drain in road. There is gravel below ground line to the depth of seven feet.—MOWBRAY.

[6779].—**Measuring and Charging**.—Would H. McCallum or "G. H. G." answer the following? When you have finished a job for which you have had "quantities," when you measure the work at the completion, do you make out a fresh "bill of quantities," with the measurements of the work as executed, including all extra works kept separate in the bill? Do you deduct all "provisional items" on the credit side of statement, and add the contracts or cost of the work for which these amounts were provided on the debtor side? Or do you go through cost of the work for which, say, £10 was provided, and you find by measure and value, at same rate as quantities, it only reaches £8, do you give them credit for £2 without any particulars? I should be exceedingly obliged if you would give me some information as to the correct manner of making out a statement of work after the contract is completed. If you found when you came to measure up the work as actually executed that for an item of, say, 450 yards of brickwork, in quantities there were only 12 yards in the work, should you give credit for this or not take any notice of it? If you had a contract, and there had been variations in it, and there was doubt in your mind as to whether variations or deductions with any small extras you had done would come to the most, what would you do?—STUDENT.

[6780].—**Extras**. I take a contract for plastering from quantities supplied by an architect. During the execution of the works the architect gives me verbal orders for extra work in sizes of corners and enrichment. The order is given in the presence of my own men. I cannot claim my schedule price for the extra work, and are not my own men who heard the architect's order given sufficient witness in place of a written order from the architect?—L. NORMAN.

[6781].—**Lager Beer Breweries**.—I am desirous of studying the planning and arrangements of the above breweries (German or American), and comparing the same with our malt beer breweries for the purpose of ascertaining by how much alteration the latter can be made adaptable for the purposes of the former, therefore I shall feel obliged if Mr. Hugh McCallum or others of your readers will advise me what books are obtainable? Also any further advice will oblige.—A YOUNG SUBSCRIBER.

[6782].—**Architect's Charges**.—A client of mine

bought at second-hand an iron church. It had been taken to pieces. Whilst in that state and from what I could make out from the man employed to take it down, I had to make the plans required by the Metropolitan Board of Works. Taking into consideration the circumstances mentioned, I should be glad to know what would be a fair charge to make. The plans, owing to the building being in pieces, were difficult to make correctly, and several were necessary before the Board was satisfied. There was, of course, also a set to be made for the District Surveyor.—A DENTON.

[6783].—**Builders' Estimates**.—A builder executed a contract for a client of mine under my supervision, and during the progress of the work was requested by me, as architect, on behalf of the proprietor, to give estimates for several extras, some of which, however, were accepted. The builder's accounts were made up and final certificate given twelve months since, and the builder now sends me a bill charging excessive sums for furnishing the estimates referred to, as a set off against an account (apart from the before mentioned contract) I have against him. Can he charge for estimates, and, if so, am I liable? A reply to this query by a reader will oblige.—ARCHITECTUS.

REPLIES.

[6752].—**Zinc Roofs**.—The edges of the zinc are sometimes turned up so as to form 1 1/2in. rolls, if they may be so called. They can be trodden upon without being injured. The wall flashings should be pointed with cement, not mortar; the latter affects zinc in some way. I have heard that the urine of cats is injurious to zinc. I should be glad to know if this is so. Zinc lasts about thirty years in London.—C. F. M.

[6759].—**Notice to Quit**.—I should consider the circumstances mentioned to be an acknowledgment of sufficient notice unless there was an understanding that it only held good on a new tenant coming in. Moreover if "F. W. H." could not prove all the particulars of his statement he might be held liable for further notice.—HUGH McCALLUM.

[6760].—**Sp. G. and Crushing Weight of Corsehill Stone**.—As I have had the pleasure of introducing into the London market Corsehill stone (which is the best red stone of the whole Dumfriesshire series), I reply to "Veritas" that its specific gravity is 2.262, the weight per foot cube is 141lb., and the mean crushing weight of three samples as given by David Kirkaldy is 5006 tons per square foot. I enclose printed copy of Kirkaldy's report. I add that Corsehill stone is in large demand, the quarries sent out during the past year 210,000 cubic feet of stone.—SAMUEL TRICKETT.

RESULTS OF EXPERIMENTS TO ASCERTAIN THE RESISTANCE TO THRUSTING STRESS OF THREE GIN. CUBES OF STUMP, RECEIVED FROM SUMMIT TRUCKEE, ESQ.									
Test No.	Description per Mr. S. Truckett.	Dimensions.	Base Area.	Cracked slightly.			Crushed, &c., by dropping.		
				Stress.	Per sq. inch.	Per sq. foot.	Stress.	Per sq. inch.	Per sq. foot.
		Inches.	Square Inches.	lbs.	Tons.	lbs.	Tons.		
J.	Corschill Quarries	5.00 5.90 × 5.92	34.92	298,620	8551	549.9	340,180	9699	6130
1435	Annan, Dunfrieshire	5.98 5.99 × 5.98	35.82	293,180	7347	472.4	285,840	7979	613.1
1436	Do.	6.00 5.98 × 5.98	35.76	207,800	5915	391.0	297.3 0	6597	372.7
1434	Do.			251,200	7171	461.1	280,776	7625	569.6
	Mean								

All bedded between pieces of pine 2 in. thick.

All bedded between pieces of pine 1in. thick.

[6761].—**Chimney**.—Does "Young Builder," by inner casing, mean a lining independent of the walls of shaft? If so, I would not recommend it. Either for strength or usefulness, unless there is a large space between it and the wall, because it will get filled up with soot and dust, and it must be tied to the outside wall, or the usual half brick thick, which is the general rule, will not carry the weight of its own load if any considerable height. Some people build the lining independent, to allow for expansion; but if tied to the outside wall, both must expand, then what is the use of the space? My idea of chimney construction is that the flue should be circular inside. The outside may be any form, and the top of flue should be of greater sectional area than the bottom, be-

cause the air is at a higher temperature when it enters than when it leaves the flue, consequently the velocity is less at the top than the bottom, provided it is not impeded by throttling at the top. There have been five chimneys constructed during six years under my supervision, four octagonal and one circular, each standing on square base. They were designed to suit the tastes of the owners, and principally to imitate others surrounding them. They all have circular flues. The circular shaft was the only one where I could adopt the flue section named above, on account of the diminishing of the outside section. This chimney is 115ft. high, 2½ brick wall at the bottom and one brick at the top, including lining, which is carried three-quarters of the height, and bonded into the outside walls, every 1ft. 6in. in height, with a course of headers and a hoop of wrought-iron, 3in. by 2in. bar, built in every 4ft. in height and within half-brick of the outside; the flue at the bottom is 4ft. 3in., and at the top 5ft. 3in. diam.; the top is covered with a cast-iron cap, 11ft. 9in. diam. outside, 4ft. 6in. high, weighing 93½ cwt., built up of 38 pieces, and filed in solid with brickwork; the brickwork was built in hydraulic lime mortar; it has been standing five years, and is as perfect as when first built. I consider the hoops are essential to a good construction. There is a chimney standing near to this one 150ft. high, the proportions similar to the last one, with cap 20ft. diam., walls 2ft. 4in. at the bottom and 1ft. 2in. at the top. This chimney has been standing 24 years, it has 24 boilers attached to it, all working at one time, and consumes 73 tons of coal in 24 hours. About six years ago it began to show signs of cracking, so it was hooped outside every yard in height round the circular shaft, and is perfectly safe now. I don't think it improves the appearance of a shaft when it is tapered so much, and it certainly is not so strong, because the surface is reduced where it ought not to be, both for resisting wind-pressure and carrying the load above. I have seen a pair of chimneys taken down about one-third from the top because they were buckled and both leaned to the east, and apparently were top heavy; they have put on smaller caps, which is no improvement in appearance, considering the height.—B. S.

[6765]—**Glazed Earthenware Flue Lining.**—I have a chimney about 45ft. high lined with 9in. glazed drain-pipes the whole height. No fall of soot has occurred during the four years it has been in use.—SATISFIED.

[6765]—**Glazed Earthenware Flue Lining.**—In answer to "Smoke," I have not had any practical experience of glazed flue piping, but I have no doubt the objection he anticipates is well founded. I have used for some time past the ordinary unglazed stoneware piping, and it certainly does cause a great deal of soot, in fact, no soot at all adheres to the flue. Doubtless the glazed surface would be much worse in this respect. I presume the theory of these matters is that with a good draught all the soot and smoke passes through the flue and out at top, being non-adherent to surfaces of the flue. I greatly doubt if this is practically the case, but I trust "Smoke" will have a reply from some more experienced party than—B.

LEGAL INTELLIGENCE.

SPECULATIVE BUILDING AT BEDMINSTER.—At the Bristol police court, on Wednesday, before Messrs. S. Wills and T. Wedmore, Charles Boon was summoned to show cause why he should not be committed to prison for not obeying a magistrates' order to pay £74 to the Sanitary Authority in respect of pitching and paving streets fronting houses belonging to him, and costs. Mr. Hooper, on behalf of the Sanitary Authority, said the defendant was ordered a considerable time ago to pay the sum, and paid £39 of it. He had been given time to pay the balance, and at the beginning of November, Mr. Salisbury, solicitor, who had been acting on behalf of Boon, said he hoped to make some arrangement. On the 3rd of November, however, Mr. Salisbury said he was sorry he could do nothing, and consequently an execution was put into Boon's premises, but the officer was met by a bill of sale for £55 odd, executed that day. Boon was sworn and examined by Mr. Hooper. He said he had a number of houses in different parts of Bedminster, but all were fully mortgaged. He had done about £40 worth of work for Mr. Bishop, and had received some of the amount in building material and £10 in cash. He had done about £130 worth of work to houses in Cabot-street. He, however, had had to pay the workmen, and had not received any benefit from the money himself. He was owner of the "Try Again" beerhouse, Sydney-street, Greenway Bush-lane, but that was mortgaged, and the bill of sale to which Mr. Hooper had referred covered the furniture, effects, and goodwill. He did not know when he should be able to pay the money to the authority, for by putting in the execution his credit had been damaged. He filed his petition in liquidation on Saturday last. Mr. Salisbury acted for him in these liquidation proceedings. The bill of sale was in respect of £55 odd advanced by a client of Mr. Salisbury to enable him to take up certain building grants. Mr. Salisbury, who appeared for Boon, said the defendant had been in struggling circumstances for some time. His property was mortgaged up to the full value, and he doubted if some of the houses would realise as much as was advanced on them. He advanced £510 on six houses in Murray-street, and it was necessary, in order that that security might not be sacrificed, that the building grants of these properties should be given up. A client of his accordingly advanced the £55 odd to enable these grants to be taken up. Mr. Hooper pointed

out that Mr. Salisbury held an equitable security for his advance but one that could not be realised till the grants were taken up. His (Mr. Salisbury's) communications to the Authority led to delay, and in the meantime the bill of sale was executed, Mr. Salisbury's security made negotiable, and the authority shut out. Had there not been the delay the authority could have levied unimpeded by any bill of sale. Mr. Salisbury said he had paid several creditors of this man, and hoped to have paid the sanitary authority. He simply told the authority he wanted a little delay so that he might investigate his affairs and see if any further advances could be made on his property, and after that investigation had been made it was found that Boon must file his petition. The authority had had half of their money, so that they were much better off than many of the creditors. Mr. Gore said Mr. Hooper must show that the defendant had had, since the order was made, means to pay the money. The bench intimated that they were not satisfied that this proof had been given, but on the application of Mr. Hooper the matter was adjourned for a fortnight.

ALLEGED SLANDER.—(Supreme Court of Judicature—Court of Appeal.—Sitting at Westminster, before the Lord Chief Justice, and Lords Justices Baggallay and Brett. Griffiths v. Holloway—Griffiths v. Steel).—These were actions for slander. The plaintiff was a contractor for paving roads, and the defendants, who were builders, were also vestrymen of the parish of St. Leonard's Shoreditch. It appeared that at a vestry meeting held on the 24th of February, 1880, at which a tender of the plaintiff for paving the parish for the next year was under consideration, the defendant Holloway, speaking as a vestryman, made use of the following words with regard to the performance of a previous contract by the plaintiff:—"St. John's-road was grouted simply with black mud," meaning thereby that the plaintiff had used improper material for grouting. The defendant Steel, who was also present at the meeting, was stated to have got up and observed, "I can corroborate that statement. St. John's-road was grouted with garden mould, which was carted from a garden in Hoxton, and I watched the carts from where it was brought." It appeared that in 1879, when the plaintiff was carrying out a paving contract for the Vestry the defendant Holloway having noticed what he thought was inferior material being used for grouting, directed the attention of the defendant Steel to the matter, and they together brought the subject before the Paving Committee, who appointed a further committee (of which the defendant Holloway was a member) to investigate the whole subject. At the investigation a surveyor stated that the material complained of was a good material, and had been in use for some years, and in the result the committee reported that there was no foundation for the charge. In consequence, the defendants, who were dissatisfied with the surveyor's statements, and thinking that the plaintiff had dealt unfairly in the contract of 1879, uttered at the vestry meeting in question the alleged slanders complained of. The plaintiff wrote asking that the words complained of should be withdrawn, and upon the defendants' refusal to do so, brought these actions. At the trial of the actions, which were tried together, before Mr. Justice Grove and a special jury, the learned judge laid down that the occasion was privileged, and left to the jury merely the question whether there was evidence of malice on the part of the defendants. The jury found a verdict in favour of the plaintiff, with damages £40 in each case. A Divisional Court having granted a new trial on the ground that there was no evidence of malice, the plaintiff appealed to this court. After a prolonged argument, their lordships reserved judgment.

JERRY BUILDING AT FINCHLEY.—Edwin Watkins Smith, builder, of Hamilton-road, Finchley, was summoned last Monday, at Highgate, for infringing the by-laws of the Finchley Local Board, by using inferior materials in the construction of the chimney stacks of six houses at Finchley, and further, with not depositing the plans of the houses with the Board.—Mr. Stevens, solicitor to the Board, prosecuted, and stated that this was a very bad case, and since the Bench adjourned it to see whether the defendant fulfilled his promise to amend all the defects complained of, he had stuck small pieces of iron into the chimneys and replastered the fronts to make it appear as if he had done so, but had not done anything the Board required. The defendant admitted this statement, and said that it would be dangerous to pull the old bars out so as to replace them with new ones, as required by the Board. Mr. Bodkin said it seemed hardly fair to builders that they should be allowed almost to complete their houses before they were summoned for not complying with the Local Board by-laws. Only a little time since a builder was summoned with respect to twenty-seven houses, and as the proceedings were not taken until the houses were finished it was necessary to pull a portion of them

down so as to remedy the defective parts. Mr. Stevens said it would want a dozen surveyors to watch the progress of all the houses in construction in the parish, and assured the bench they took immediate action in all cases brought under their notice. Mr. Bodkin said if there were not sufficient persons to do the work others ought to be appointed. It seemed to him that action ought to have been taken earlier, and it was a great pity the local boards had not the power to stop building work when they found it was not being carried on in accordance with the by-laws. However, the defendant in this case had clearly infringed them, and then tried to deceive both the board and the bench, and he would be fined £5 and costs on each of the two summonses, including the solicitor's and surveyor's fees—in all £14 14s. The defendant asked for time to pay the money, but his application was refused, and the clerk told him unless he paid it at once a distress warrant would be issued.

IN RE GREEN.—(Before Mr. Registrar Murray.)—Mr. Yetts applied, under a petition for liquidation, presented by Robert Green, builder, contractor, and farmer, of Elm-grove, Lower Norwood, for the appointment of Mr. A. H. Lavers, of Nine Elms, as receiver and manager of the business, and also for an injunction to restrain several actions. The debts were returned at £23,700 in the aggregate, of which about £11,000 was unsecured, with assets about £25,900. The application was supported by creditors, and His Honour granted the order.

ST. MARY-AT-HILL CHURCH—FACULTY REFUSED.—**PEEK v. TROWER**—(Archdeacon's Court. Before Lord Penzance, Dean).—Judgment was given in this case, which was an appeal from the Consistory Court of London, granting a faculty to the rector and churchwardens to make alterations in the interior of the church of St. Mary-at-Hill, at an expense of about £500, out of the parochial funds.—Sir H. Peek, M.P., one of the patrons of the living, opposed, on the ground of the alleged wasteful expenditure, and that pending legislation under the Royal Commission on the City Parochial Charities the church might be abolished. Since the report of the case on the 27th ult. Lord Penzance had viewed the edifice. Lord Penzance, whose judgment was read by the Registrar (Mr. Moore), on account of his indisposition, after stating the facts of the case, said it was intended to lower the tops of the pews, to slope their backs, and make them more comfortable; to move some of the pews, and raise the floor of the church. The church was built from a design of Sir C. Wren, and taste differed as to pews. Some were for high backs, and some for low backs. It was a mere matter of taste and fancy. In the last ten years the population of the parish had decreased from 616 to 287, and out of 60 ratepayers, 48 opposed but were non-residents. After deducting the choir and the caretakers of the warehouses, the congregation of parishioners was very small indeed. In his opinion the court ought not to sanction the proposed alterations in the absence of a clearly-expressed opinion of a sufficient body of parishioners, and, under all the circumstances, he saw no reason to interfere with the existing arrangements of the old church. The order of the Court below must be reversed, and the faculty refused. His lordship made no order as to costs.

IMPROPER BUILDING MATERIALS.—At the Edmonton Petty Sessions last week Caleb Champion, builder, of St. Anne's-terrace, Tottenham, was summoned for not complying with by-law 12 of the Tottenham Local Board, in the materials used for the construction of two houses now in course of erection on the Markfield estate, Stamford-hill. Mr. de Pape, surveyor to the local board, produced samples of the mortar taken from the walls, and stated that it was not a proper material for the purpose. Defendant, who said his foreman used the bad mortar without his knowledge, was fined £5 for each offence, with 10s. costs.—Arthur John Keeler, of Stamford-hill, was summoned for a similar offence in the construction of two houses on the same estate, and Mr. de Pape, having proved that the so-called "mortar" contained very little lime, and that defendant persisted in its use after being warned, he was fined £5 with costs for each house.

THE TRINITY HOUSE CORPORATION v. THE METROPOLITAN AND THE METROPOLITAN DISTRICT RAILWAY COMPANIES.—(Middlesex Sheriffs' Court.—Before Mr. Under-Sheriff Burchell and a special jury.)—In this case the claim exceeded £20,000.—Sir John Hulker, Q.C., and Mr. Vaughan Williams were for the Trinity House; Mr. Webster, Q.C., with Mr. Graham, represented the railway companies. The claim was in respect of several houses and land on Tower-hill, near the hall of the Corporation, and a claim arose in respect of an "easement" for tunnelling. The jury had previously viewed the property, and both sides agreed to try by eight jurors. For the Corporation the estimates were:—Mr. Horsey, £17,742; Mr. P. Anson, £18,897; and Mr. Chatfield Clarke, £17,567; to which was to be added 10 per cent. for compulsory

sale. For the companies, Mr. Alderman Ellis (the Lord Mayor elect), £11,820; Mr. Clifton £11,850; Mr. Farmer (Debenham, Tewson and Farmer), £12,000; and Mr. Lowe, £11,755. These sums were without the customary 10 per cent. Mr. Under-Sheriff Burchell directed the jury that the claimants were entitled to a full compensation for the property, and when they had arrived at a fair amount they would add 10 per cent. for a forced sale. The jury, after consulting for half an hour, assessed the value, including £200 for easement, at £14,559.

STATUES, MEMORIALS, &c.

YORK.—Last week a presentation was made to a highly respected citizen of York—Mr. William Pumphrey—in recognition of many services rendered to the city. The presentation took the form of an illuminated address, together with two articles of library furniture, designed specially by Mr. W. H. Thorpe, architect, of Leeds, and executed in wainset oak. They consist of a handsome library table with drawers in each pedestal, and a bookcase, each containing elaborately carved panels, with the City arms and Mr. Pumphrey's monogram.

STAINED GLASS.

JERSEY.—A stained-glass window has just been erected at St. Mark's Church, Jersey, for the Rev. H. M. C. Price. The window is an eight-light, and has been executed by Messrs. Gibbs and Howard, of London. The lights contain foliated ornamental canopies and bases on alternate ruby and gray grounds, and contain each a subject illustrating a scene from the life of Our Lord, and finally depicting his glory as King and Priest, surrounding by adoring angels holding palms, the tracery containing worshipping angels amid foliated ornament.

WATER SUPPLY AND SANITARY MATTERS.

GLOUCESTER.—The town council have recently received reports from Mr. J. F. Bateman, C.E., of Westminster, and Mr. Read, their borough surveyor, as to the progress of the boring operations at Birdlip. Three borings have been made, and the sand above the blue lias formation was reached at respective depths of 165ft., 184ft., and 51ft. from the surface, yielding in each case a supply of good water, which, up to the present time, was abundant. The cost of the experimental borings was about £250, and the results were satisfactory; and the town council were now asked to sanction the cutting of a tunnel between the two deeper borings. The engineer and surveyor were authorised to proceed with the works.

MARKET HARBOUROUGH SEWERAGE.—The plans for the main sewerage of Market Harborough, and the adjoining parishes of Great Bowden and Little Bowden, in the counties of Leicester and Northampton (these parishes forming a united district under one Local Board), having been approved by the Local Government Board, a contract, amounting to £11,500, has been entered into with Mr. G. Stevenson, of Evington, near Chesterfield, for carrying the plans into effect. The works are now being executed under the direction of Mr. J. B. Everard, of Leicester, the consulting engineer, with Mr. E. G. Mawbey, the surveyor to the board, acting as resident engineer and clerk of works.

MEXBOROUGH SEWERAGE SCHEME.—Mr. J. T. Harrison, C.E., held an inquiry at Mexborough last week respecting an application which had been made by the local board for sanction to borrow the sum of £11,000 for works of sewerage and sewage disposal. The clerk (Mr. Verity) explained the steps which had been taken by the local board to have an efficient scheme prepared. In answer to the inspector, he stated that the population of the township in 1871 was 4,316, whereas at the last census it numbered 6,411. The ratable value of the township was £2,415. The existing debt consisted of loans for the Market Hall and street improvements, amounting altogether to £7,302 17s. 8d. The engineer, Mr. White, stated that his mode of dealing with the sewage was by gravitation into a receiving tank, which would be capable of holding eight hours' supply of sewage, without pumping. This would be at the rate of 2 1/2 in per head per day. He estimated the total cost of the scheme at £17,500 17s. 11d. A report will be made to the Local Government Board.

GOVERNMENT INQUIRY AT DONCASTER.—Captain Hildyard last week held an inquiry at Balby respecting an application made to the Local Government Board for sanction to borrow £10,000 for sewerage and sewage disposal in the parishes of Balby and Doncaster. It was explained that it is proposed by the scheme to partly divert the sewage by its own

gravitation and partly by a pump, the motive power of which will be a wind-engine, and the sewage, after being allowed to settle, will be distributed upon land to be purchased from Mr. W. Aldam, chairman of the rural sanitary authority, and situate on the south side of Balby. Evidence was given at length by Dr. Wilson and Mr. Wright, the surveyor, the former on the necessity of a scheme, and the latter in explanation of the one proposed. There was some opposition to the land proposed to be purchased, one person stating that it was unsuitable, and the scheme would be a failure.

CHIPS.

The building of a new church has just been commenced at North Bralley, Somersetshire. The contractors are Messrs. W. and F. Long, of Bradford-on-Avon.

The contract for the erection of the Tay Bridge has been given to Messrs. Arrol and Co., of Glasgow, who carry on extensive works, and are at present engaged in erecting a large railway viaduct at Montrose. Mr. Arrol arrived at Dundee on Wednesday, and was engaged with Mr. Barlow, C.E., selecting sites for the erection of workshops, &c. Messrs. Arrol are also the contractors for the Forth Bridge undertaking.

Mr. Alfred Hubert, who, for twenty years, has practised as an architect and surveyor at Ipswich, recently died at the age of 38.

The new Claude Brown memorial reredos in St. Leonard's parish church, Hythe, East Kent, was unveiled on Tuesday week. It is Early English in character, and consists of an alabaster canopy, richly ornamented with the dogtooth. Beneath this is a bas-relief of Canadian marble representing the Entombment of the Saviour. The relief was executed by Mr. H. H. Armistead, R.A.; the canopy by Mr. Earp, of Kennington; and the design was furnished by Mr. G. E. Street, R.A., P.R.I.B.A. The cost has been over £1,000.

New sewerage works at Newmarket, Cambridge-shire, constructed from plans by Mr. J. F. Clark, C.E., were formally handed over to the local board as completed on Monday week.

A Bible Christian chapel was opened at Seal, Kent, on Wednesday week. It seats 150 persons, and cost £450. The builder was Mr. Boarse, of St. John's, Sevenoaks.

The harbour trustees of Maryport adopted last week a recommendation by Mr. Dobson, their engineer, to remove the light-house some 100ft. seawards from its present position.

At a meeting of the Wolverhampton Town Council on Monday the Mayor announced the receipt of a letter from a friend, offering to build a Public Art Gallery, to cost £5,000, provided that the town gave a suitable site, and that subscriptions amounting to £10,000 were first promised. The donor desired that a committee should be appointed to mature the plans, and added as a strict condition that his name should be kept secret. The Mayor expressed the hope that the required sum would be subscribed.

On Saturday week the Countess of Dartmouth laid the memorial-stone and new chancel of the parish-church of St. Mary, Lewisham, which has been practically recast with the exception of the lower part of the 15th-century tower, from the designs of Mr. Arthur W. Blomfield, M.A., of Montague-place, London. In the nave the flat ceiling has been replaced by an open roof, the area is being reslated, the gallery fronts lowered and opened out, and a new entrance provided. The cost of the chancel is between £2,000 and £3,000. The contractor is Mr. Parmenter, of Braintree, Essex.

A new village club-house at Benenden, Kent, was opened last week by Lord Cranbrook. It has been built from the designs of Mr. Devey, of London, and consists of a ground-floor of reading-room and amusement-room, and over these a committee-room, steward's apartments, and bedrooms for lodgers.

Extensive building operations have been and are in progress on the Dane Hill estate, Rungate. Mr. A. Pitts is the architect, and Mr. W. Martin, also of Rungate, the builder.

The extension of the Metropolitan District Railway from Mill-hill Park, Ealing, to Hounslow, is being rapidly pushed forward, and the embankment work has been carried as far as the King's Arms-lane, Hounslow, where a goods and luggage station will be built—while preparations are also being made for the terminus at Hounslow Heath. Mr. J. Wolfe Barry is the engineer. It is contemplated to obtain power next session to continue the line from Hounslow to Windsor.

The new public hall at Dersfourt, which has been built from the designs of Mr. Samuel Knight, of London, selected in competition, was formally opened on Wednesday week.

Our Office Table.

A YEAR having elapsed since the Clerkenwell vestry undertook the work of doing its own dusting, slopping, and watering, the works committee presented that body last week with the first annual report on the subject. The new system was commenced on the 19th of May, but contractors were engaged to a limited extent on day work till the 10th July. Since the 31st May, 5,570 loads of dust and 2,410 of street-sweepings have been removed; 5,837 chaldrons of ashes have been delivered to purchasers in 85 barges; 60 freights of street-sweepings and 14 of hard core have been removed from the wharf. The entire cost of buildings, plant, and preliminary expenses, incurred during the year, amounted to about £4,600, viz.:—Premium, £500; buildings and paving, and legal expenses, £1,993; horses, £1,155; vans and carts, £681; harness, £176; gas-engine and sundries, £155; towards meeting which £4,000 has been borrowed, repayable over five years. The expenditure for the year amounted to £5,385 9s. 2d., from which must be deducted receipts for ashes and breeze, £761 3s. 1d., and value of ashes and fodder on hand, £40, making a total of £501 3s. 1d., which, subtracted from the expenditure, leaves the net cost for the year £4,884 6s. 1d. The cost of the work during the preceding six years has averaged £3,947 9s. 3d.

It is rather difficult sometimes for an architect to know what a clergyman really does want in the way of style and construction, but there is no mistake about the requirements of the Bishop of Rochester. Speaking about the plans and requirements of new churches, in his primary charge last week, Bishop Thorold said:—"Why not try a Basilica, with a font big enough for immersion, and a pulpit in which the preacher can both move and think, and space in which people can see, hear, and worship? To all of which I would briefly reply, taking the last first: A fine red brick Basilica is the one thing of all others I wish to see. Who will build us one? No one regrets this new fashion of church building in fragments more than I; but it might be unfair for a bishop to interfere with local discretion." In deprecating a too-lavish expenditure under this head, his lordship suggested that it might be worth considering whether we have not had enough of Gothic churches with their difficult acoustics and expensive ornamentation.

It may perhaps interest some few of our readers to know that Miss Ethel Pierson (Mrs. F. E. Randell) was last week presented with a handsome bracelet by the members of Mr. D'Oyly Carte's "Pinafore and Sorcerer Opera Company," with which she was associated as *prima donna* for nearly three years. The bracelet is a massive gold one, and bears the following inscription:—"Presented to Miss Ethel Pierson (Mrs. F. E. Randell) as a mark of esteem by the ladies and gentlemen of 'H.M.S. Pinafore and Sorcerer Opera Company.' 'The fairest flower that ever blossomed.' 'Heaven bless Aline!'"

A PIECE of clever and skilful work was done at Elsecar parish-church on Friday last by Mr. Ball, the well-known steeple Jack of York Castle, Oldham. The spire has not been repaired since the building of the church in 1843, has been found to be out of repair, and the matter being placed in the hands of Mr. Ball, he commenced operations on Friday afternoon, by erecting eight ladders connected together, one at a time, as he rose from the churchyard to the weather-vane at the top of the spire, a feat of which Mr. Ball may feel justly proud, as the time occupied from start to finish was two hours and thirty minutes. We understand that, as the result of Mr. Ball's examination and report, a new lightning-conductor will be erected, and the spire thoroughly restored by him.

THE Trades Councils of London are providing themselves with evidence respecting the workmen's dwellings of the metropolis which seems to have an important political bearing. Circulars have been sent out to the trade committees in every district, which embody the following questions respecting the wants of the London workmen:—Are the present block dwellings suitable; are they built in convenient places; are they better or cheaper than the present house accommodation; should dwellings be pro-

vided in the suburbs, and, if so, what alteration in railway arrangements will be necessary? The questions have been asked with a view to providing the Artisans' Dwellings Committee of the House of Commons next session with information as to the views of the workmen themselves, which is regarded as essential before the new Act dealing with the question can be framed; and the questions given above were formulated by Mr. Broadhurst, M.P.

The Corporations of Glasgow and Dundee have decided to apply to Parliament for powers to supply the electric light to all places, including dwelling-houses, in each town. The extensive ship-building works of Messrs. J. Readhead & Co., at South Shields, are now being lighted by the "Brush" system, and Messrs. Leslie & Co., shipbuilders, Hebburn, are about applying the same system to their works. Last week experiments were made in the plate-mill department of the Consett Ironworks with the "Brush" system. If the present trial proves satisfactory, as it is fully expected it will, the company intend to extend its use throughout the whole of their plate-mills and forges. The Agricultural Hall, Islington, has been illuminated by the "Brush" system during the Food Exhibition. The lamps, of which there were twenty-four, were suspended from the galleries, and the power was derived from a fixed and a portable engine. The electric light in the British Museum has worked fairly well, but a few hitches have occurred.

A PROJECT has been set on foot for holding a Universal Exhibition in Rome in 1885-86. The support of numerous members of both Houses of the Italian Parliament having been obtained, Signor Orsini, secretary of the Central Committee of the Exhibition, has proceeded to London with letters from the Italian Ministers, and has constituted there a British Central Committee for the purpose of securing the participation of English exhibitors. The committee he has formed is composed among others of the Lord Mayor of London, Mr. Grenfell, Governor of the Bank of England; Messrs. Thomson Hankey, H. Palmer, W. Blake, J. Hambro, and A. Baring, directors of the Bank of England; and Baron Leopold de Rothschild. Committees will also be formed in Manchester, Birmingham, Leeds, and Liverpool.

AN Exhibition is to be held in Berlin next year of the "science and technology of health, and the saving of life." It is not international, strictly speaking, but foreign manufacturers are specially invited to send articles which are in any way connected with the subjects indicated by the title. Mr. D. Grove, of Friedrich-strasse 24, Berlin, S.W., will give all particulars to any of our readers who may be interested.

AN exhibition of models and plans of educational edifices is to be opened in Paris in the beginning of next February. For the best design of a lyceum the prize will be 10,000 francs; for the second best 5,000 francs, similarly with designs for a normal school; and various other prizes of less value are offered (for particulars of which see *Revue Industrielle*, Oct. 26).

THE Royal Commission on Technical Instruction, who have been in Paris for the last fortnight, have visited many of the elementary and secondary schools, as well as those for higher technical instruction, such as the Ecole Centrale and the Ecole des Mines. They have also spent two days at Chalons and at Rheims, and will leave Paris probably this morning for Le Creusot, Lyons, and St. Etienne. On their return to Paris they will proceed to Normandy and the manufacturing districts of the North of France. The secretary and a number of the Commission are now at Limoges, the principal seat of the porcelain manufacture. The Commissioners have everywhere met with the greatest readiness to give them all information.

CHIPS.

Messrs. F. and A. Wheelodon, architects, of Wolverhampton, have dissolved partnership.

West Free Church, Dundee, was reopened on Sunday week after refooring, reseating, and renovating, and the laying of a telephone from the pulpit to the bedside of a bedridden member of the congregation, 300ft. distance. The latter innovation is reported to be a success.

A new back is about to be built for Messrs. Lacon, in Norwich-street, East Dereham, from the designs of Mr. Brown, architect, of Norwich.

The memorial-stone of a New Jerusalem Church was laid in Waldegrave-road, Anerley, S.E., on Monday week. The building is Gothic in character, consisting of nave, 80ft. by 38ft., and chancel. Beneath the chapel proper is a schoolroom, and the angles of chief front are marked by turrets containing staircases of communication between chapel and schoolroom. The building has been designed and is being entirely carried out in Portland cement concrete by Mr. W. J. E. Henley, manager of the Concrete Building Company, Blackfriars-road, S.E. The total cost will be £3,000.

The Oxford Architectural Society visited on Saturday week the cathedral, where they were received by the Dean, who showed that the choir with its aisles, the transepts and towers, were of the latest period of Norman architecture, having been consecrated in 1180. The groined roof of choir was built early in the reign of Henry VI. Among the modern additions to the church furniture were the bishop's throne, designed by Sir Gilbert Scott, and executed in Italian walnut by Messrs. Farmer and Brindley, and the new reredos only placed in position a few weeks since; it is of red Damfries sandstone, with a central panel of Rosso antico, and was designed by Mr. G. F. Bodley.

The town council of Ipswich have raised the salary of the borough surveyor, Mr. Edward Buckingham, from £300 to £375 per annum. Mr. Buckingham was appointed in 1871, at a salary of £200, and since then, owing to the growth of the town, the number of men under his supervision has increased from 25 to about 100.

At the annual meeting of the Leek Art Class on Monday night it was announced that Mr. Joshua Nicholson, a silk manufacturer at Leek, would shortly erect a free library, picture gallery, and art museum. Mr. Nicholson, explaining his project, said its cost would not be less than £10,000, and he had arranged to contribute £500 annually until its maintenance was otherwise secured.

A new town clock at St. Michael's, Lewes, which has been constructed by Messrs. Gillett and Bland, of Croydon, is to be publicly started at noon on Tuesday next.

The town council of Bewdley has been negotiating with the gas company for the purchase of the company's undertaking and plant. The terms asked, £17 per £10 share, are, however, considered so high by the councillors that the proposals have been broken off.

Mr. G. E. Hawes, of Chapel Field, Norwich, has purchased the entire stock of iron standards manufactured by Mr. John Glendenning, late of Chalkhill Works, trading under the name of Colman and Glendenning, and is now offering "The Eastern Counties," "The Collegiate," "The County," and other desks at greatly reduced prices.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (TO-MORROW).—Opening of Chiswick School of Art. Dinner, 6 p.m.

MONDAY.—Royal Institute of British Architects. "Earthenware Pots (built into churches) which have been called Acoustic Vases." By G. M. Mills. 5 p.m.
Society of Arts. Cantor Lecture No. 1. 8 p.m.

TUESDAY.—Institution of Civil Engineers. "Forces and Strains of Recoil in the Elastic Gun Carriage." By H. J. Butter, M.I.C.E. 8 p.m.

WEDNESDAY.—Society of Arts.

FRIDAY.—Architectural Association. "The New Examination and What it Involves." By Prof. T. Roger Smith. 7.30 p.m.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE second Ordinary MEETING will be held on MONDAY, 21st inst., at 8 p.m., when a Paper by GORDON M. BILLS, Associate, on "Earthenware Pots built into churches which have been called Acoustic Vases," will be read. The next nomination of Candidates will take place on the 5th December.

J. MACVICAR ANDERSON, Hon. Sec.
WILLIAM H. WHITE, Secretary.
9, Conduit-street, Hanover-square, London, W.

Trade News.

WAGES MOVEMENT.

PARIS.—As the carpenters' strike continues in Paris the masters are obtaining hands from abroad. On Thursday week no fewer than nine hundred men arrived from Belgium, two hundred and fifty from Switzerland, two hundred from England, and two hundred from Italy, who at once found work. On Friday a further detachment of three hundred reached Paris from Brussels, Antwerp, and Liège;

some two hundred are expected before the close of this week from Switzerland, and an equal number from the North of Spain. Thus a total of some two thousand foreign carpenters will next week be earning their bread in the French capital. In view of the number of strikes now existing in various trades, the French Academy of Moral and Political Science has offered a prize of five thousand francs for the best essay on "The Effects of Coalitions and Strikes." Competitors are directed to trace the movement in the rates of wages in trades from which strikes have been absent and in those in which they are of frequent occurrence. Valuable and interesting statistics may be anticipated.

GREAT STRIKE IN THE POTTERIES.—About two-thirds of the people engaged in the earthenware manufacture in the Staffordshire potteries struck work last Friday, in consequence of the employers refusing them an advance of wages. Nearly 30,000 men, women, and boys are out, and the struggle threatens to be prolonged. It is the first strike in the trade since 1836. Several of the large firms have arranged with their hands, who have not stopped work.

Epps's Cocoa.—Grateful and Comforting.—

"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected Cocoa, Mr. Epps has provided our breakfast tables with a delicate-y flavoured beverage which may save us many heavy doctors' bills. It is by the judicious use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. Hundreds of subtle maladies are floating around us ready to attack wherever there is a weak point. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame."—*Civil Service Gazette*.—Made simply with boiling water or milk. Only in Packets labelled—"James Epps and Co., Homoeopathic Chemist, London."—Make use of Epps's Chocolate Essence for afternoon use.

Lamplough's Pyretic Saline is refreshing most agreeable, and the preventive and curative of FEVERS, BILIOUSNESS, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by chemists throughout the world, and the Maker, 113, Holborn Hill. Use no substitute. See Medical Testimony.

Holloway's Ointment is not only fitted for healing sores, wounds, and relieving external ailments, but rubbed upon the abdomen it acts as a derivative, and thus displays the utmost salutary influence over stomachic disorders, derangements of the liver, irregularities of the bowels, and other intestine inconveniences which mar man's comfort.—ADVT.]

Douling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to CHARLES TRASK, Norton-sub-Hamdon, Ilminster, Somerset.—[ADVT.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates.

General Repairs and Alterations Executed: Experienced Workmen always in readiness, and sent to any part of the country.—[ADVT.]

BATH STONE.

BOX GROUND,

THE BEST FOR ALL EXTERNAL USE.

CORSHAM DOWN

CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.

(See trade advt. on p. XXIII.) ADVT.

TENDERS.

* * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ASHBURN.—For the rebuilding of a bridge at Bagtor, for the Ashburnton district highway board:—
Joint and Eastbrook £39 15 0
Stevens accepted) 51 10 0

BARROW-IN-FURNESS.—For the construction of Salt-house high level intercepting sewer, for the Barrow Town Council:—

Watts, E., Barrow (accepted) ... £2,722 15 6
[Another tender was received for this work £3 lower than the above.]

BARROW-IN-FURNESS.—For the construction of a sewer from Hereford-street to the back street between Day and Leicester-streets, for the Barrow Town Council:—
M'Kenzie, F. (accepted).

BERMONDSEY, S.E.—For laying out the parish churchyard as a public garden, for the Bermondsey vestry:—
Maller (accepted) 21,179 0 0

BERMONDSEY, S.E.—For heating apparatus at the new town hall, for the vestry:—
Bacon and Co. (accepted) 275 0 0

BRICKENHEAD.—For erecting a shed for disinfecting vans:—
Snape, G., accepted at £31.

BATLEY.—For erection of Sunday schools to Zion Chapel, Branch-road, Batley. Mr. W. Hamstead, A.R.I.B.A., architect.

Accepted tenders.

Mason:—		
Goodall, C., Batley	...	£193 12 7
Joiner:—		
North, W., Batley	...	387 17 1
Plasterers:—		
Morton Bros., Batley	...	91 11 7
Plumber:—		
Senior, J. H., Batley	...	61 10 0
Thornton, J. M., Heckmondwike	...	61 15 3
		£1,000 9 6

BIRKENHEAD.—For the erection of a new set of gates and gate-piers at the Italian Lodge entrance to the Birkenhead Park:—

Stonework:—Gass, Amoss & Co. (accepted), £87; and ironwork, Jones and Williams (accepted), £30.

BLACKBURN.—For the erection of two dwelling houses in Cleaver street. Mr. J. Warde-Bulcock, A.R.I.B.A., architect.

Hacking, J. C. and A.	...	£520 19 0
Rowe, R.	...	315 0 0
Euston, R.	...	335 0 0
Kenyon and Moulding (accepted)	...	330 0 0

BROMSBURY, LONDON, N.W.—For the erection of stabling and coachhouse in the Elmware-road, Bromsbury, for Mr. J. Curzon. Mr. W. Graves, architect:—

Ward and Lambie (accepted).

CANNING TOWN, E.—For alterations to shop at Canning Town. Mr. Waite, Stair, architect:—

M-Lean	...	£1,510 0 0
Cawthorne	...	1,450 0 0
Hail	...	1,310 0 0
Oldwell	...	1,200 0 0
Clark	...	1,170 0 0

CARDIFF.—For kerbing, paving, and channelling the footways of Wellington, Edward, and Union-streets for the Corporation. Mr. Williams, M.I.C.E., borough engineer:—

Union-street:—

Pearson, J. C., Cardiff	...	£87 16 5
Smith and Pring, Cardiff	...	70 8 3
Rich and Harris, Cardiff (accepted)	...	65 4 10

Wellington street:—

Pearson, J. C., Cardiff	...	£110 8 8
Smith and Pring, Cardiff	...	100 5 14
Rich and Harris (accepted)	...	93 15 7

Edward-street:—

Pearson, J. C., Cardiff	...	£73 6 6
Smith and Pring, Cardiff	...	67 10 2
Rich and Harris, Cardiff (accepted)	...	64 4 10

CARDIFF.—For alterations and additions to Llanisher Villa, Cardiff, for Mr. Henry Garrett. Mr. W. D. Blesley, architect:—

Billiard room, terrace, porch, and stables:—

Shepton, S.	...	£1,750 0 0
Lock, F.	...	1,748 0 0
Jones, J.	...	1,665 10 1
Thain, W. (accepted)	...	1,645 0 0

CARDIFF.—For erection of new premises for the South Wales Fish and Poultry Company, 73, St. Mary's street, Cardiff. Mr. W. D. Blesley, architect:—

Thain, W., Cardiff	...	£1,670 0 0
Bird, C., Cardiff	...	1,650 0 0
Purnell and Fyfe, Cardiff	...	1,650 0 0
Gough, T., Cardiff	...	1,632 0 0
Gibson, R., Cardiff	...	1,628 0 0
Jones, J., Cardiff	...	1,580 0 0
Shepton, H., Cardiff	...	1,520 0 0
Jones Brothers, Cardiff	...	1,500 0 0
Howard, F., Cardiff	...	1,285 0 0
Roberts, E., Cardiff	...	1,225 0 0

CHARING CROSS.—For new medical schools, for the Charing Cross Hospital, Chancery street, W.C. Mr. J. J. Thompson, A.R.I.B.A., architect:—

For blinds, Guyan and Son, Carburton (accepted).

CHICHESTER.—For lighting the borough for the twelve months ending 9th November, 1882, with 22 electric arc lamps, half of them to be burning 4,000 hours, and all of them 2,000 hours, and as many of the Lane-Fox lamps as may be necessary:—

Hammond and Co (accepted) ... £885 0 0

CHIGWELL.—For new roads, forming footpaths, and surface water-drains, on the British Land Company's Estate at Chigwell, Essex. Mr. Henry B. Michell, surveyor:—

Crockett	...	£1,033 0 0
Acock	...	1,025 0 0
Dunmore	...	951 0 0
Wilson	...	951 0 0
McKenzie	...	913 0 0
Keble	...	925 0 0
Killingback	...	920 0 0
Harris	...	915 0 0
Pull	...	900 0 0
Pizzey	...	898 0 0
Bowfield	...	878 0 0
Jackson (accepted)	...	780 0 0

CROUCH HILL, LONDON, N.—For completion of two houses at Crouch Hill. Mr. W. Stair, architect. Quantities by Mr. H. J. K. R. K. R., surveyor:—

Oldwell	...	£973 0 0
Pick	...	840 5 0
Lager	...	840 0 0

DEPTFORD, S.E.—For erecting a central relief station at Deptford, for the Greenwich board of guardians:—

Banks, E., Lewisham (accepted) ... £1,045 0 0

DEPTFORD.—For providing and laying 175 lineal yards of 15-in. sanitary pipes at Carville. Mr. J. McGregor, district highway surveyor:—

Goldsmith, R., Durham	...	£39 7 6
Ansley, B., Durham	...	31 10 6
Hill, J., Durham	...	36 0 0
Stoker, J., Newbottle	...	35 0 0
Carroll J., Durham (accepted)	...	33 0 0

EAST GRINSTEAD.—For the erection of a pair of cottages on the Imberhorne Estate, for Mr. E. Bloom, C.B. Mr. S. W. Haughton, East Grinstead, architect. Quantities by the architect:—

Longley, J., Turner's Hill	...	£1,128 0 0
Penn, G. and F., Pembury	...	1,043 0 0
Charlwood Bros., East Grinstead	...	875 0 0

* Accepted.

FAYNSHAM.—For sewerage and watering the town during the ensuing year:—

Keeler, R.	...	£165 per an. am.
Davis, A. (accepted)	...	115 ..

FLECK WOOD.—For completing new schools at Thornton, for the Fleetwood School Board. Mr. Sewa d, architect to the Board:—

Jones, R. (accepted).

FOREST GATE.—For the Emmanuel Schools, Forest Gate, E. Messrs. Habershon and Fawcner, architects. Quantities supplied:—

Cox	...	£1,651 0 0
Allen and Son	...	1,630 0 0
Boyle	...	1,592 0 0
Niblett	...	1,575 0 0
Staines and Son	...	1,572 0 0
Gray	...	1,540 0 0
Bakewell Bros.	...	1,540 0 0
Garrad	...	1,481 0 0
Castle	...	1,480 0 0
Priestley	...	1,469 0 0
Bastley	...	1,450 0 0
Johnson	...	1,447 0 0
Hooper	...	1,435 0 0
Johnson	...	1,420 0 0
Warr	...	1,425 0 0
Pack Bros.	...	1,420 0 0
Mason	...	1,395 0 0
Jones	...	1,385 0 0
Crisp and Tomlin	...	1,383 0 0
Richardson, J. O.	...	1,369 0 0
Evans	...	1,350 0 0
Higgs	...	1,338 0 0
Judl	...	1,330 0 0

FOREST HILL.—For works in laying drain to connect drains of houses Nos. 1 to 7 (inclusive), Vaughan Villas, Devonshire road, Forest Hill, Lewisham, for Messrs. J. Vaughan Brettell and J. G. Goldham. Messrs. Ebbetts and C. Cobb, of Savoy House, 115, Strand, W.C., architects:—

Cowland Bros.	...	£87 0 0
Holt, W.	...	107 18 4
Kellett and Bentley	...	88 12 0
Blossom, F.	...	84 17 0
Baylis, H.	...	84 10 0
Lantoff, J.	...	79 0 6
King, D.	...	78 0 0
Langleier and Pinkham	...	75 0 0
Steel, Brothers (accepted)	...	65 0 0

FIMLEY, SURREY.—For alterations and repairs to the Bridge House Hotel, Fimley, Surrey, for Mr. T. F. Harris, Staines. Messrs. Low and Birch, architects:—

Joseph Higgs (accepted).

FULHAM.—For the erection of Ye Qui en Anne Tavern, Crown-road, Fulham, for Mr. A. J. Christy. Messrs. W. G. Habershon and Fawcner, 38, Bloomsbury-square, London, W.C., architects:—

Wheeler, Ravenscourt Park	...	£4,500 0 0
Benton, Buckingham Palace-road	...	4,043 0 0
Niblett, Highbury	...	3,838 0 0
Coles and Bates, Croydon	...	3,728 0 0
Rowles, Acton	...	3,678 0 0
Grant, Putney	...	3,648 0 0
Mattock Bros., Wool Green	...	3,614 0 0
Smith, West Brompton	...	3,597 0 0
Warr, Croydon	...	3,498 0 0
Lucas, Kensington-square	...	3,454 0 0
Lyford, Hamma-smith	...	3,332 0 0
Ashford, Slough	...	3,280 0 0
Judd, Bow	...	3,183 0 0
Potter, Leicester	...	3,168 0 0
Ohorn, New Kent-road	...	3,150 0 0
Allen, Kilburn (accepted)	...	3,090 0 0
Williams, Putney	...	3,090 0 0
Richardson, Clapham	...	3,078 0 0
Blackmore, West Brompton	...	3,066 0 0
Higgs, Loughboro' (withdrawn)	...	2,992 0 0
Higgs, J., Upper Park-pl. (to late)	...	2,997 0 0

GATESHEAD-ON-TYNE.—For sewerage, levelling, paving, and channelling Back-street, between Chancery-street and Abbots-street, for the Urban Sanitary Authority. Mr. J. Bower, C.E., surveyor:—

Simpson, J. T., Newcastle-on Tyne	...	£71 8 9
Maughan, G., Jarrow	...	67 4 0
Wardlow, J., Gateshead	...	66 7 9
Elliot, D., Gateshead	...	63 13 9
Craig, J. & W., Gateshead (accepted)	...	63 10 6

Back Hartington-street.

Wardlaw, J., Gateshead	...	£193 6 6
Maughan, G., Jarrow	...	178 2 10
Craig, J. and W., Gateshead	...	173 12 2
Elliot, D., Gateshead (accepted)	...	172 17 1
Hull, J. E. & Co., Gateshead	...	171 3 5

GATESHEAD-ON-TYNE.—For erection of a lodge in Saltwell Park, for the Borough of Gateshead-on-Tyne. Mr. J. Bower, C.E., borough engineer:—

Ferguson, F., Gateshead	...	£114 8 0
Harrison and Lowe, Gateshead	...	420 0 0
Atkinson, J., Gateshead	...	414 0 0
Greaves and Stockdale Gateshead	...	378 5 10
Thompson, A., Gateshead	...	393 0 0
Rippon, J., Gateshead	...	311 6 11

* Accepted.

GRANTHAM.—For the formation of a curved embankment and railway for the North Junction at Barkst near Grantham, for the directors of the Great Northern Railway Company:—

Baker and Firkbank, Lincoln (accepted).

HASTINGS.—For the construction of three oak timber groynes, one opposite Carlisle villa, one opposite Breads-place, and one opposite Beach-terrace, Hastings:—

Austin and Dibley, Hastings	...	£1,350 0 0
Winer, F., Hastings (accepted)	...	1,145 0 0

HALIFAX.—For the erection and completion of a shed, for Messrs. Whiteley, Holden, and Co., hydraulic engineers. Mr. J. Willey, 30, Southgate, architect. Quantities by the architect:—

Excavator, mason, and bricklayer:—

Spencers Bros., Halifax	...	£195 0 0
Pickles, J., Halifax	...	191 0 0
Hopkinson, W. and Sons, Halifax	...	187 0 0
Calpan, N. and Son, Halifax	...	185 0 0
Parkinson, R., Halifax	...	164 0 0
Furness, H., Halifax	...	163 14 0
Kitchen, J., and Wild, J., Halifax	...	157 0 0
Turner, T., and Bros., Halifax	...	156 10 0
Forster, A., Halifax	...	150 16 0
Wilson, J. W. and Son, Halifax	...	150 0 0
Riley and Robinson, Halifax	...	140 0 0
Naylor, E., Halifax	...	139 0 0
Simpson, G., Sowerby Bridge	...	137 15 6

Carpenter and joiner:—

Holden, T., Halifax	...	110 0 0
Suzellie, S., Halifax	...	106 10 0
Boocock, E. H., Halifax	...	106 10 0
Townsend, G., Halifax	...	100 0 0
Noble, W. H., Halifax	...	98 10 6
Farnell, J., Halifax	...	96 0 0
Fleming, J., Halifax	...	95 0 0
Byson, J. and Son, Halifax	...	91 10 0
Greenwood, S., Halifax	...	92 10 0
Turner, J., Halifax	...	90 0 0
Holstead, A. and Son, Halifax	...	90 0 0
Tuley, T., Halifax	...	89 10 0
Yates, L., Halifax	...	86 12 11
Crossland, J. and Son, Halifax	...	80 10 0

Slater and plasterer:—

Wadsworth, H., Halifax	...	65 0 0
Burgett, S. and Son, Halifax	...	58 0 0
Taylor, J., Halifax	...	52 0 0
Pickles, S. and Son, Halifax	...	51 0 0
Taylor, S., Halifax	...	50 8 0
Wadsworth, W. H., Halifax	...	50 0 0
Bancroft and Taylor, Halifax	...	45 0 0

Plumber and glazier:—

Barker, T., Halifax	...	43 0 0
Walshaw, C. A., Halifax	...	40 14 3
Scruton, J., Halifax	...	36 10 8
Akro, D. W., Halifax	...	36 0 0
Futh, J., Halifax	...	35 5 2
Architect's estimate	...	325 0 0

* Accepted.

HALIFAX.—For erection of a shed to cover 900 yards super., and cellaring (part fire-proof) co-extensive therewith, in Halifax. Mr. J. Farrar, Crossley-buildings, 20, Northgate, Halifax, architect:—

Mason's work:—

Jenkinson, H., Halifax	...	£950 0 0
------------------------	-----	----------

Ironfounder:—

Berry, J., Halifax	...	613 6 8
--------------------	-----	---------

Joiner:—

Halliday, J., Halifax	...	380 0 0
-----------------------	-----	---------

Slater and plasterer:—

Blackburn, A. S., Halifax	...	192 0 0
---------------------------	-----	---------

Plumber and glazier:—

Firth, S. and Son, Halifax	...	179 10 0
----------------------------	-----	----------

HASLING.—For construction of a large oak timber groyne at the battery, Rock-a-Dore, Hastings:—

Austin and Dibley, Hastings	...	£2,400 0 0
Winer, F., Hastings (accepted)	...	2,350 0 0

HATFIELD, HERTS.—For building a lock-up at Hatfield. Mr. Urban A. Smith, C.E., county surveyor, Hatfield:—

Twelvevrees, E.	...	£7,585 0 0
Hunt, T.	...	6,775 0 0
Gibbons and Co.	...	6,597 0 0
Angood, J.	...	6,600 0 0
Glassecock, J. L.	...	6,233 0 0
Willmott and Son	...	6,196 0 0
Seaks and Norris	...	6,175 0 0
Beale, W. J.	...	5,977 0 0
Wade and Eley (accepted)	...	5,870 0 0

HEDDERSFORD.—For pipes in connection with the new water supply for the town council:—

Roberts, J. and S. (accepted)	...	5in. and 6in. pipes, £1 16s. 3d. per ton; 4in. pipes, £1 17s. 6d. per ton, delivered at Hereford.
-------------------------------	-----	---

HUNTINGDON.—For additions of a store-room, disinfecting room, and office to the barracks:—

Rowe, J., Huntingdon	...	£454 0 0
Markham & Mason, Godmanchester	...	449 0 0
Balmer, Huntingdon	...	449 0 0
Howard, J. H., Huntingdon	...	420 0 0
Rowe, W., Huntingdon	...	410 0 0
Lord, C., Huntingdon (accepted)	...	405 0 0

IPSWICH.—For extension of laundry, and building a drying-room at St. Peter's Workhouse, for the Ipswich board of guardians. Mr. H. M. Byton, architect:—

Barford and Perkins (recommended for adoption), £200.	...	
---	-----	--

KILBURN, N.W.—For the erection of stabling at Kilburn, for Mr. J. Griffiths. Mr. W. Graves, architect:—

Ward and Lambie (accepted).	...	
-----------------------------	-----	--

KING'S NORRIS, BIRMINGHAM.—For extension of the sewer in Wake Green-road, including manholes, ventilators, &c., in Mossley District, for the King's Norton rural sanitary authority. Messrs. G. B. Nicolls and Son, C.E., engineers, Imperial Chambers, A.

THE BUILDING NEWS.

LONDON, FRIDAY, NOVEMBER 25, 1881.

THE TEWKESBURY ABBEY CHURCH RESTORATION.

THE indefatigable Society for the Protection of Ancient Buildings is airing another grievance. Its secretary recently wrote to the *Times*, calling attention to a rumour that a proposal was about to be made to "destroy the fine west window" of that well-known church, Tewkesbury Abbey, and inclosing a report of a competent member of the Society upon the state of the western archway and window. The conclusions arrived at are: that the stonework is in a good state of preservation, and that the restoration is quite unnecessary, and would lead to the effacement of another interesting portion of the Abbey, an ancient fabric which has already received irreparable damage at the hands of the "restorers" of the present day. This letter proved to be the commencement of a controversy between the vicar of Tewkesbury, Canon Venables, Sir Edmund Beckett, and other disputants for and against the contemplated restoration. The reader will fail to gather any very distinct idea from any of the letters as to what it is really intended to do at Tewkesbury, and, in fact, the age of the present west window has become the primary question of quarrel. The great inclosing arch has seven orders, one of which was discovered buried in the wall by the late Sir Gilbert Scott during the recent restoration, and the present window is supposed to occupy the position of several small windows of Norman date. The professional adviser of the society states, with regard to this Perpendicular window, "that the main lines of the tracery still remain, and that the date 1686, which is cut on the shield and tablet on the existing window, refers to a general repair and alteration of the tracery rather than to a complete rebuilding of the whole." The date, moreover (1686), is a stubborn fact, and the opinion is borne out by a well-attested fact that the window was blown in in the year 1661. According to the Society's report, the inserted window in the great Norman western arch is only one of a series of changes made at various architectural periods. The archway was, it is asserted, always filled up by a wall as it still is, and evidence of this is adduced by the writer, such as that the innermost shaft of the seven engaged stone shafts of the archway "is worked in the same stone as the start of the wall," and the remains of part of the old west Norman doorway seen inside, and which it is said rose higher than the sill of the present window. The writer does not tell us what the Norman windows (if any) were like, but mentions the traces of a Decorated window in the early part of the 14th century, when the Norman doorway was blocked up, the sill of the inserted window cutting into its arch. At this time the wall is said to have been thickened on the outside 16in., which wall concealed the inner shaft. Various traces of this remain; the inner arch, the outer member of outer arch, the jambs, and part of mullions. The detail is described to be of pure Early Decorated design, and the report goes on to say, "It appears very improbable that the builders during the Perpendicular period, or in the year 1686, would have used these Decorated mouldings if they had started afresh making an entirely new window, and had no parts of an earlier one into which the new work had to be

fitted." The next change was the alteration of the Decorated into a Perpendicular window, the main lines of which are said to remain. It is at least pretty conclusive that the date 1686 refers to a general repair and alteration, rather than a rebuilding of the whole, and the semi-Classic corbels introduced confirm this view. As everyone who has seen this fine west front knows, the present window is of Late Perpendicular design, and of seven lights. The stonework is in good repair, the mouldings being sharp. The late Sir Gilbert Scott, adds the writer of the report, expressed a very strong opinion that it should be preserved, and it is stated further that the Restoration Committee are at present divided on the subject.

Such is the position of the question. It may be inferred, from the letter of Mr. Robeson, the vicar of Tewkesbury, that the question of the restoration of the window has been before the Committee, who have entertained doubts about it, and the report of the Society is welcomed as a contribution towards the general knowledge of the subject. But the Society was precipitate. From our own personal inquiries, we find the majority of the committee are opposed to the restoration of the window; and that in this, as in some other instances, the officers of the Society have allowed their valour to outrun their discretion. The Committee have not instructed Mr. John O. Scott, their architect, to prepare any design, and that gentleman, we believe we are right in saying, has never proposed that the west window should be restored, though he has recommended that good painted glass should be put in. The whole dispute has sprung out of a mere rumour of "some possibility of a proposal being made to destroy it." The Society has found a champion in Canon Venables, who, rather amusingly adds his protest against an attempt which has not yet even an existence. He refers to "this fresh attempt to reduce our grand historical buildings to an ideal standard of purity of style by the effacement of essential features, which, however much we may sometimes regret their introduction, have become part of the history of the fabric." The well-used argument of the Society, that architecture was once a living art, and was perpetually receiving additions and alterations in the successive styles of the day, is again dragged in, without any notice of the fact that it is an argument which may be used to support the modern restorationist as well. Why should 19th-century architects be denounced as destroyers who have only been doing more thoroughly what the 16th and 17th century restorers did ignorantly? Canon Venables refers incidentally to St. Alban's, which is hardly an analogous case. At St. Alban's Abbey a small outlay would have been sufficient, probably, to restore the west front from existing data; the stonework was not decayed to any extent. It is perfectly true, nevertheless, that any restoration of Tewkesbury must be chiefly conjectural, and on this ground to a large extent destructive, and every architect and archaeologist would deplore the destruction or serious alteration of so grand and unique a western front. With a good deal of the Canon's letter we agree in the abstract, but we fail to see how they apply to a restoration which is not yet even in contemplation. The window is not threatened, it is in a good state of preservation; the date is known to be that of repairs to the original Perpendicular window, and we can scarcely think the restoration committee will commit themselves to the introduction of a window simply for the sake of its being new, however much it may appear to harmonise with the style of the interior. So far, all is speculation and surmise. With the doubt

expressed by one correspondent whether the opening was ever intended by the original architect to be a window, we have little to do. Whatever the intention of the builder of the great arch may have been, no modern restorer would venture to tamper with a feature which has ever marked Tewkesbury as a grand and unique specimen of English Norman architecture. Canon Venables' letter has brought Sir Edmund Beckett into the arena. With characteristic fervour, and not a little common sense, Sir Edmund asks: "What is the real condition of the present west window? Would a restoration of it be practically a rebuilding, mostly in new stone? A good measure of that is the estimate." To us this is the real point of the whole question. If a "restoration" amounts to rebuilding the window in new stone, the committee have a reason for asking their architect to prepare a design in accordance with the old front. Facts prove that such a state of things does not exist—that the window needs little or no repair.

Enough has been said to show the nature of this uncalled-for agitation about a restoration not even contemplated. No doubt can be entertained that a great deal of money has been wasted on unnecessary restorations—we would rather call them reconstructions—of late years, though no one will be disposed to cavil at what Sir Gilbert Scott did at Tewkesbury, a description of which will be found in the *BUILDING NEWS* of September 26th, 1879, and illustrations on May 11, 1877, and August 12, 1881, p. 195. Nor can it be denied that to substitute an imitation of something older; for Late work, to insert, for example, a Norman window under the great arch at Tewkesbury abbey-church, would be a very stupid and unnecessary proceeding, especially when the Perpendicular window is in a good state of preservation. The window now existing is declared by some to be a specimen of Late Perpendicular work unworthy of respect, while the Society for the Protection of Ancient Buildings declares it to be of good design, and that the mayor and churchwardens who have their names inscribed with the date 1686, simply appropriated the remains of the older windows. To pull to pieces a solid and substantial window, as this is said to be, just to gratify the taste of a few, and when other repairs are more necessary, would be exceeding the duties of those entrusted with the care of the fabric. The whole question ought to rest on the evidence of the condition of the window, and we have every confidence in the discretion of a committee guided by the care and caution of so conservative a restorer as Mr. John O. Scott, into whose hands the work of restoration has recently fallen. On the other hand, the Society, by rushing into print and sounding a false alarm, has, to a certain extent, and not for the first time, led people into the belief that something of a most destructive kind was going to be done. The zeal of its officials has unnecessarily exceeded their care to acquaint themselves with the real facts of the case on which they base their appeal; and the readiness of their "competent member" to report on another architect's work seems at the best hasty and inopportune.

THE FEMALE SCHOOL OF ART.

THE exhibition of drawings, held at the Female School of Art, 43, Queen's-square, Bloomsbury, affords an excellent proof of the success of this establishment. The course of instruction in this school, which is in connection with the Science and Art Department, comprises the usual branches of geometrical drawing and perspective; freehand drawing from the flat and from the round; shading from the same; model

drawing; figure drawing, from the antique and from the life; modelling in clay and wax; painting in water-colours, tempera, fresco, and oil; original designs for decoration and manufactures, &c. The Queen's Scholarship, of the value of £30 per annum, tenable for one or two years, has been won by Constance Wood, for a chalk drawing from the antique. The Venus is a fair specimen of this lady's skill in figure drawing. Mary Elizabeth Harding takes the Clothworkers' Scholarship of £20 for some excellent work, and the Gilchrist Scholarship of £50 falls to Ethel Chapman Nisbet, and O. A. Bodé. Mary E. Harding wins the Queen's gold medal and Florence Reason a National silver medal. The gold medal is for a group of fruit—melons and grapes in a vase, from Nature. The grouping and colour are both excellent. Florence Reason's truthful sketches of poppies and yellow roses display a charming appreciation of flowers, and the delicacy of handling and execution satisfy the most exacting. Ethel Chapman Nisbet, in a set of five water-colour studies, has shown herself also an adept in manipulative skill with the brush, the poppies and peonies, and the shells being beautifully drawn; and in the same branch of art we must award praise to Mary Emily Carter's *peppa-nuts*, lemons, and pomegranates—both of which ladies win National silver medals. Norah Waugh well deserves the bronze medal for her "Gladiator," from the antique, in oil; and the same distinction is conferred on Rose Ethel Welby, for a group in water-colour of daisies and buttercups, delicately drawn and coloured; and to Edith Harris for a white geranium, charmingly true to nature. These are the chief prize drawings; but we glance also at the series of heads in oil on the end screen. One of a female is full of rich harmony in colour, with a golden-toned background, admirable in drawing and expression, calls for mention; and another of an old man's head, bold and truthful: both are from nature. The studies in oil of M. E. Harding, F. Reason, and Christmas are admirable also. The still-life groups in oil are, with the exception of the gold-medal picture, of less merit. Lillian Abraham is another young lady who has made her mark as a water colourist; while Kate Richard's geraniums, grapes, and apples are inimitable specimens of skill in fruit-painting. "A French Peasant Girl," by Florence Reason, and several other studies of the same subject must be noticed. Emily Stone's sunflowers are vigorous and cleverly drawn. Of prize monochrome studies Norah Waugh's "Wrestlers," and Ethel Chapman Nisbet's ornament, a frieze from the cast, shaded in oil, deserve special commendation.

Among the chalk studies from the antique, of which there are several, we place in the foremost rank Florence Reason's fighting gladiators; after which the studies by Misses Ashton and Harding, and the heads from the life by Misses Lovell, Payne, and C. Wood must be mentioned.

The contributions of students in the upper rooms are even more interesting and instructive, as showing the practical work of the school. These include water-colour, sepia, and chalk drawings. We meet here with original designs for ornament: Jane Cooper's design for fireplace—an arrangement of flowers and conventional panels and borders, is worthy to be noted for some boldness and spirit; and another original design shows a conventional arrangement of buttercups and cinquefoil for door-plates, by Edith Robinson, who receives a bronze medal. The designs for door-plates, by Marion Henn and Agnes Lee, are of merit; and Dora Crittenden is another lady artist who has shown undoubted skill in folial arrangements. The vacation prizes awarded are several. The studies of flowers by Rose E. Welby, Ellen Prowse, and Louisa

Williams are thoughtful transcripts of nature; and we particularly call the attention to the water-colour studies of skies, by Otilie H. Bodé and E. Deane. These are freely executed in simple colour from nature. E. Prowse and E. Flack also obtain prizes for objects sketched in colour. Even more noteworthy of the kind of instruction afforded in this school are the admirable series of "tit-bits," to use an artist's phrase, called "artist memoranda." Ethel C. Nisbet, a young lady who has made her mark in other branches, has here a delightful series of sketches of buildings, foliage, and other accessories executed in a masterly manner, and we must speak very highly also of the studies, contributed by Mary Harding, Edith Ellison, Rose E. Welby, and O. H. Bodé, and others. This kind of analytical study of the landscape is of great service to the student. One of the objects sketched in colour is a Gothic doorway, and the accuracy and precision with which it is executed is worthy of all praise. O. H. Bodé's pencil sketches are feelingly drawn. We notice in passing an Egyptian border design for plates of some boldness.

The Gilchrist prizes for advanced ornament are awarded to Edith Rowe for some clever tile and dado patterns, and to Agnes Lee, for frieze ornament, and the prize for elementary figure drawing to Marion Henn. Misses Flockton and Forster are able exhibitors in sepia ornament from the cast, and the heads from the antique in chalk, by Misses Rushton, Flockton, Whiteher, &c., call for a passing tribute.

In model drawings, the Baroness Burdett-Coutts scholarship of £40 is awarded to Dora Crittenden; Alice Barclay obtains a prize for model, and the prizes for freehand go to M. Cathcart and Dora Crittenden. A vase and cylinder, shaded in chalk, is the subject of the Baroness Burdett Coutts' prize, and we see other clever drawings evincing an accurate knowledge of perspective, light and shade in this department. The Female School of Art by these prizes furthers the principles of a solid art training, which has been too long neglected in the instruction of drawing among girls. Here we find proof that geometrical drawing and perspective drawing from the round, including shading, have not been overlooked. Prizes have been awarded also for modelling, and we find Henrietta Marcus is the successful student for modelling a hand from nature. There are also drawings for a design for a cameo brooch, for which F. Reason, Edith Ellison, and M. E. Harding have carried away prizes. We must not forget to notice the very creditable specimens of wood-carving by female students of the National School of Wood-carving. Ellen Hind obtains a prize for some frames, and this branch of art work has been ably pursued by several ladies. The exhibition amply justifies the reputation earned by this school for the thoroughness of its teaching under the skilful superintendence of Miss Gann, the lady director. The national and local scholarships, such as the Gilchrist, the Clothworkers', the Queen's Gold Medal, and the other prizes open to students are high enough to encourage and develop the best female talent for art, and hence the contributions are all above the average standard.

LONDON SQUARES AND OPEN SPACES.

WE take the opportunity, every now and then, of advocating the cause of public improvements in this great city, and hinting occasionally at what, as we think, might well be done towards the rendering it more healthful and pleasant than it is. These so-needed improvements are, indeed, many in number, and must needs be added to all but indefinitely; but there is one

which, as we have always thought, precedes others, and that is the increase and improvement of our London Squares and open spaces, and grass and tree planted spots of ground. These open spaces are, as it is, but comparatively few in number, and are not a little irregular, and wasteful in their arrangements and setting out, and it is not a little grievous to note in the suburbs of London, and all round it, how little provision has been made for adding to these open and grass covered squares. In the district to which we here more particularly refer, and the one which has most closely come under personal observation, there is a whole town, we had all but said, where not a single "square," whether new or old, is to be found. Whole lines, miles we may say, of quite straight streets of small houses have been built up, and are at this moment in course of building, where a square, or open space, has not so much as been thought of. Surely this is a mistake, and must concern not the special district only, but the whole of this vast city, for the inner and dense parts of it must feel the influence of its so close and pent up surroundings.

In glancing at a map of London, whether old or new, it will be seen how out of sheer accident it is that a square shows itself. At times they are comparatively close together, as are Portman-square and Manchester-square, and sometimes they are fully a mile apart, as in the East-end of London and in Southwark. Here and there is one of goodly size, as Lincoln's Inn-fields, and at others so small and crowded up is the square as to be all but unnoticeable—all simply showing how accidental has been the fact of there having been any thought taken about them. But better late than never, for there are not a few spots where even now, and as it is, a square might be formed, and a bright plot of grass-covered ground made to appear where now all is dull and dismal enough. But without waiting for this, may not, as has been suggested, the present squares of London be made more useful than they are now, and opened to the public and made more accessible and pleasanter every way. We can but think they may be, and it is towards this doubtless that the suggestion has been made that the large square of Lincoln's Inn-fields should be thrown open to the public. It would be difficult to see how a better beginning could be made, or a better example set, and there must be some special interest in this particular square which has thus caused it to be selected as the one to begin with, and thus to test the utility and advantages of the proposed opening of the London squares. Lincoln's Inn-fields is indeed a notable place, and has been in its day the theatre of some remarkable events, and the place of abode of some remarkable men. It was first laid out in 1619. Newcastle House, at the corner of Great Queen-street, was the residence of the Lord Chancellors Somers, Cowper, and Harcourt, and of the Duke of Newcastle. This house is on the west side of the square or fields, together with Lindsey House, the work of Inigo Jones, and a good one it is and right carefully designed, as all his work in London is. On the east side is Lincoln's Inn Hall by Philip Hardwick. The Royal College of Surgeons is on the south side, as formerly was Sir William Davenant's theatre. On the north side is the museum formed by the architect, Sir John Soane; so that all round the grass covered plot in the centre are to be seen some historic memorials and notable structures. It may be mentioned, too, that in the centre of the Fields was beheaded, in the reign of Charles II., on the 21st of July, 1688, Lord William Russell, a remarkable man, in very many ways, and one whose "history" is noteworthy. Thus, in the proposition to open the "Fields" to the public, there will be found in them much more than the grass and tree-covered ground itself now

confined to so few living in the square itself, or its more immediate neighbourhood. There will be found as well, many things of interest which would otherwise pass, may be, without note, but which can but add to its interest with the public at large.

But it is not this alone which makes Lincoln's Inn-fields noteworthy, and a fitting place in which to begin the opening of the London squares to the general public, or in other words, the making a right of way through them. It is one of the largest, if not the largest of the green spots of London, and might be made yet larger without detriment to the surrounding roadway. A careful examination of a good plan of the ground is necessary to see this, and we would call attention to it in the hope of its being attended to elsewhere, for in not a few of the London squares, *e.g.*, St. James's-square, the grass, and in some cases, the flower-planted ground, bears no proportion to the whole space or square inclosed by the surrounding houses; while the roadway is altogether, and quite unnecessarily broad, and out of all proportion to the traffic requirements of the locality. We name this the more especially, for it needs but a glance at any coloured map of this huge London City to see how much is lost to cheerfulness and comfort, and may be *health*, by the merely accidental and haphazard way in which these matters, and the like of them, have been worked out. In this special case of Lincoln's Inn-fields it will be noticed that running north and south are Gate-street and Portsmouth-street, and which, though somewhat narrow, are amply wide enough to take the whole traffic as it is, and hence the green and grass-covered plot might well be made to fall in with the lines of these streets, and thus to be so much the larger, and the more sightly.

And this applies equally to the other sides of the square, so that the inclosed grass and tree-covered space in the centre of it might be very greatly *added to*, without difficulty, and most surely the *larger* this is the better; an addition, indeed, we may fairly say, to the *lungs* of London. There is, as we have said, but may well repeat it, hardly a square in London wherein this increase in the area of the inclosed grass and tree-covered space might not be greatly added to without at all interfering with the carriage roadway around it. Portman square, to name but one other, is a large one, and the centre only is occupied with a small oval-shaped garden, so that fully *one-half* of the space is lost. The streets running north and south, and east and west, are fully equal, perhaps more than equal, to the road traffic, and were but the garden brought into a line with these, so much the larger and pleasanter would this garden be. This subject might well be brought to the notice of the authorities all over wide London, where there now exist any "Squares," or where any improvement is at all possible. There is need but to hint here at the number of comparatively quiet London streets in which some signs of nature's work in this way might well find a place, but which are, as things go, so full of desolation. Here and there it is true, by mere accident, this has been done, and a goodly row of trees are to be seen; but such are, it need not be said, but too rare.

It is somewhat curious to note that there is no "square" within the bounds of the "City" proper, the really oldest part of this huge metropolis, with the exception, if it can be so called, of Moorfields in the north of it, and touching its very wall, those of Finsbury-square, the Artillery Grounds, and the Charter House Grounds and Square being to the north of it, though quite close to it. Not to travel beyond the immediate subject of London squares we may perhaps, in passing, express some regret at the poor use that has been made, or is making, of the Thames

Embankment as a place not alone for traffic, but for long and regular lengths of green and grass-covered and tree-growing spaces or squares. It extends all but from Blackfriars-bridge to Chelsea-bridge, and would seem to have offered an opportunity hardly to be surpassed. What the old Assyrian, in his barbaric days, would have done with it, who will venture to imagine? With the great river on one side, and with the great city on the other—a city, as we are often reminded, of "palaces"—what would he not have done with these elements of greatness and architectural and natural display? A very hard and difficult art problem presents itself here, from whatever point of view looked at, for Nature herself must needs adapt her forms and rough grouping to the regularity of architectural requirements, or the architecture must needs be made to bend to them.

Much else there is which calls for note here on this subject of the squares and green spots in the midst of London. There is, however, one special phase of it which may well be made careful note of. It is that of the but too excessive care and attention which would seem to be given to the work which Dame Nature does so well, though roughly. The magnificent luxuriance always to be observed in utterly neglected and out of the common way spots of ground contrasts not a little strangely and instructively with the careful prunings and cuttings, and orderly arrangements of the well-kept and dainty garden and fashionable square. Most surely it is quite possible to do too much. Lincoln's Inn-square has indeed, to some extent, escaped this, for a goodly expanse of fresh-looking grass is visible, and the trees show signs of unheeded growth and of natural forms; but this is not always so, as many must needs have observed. These squares and gardens might well, too, be made of interest in a botanical sense, and left so far to nature as to show how infinitely varied are the forms produced even in the very same species of plant, whether tall tree or ground-plant, or humble grass-blade. Educationally, then, how much is there here? C. B. A.

"A BEAM FROM ST. MARK'S."

SO much has of late been written about ill-fated St. Mark's, that it may seem almost superfluous to add more. In what has been published here, however, I have not yet observed that the special feature, which I propose to discuss, has been alluded to; and moreover, my subject, rather than relating specially to St. Mark's, has been suggested by it.

It is possible that some few careful observers of the west front of St. Mark's will have remarked that the arches of the upper arcade are not strictly vertical, but inclined gently towards the beholder. When Meduna had in view the destruction of the west front in a manner similar to that in which the south and north have been destroyed, one of the first things he did was to remove the oggee crowning from the southernmost of the upper arches, asserting the inclination of this arch to be good cause for the proposed restoration.

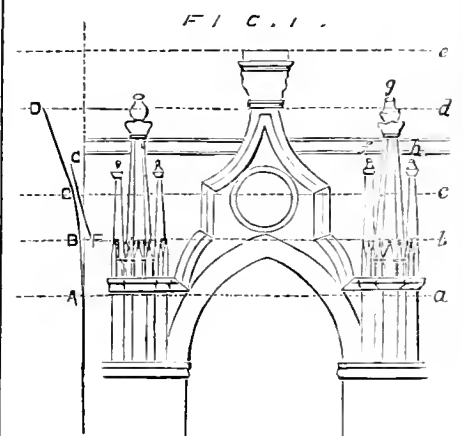
I believe that since I was in Venice this ornament has been replaced, but the church was for so long a time to be seen deprived of it, that the blank cannot fail to have been noticed. I may say here merely in passing, that this interference was fraught with most unfortunate consequences to the old mosaic of the archivolt, much of which fell out when once exposed.

Now, we all know how the Northern picturesque builders of timber-framed constructions, made the gables in their streets to overhang. Often, no doubt, this was the result of settlement, often of careless build-

ing—to which the kind of construction might easily lend itself—but just as often of intention. From whatever cause, the effect produced is a great one. Let us number the upper arches of St. Mark's, (1), (2), (3), (4), (5), from our left as we face it, and bearing in mind, that we have to deal with Byzantine circular arches, capped by Gothic ogges; then the forward inclinations of the Byzantine arches are respectively, 15, 8, 7, 11, 10 centimetres, these inclinations being severally determined by suspending a plumb-line from the head of an arch, and taking the distance the plummet hangs forward in front of a line from springing to springing. Note, however, in these measurements that arch (5) has been—I cannot say how much—renewed, and its inclination must not therefore be entirely depended upon, although it cannot but be something approaching what it originally was.

Thus we see that the centre arch is inclined slightly to the beholder, and those flanking it a little more so. And here I must remind the reader of what Mr. Street has pointed out to us—that the whole front is set out in a curved line, recessed 25 centimetres in the centre, and I would ask him for a moment to consider the effect of this feature, combined with that of the inclination, imagining himself standing right in front of the centre of the building. Each side, as it were, is turning and nodding towards him. But do not let it be thought that I am here hastily about to make the rash assertion, that I believe this inclination to have been the result of deliberate intention on the part of the old builders. I do not think that anyone who has really entered into a study of St. Mark's will doubt that the feature noted by Mr. Street is so, and I certainly do suggest that this one under consideration may, perhaps, not be quite so much of the result of settlement as Sig. Meduna would have us believe. I have called attention to it, as well as for its own sake as that it forms a fitting introduction to the further consideration of some cases, which, while they may to some extent reflect back upon St. Mark's, will certainly prove to the most incredulous that the later Venetian builders (15th century) were, in their refined stone constructions, alive to the effect which could be produced by the studied inclinations of the upper members of their buildings.

Fig. 1 is an outline—lettered for reference—



of the upper part of the Porta della Carta, which I need hardly describe as the great entrance to the Ducal palace. It was erected under the Doge Foscari by Giovanni and Bartolomeo Bons, 1439-1441, and is therefore somewhat later than the last Gothic additions to St. Mark's. Gothic had expired in Venice by 1480. It is, then, one of the erections of its latest times; but despite this, and the fact that it is a composition which has met with some abuse, I must confess much liking for it. That the brothers Bons

were artists who believed that some effect was to be obtained by inclination, will appear from the measurements I am about to give.

The height of *a* from the ground is 12 metres or 39ft. 4in.

ab = 1.29m. (or 4ft. 1in.) and inclines outwards 12 millimetres.

bc = 1.03m. (or 3ft. 4in.) and inclines outwards 12 millimetres.

cd = 1.70m. (or 5ft. 7in.) and inclines outwards 83 millimetres.

i.e., the whole projection of *d* is a little more than 1 in. in a height of 13ft., and the gable in section takes the form I have shown by the exaggerated line *ABCD*. The finial which forms a pedestal for the statue of justice barely continues the inclination of *CB* (on account of its swelling foliage, no further inclination is necessary), so that the lateral mouldings at its top are inclined 27 millimetres in a depth of 470, or, roughly, 1 in 18; that is, if we could stand about 305 yards down the piazza away from the porta, and look at these mouldings, the visual beam would be in one line with the line of them, thus (see Fig. 2). This may, perhaps, serve

FIG. 2.



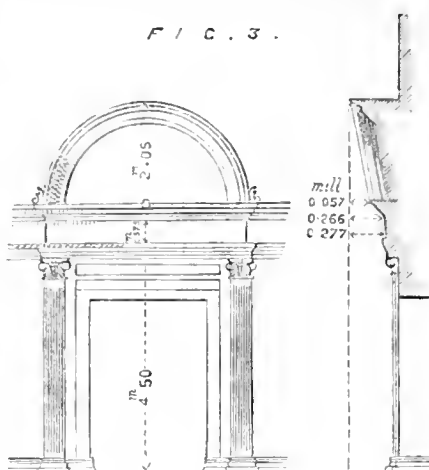
as a practical illustration of the amount of inclination.

But we have yet to consider the most subtle part of the arrangement. The medallion over the arch head contains the figure of St. Mark, and thus vies with the crowning Justice in forming the feature to which all else leads. Its outer diameter = 1.55m. (5ft.). Now note: it is placed between *bc* and *cd*; *bc* is inclined forwards about 1 in a height of 86; *cd* about 1 in 13; and the medallion 32 millimetres in a diameter of 1.55m., or, roughly, 1 in 48; that is, its inclination is intermediate between those of *bc* and *cd*, and it therefore takes the position I have indicated by the line *F.G.* in Fig. 1. Such arrangement speaks for itself, and with regard, at least, to the Porta della Carta takes the matter out of the reach of dispute. But to show how all is in harmony, I go on to notice the lateral pinnacles or needles. That lettered *f* seems to have suffered some restoration; but *h*, the small one on the right, has its axis leaning forward 30 millimetres in a height of 1.26m., (this latter measurement taken from the top of the little gablets to the underside of the finial). The centre pinnacle *g*, measured in the same way, has its axis inclined 70 millimetres in a height of 2.28m. I regret that the difficulty experienced in taking the measurements prevents me giving corresponding ones of the pinnacles flanking the gable on the other side. In now passing on from the Porta della Carta, it will suffice to state that the lower part of the structure and the wall rising up behind it are strictly vertical.

Let us now turn to the consideration of the gateway of the Scuola San Giovanni Evangelista. This Scuola was a corporation founded about 1350, by workmen of all trades, and the first building seems to have been completed in 1405, but about 1480, or later, large additions were made. A fine staircase was added, leading to a hall where once hung some of the best Bellinis and Carpaccios now in the Academy, and at the entrance to the cortile was crested a highly decorated central doorway, surmounted by a circular pediment, and on

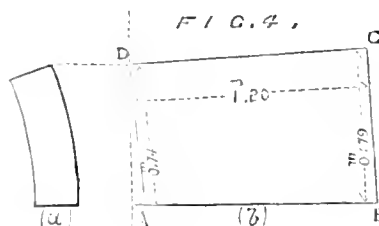
each side of it, lateral pedimented windows, the whole in the manner of the earliest Venetian Renaissance.

I leave the accompanying outline to speak for itself. (Fig. 3.)



Scuola San Giovanni had the ill fortune to undergo some restoration in the year 1731; but, from what Mr. Ruskin says of its state, when he wrote in 1877, this does not seem to have done it such injury as one would suspect from any extensive repairs; but, especially, from any such carried out at that date. Moreover, it is highly probable, that if actually pulled down by the despicable builders of that century, who seemed to have little better aim than precision, the pediment would have been set up strictly vertical. Hence, as we see it, it appears a good example, without doubt, of the point we are considering. It is, then, with much sadness, I have to say that no one will again see it as Mr. Ruskin describes it. It is in the hands of the restorer, and it is but small comfort to be told that there is a chance of the old marbles being replaced without being scraped. Although a digression, I may here also state that the Church of S. Giovanni, standing in the same cortile with the Scuola, has the remnants of a Gothic apse. Only a few weeks ago, I had a letter from Venice, bearing the tidings that this had just been "whitewashed." Can we wonder at the way they have treated St. Mark's, which, truly, I had rather have seen whitewashed than in its present state—whitemarbled!

Returning now to the arcades of St. Mark's, the crowning ogees of the arches, distinguished as before, project respectively, 38, 26, 23, 31, 31 centimetres, from the same points from which the inclinations of the Byzantine arches were measured. To measure their actual forward inclination, we must, of course, deduct the depth of the moulding which surrounds them; but that this inclination, whatever may be thought of that of the Byzantine arches, was really intentional, will appear from the annexed dimensions of one of the two lowest vous-



soirs, which form the springing of the ogee of arch 5. (See Fig. 4.) *a* represents the front, of which the dimensions do not con-

cern us, *b* the side. *C* and *D* are right angles, and *AB* is laid horizontal. *AD* = 0.74. *BC* = 0.79. The inclination of *AD* is obvious.

In now quitting St. Mark's to add a few thoughts suggested by what has gone before, I will only note that, constructively, the upper arches are in a most perfect state of preservation, and we may congratulate ourselves that, now, at least for some time to come, they are to be left alone to nod to us undisturbed.

It is an axiom in all branches of the arts—and one, perhaps, specially applicable to architecture—that there often exist certain subtle qualities which, while they appeal to the appreciative senses by adding tone and elegance to a design, yet remain long, perhaps always, concealed. If, perchance, the mystery is discovered, and the problem solved, the satisfaction obtained adds to the pleasure derived, and the impression is complete. But our sympathies, on all subjects appealing to the taste, are so widely different, that I know well the impossibility of obtaining every reader's admission, that the feature which forms the subject of this paper is, or even may be, one of these refinements, the existence of which, however, all who claim to understand art, even in the smallest degree, must, certainly, allow. Inasmuch as there are those who would declare the noble swelling of the Tower in Air, at Florence, or the cunning curvature of Rouen's Tour de Buerre to be barbarisms, so I have already met with those, in whom the only sensation aroused by an inclining gable or pediment is, that it is going to fall on them. It needs but a passing glance at many of our modern buildings—if, indeed, they do express the feelings of their designers—to be led to the conclusion that any violation of the rule—not to mention the plumb line—means offence to minds whose ideas of architectural beauty seem to exhibit themselves mainly in either setting up so many columns or windows, side by side at equal distances, or endeavouring to persuade the public into their way of thinking, by writing apparently authoritative and learned criticisms on buildings which they cannot understand. From such, shallow ridicule only can be expected of a point which must be for ever in direct opposition to their principles. But from those whose sensations are not blunted by the perpetual consideration of equal feet and equal inches—symmetry "in all its branches"—may we hope for a development of a subject such as this, so that it may be placed, by careful reference to old examples, upon a sure footing. In its consideration, however, one point must be kept in view. If the bending forward is obvious, or is such as ever to reveal itself, the mind, being once aware of its existence, must be satisfied that there is ample support suggested to prevent collapse. Thus, if we felt that there was the remotest chance of those gracefully bending ogees in the Chapel of our Lady, at Ely, falling forward on us, they could never excite that delight in us which they now do. At St. Mark's an adequate sense of support is suggested by the shafts which, projecting from the wall face, but, at the same time, bound to it, and to one another by their bold and continued abacus, sustain the arches. At the Porta della Carta we are satisfied by the upright wall behind the gable into which we know it is well bonded. Again, in the Northern timber-framed constructions the very display of the timber alone suffices. Deceive us into feeling, in any way, that such building is of brick or stone, and we shun it immediately as dangerous. As a fitting instance of this head, let us imagine what would have been the effect if this inclination had been introduced—even in the least noticeable degree—into such a gable as one we used to know of (happily now we do not) in Oxford-street, W. We should have

had always to have passed by on the other side, which would have been unfortunate, as subjecting us to the greater chance of the disagreeable sensation of catching a glimpse of it.

I will conclude by expressing my best thanks for the generous and ready aid I have received from a Venetian gentleman in the consideration and working out of this subject. Indeed, without his help (he has supplied me most kindly with all the measurements I have been enabled to give, and, with many suggestions) this paper could never have seen the light. Of whom I would say, I only wish that there were many more in Venice eager to devote themselves with such unflagging zeal as he does, to every endeavour to instruct his fellow-citizens in a real appreciation of their glorious inheritance. VEDECE.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE second ordinary meeting for the present session was held on Monday evening, Prof. T. Hayter Lewis, V.P., in the chair. Mr. Fowler was welcomed by the chairman on the occasion of taking the office of hon. solicitor to the Institute, in succession to the late Mr. Ouvry.

EARTHENWARE POTS (CALLED ACOUSTIC VASES) BUILT INTO CHURCHES.

Mr. GORDON M. HILLS read a paper upon this subject, illustrated by twenty-two full-sized drawings of typical examples of these vessels. The subject had, Mr. Hills remarked, not previously been dealt with, except in scattered notices of the discoveries of pots in churches. The theory that they were intended for acoustic purposes had only arisen in the present century amongst French and English writers, but was based upon a statement by Vitruvius, which we now knew to be confirmed by a note by a mediæval monk at Metz. Vitruvius, writing at the period of Augustus, says (V. 5) that brazen pots were used in the construction of Greek theatres, under the seats, for the improvement of the sounds, and refers to minute mathematical rules which governed their position, but does not appear to have seen an example, nor to know the exact manner of their employment, and distinctly says they were not used in Rome, but that while there were a few instances in Italy, there were many in Greece. The next reference to the use of acoustic vessels is in 1432, but it only became known to the present generation about twenty years since. During the demolition of the Cîteaux monastery at Seans, a suburb of Metz, the records were examined, and an entry was found that in 1432 the prior had pots of earthenware placed in the church, as he had seen them used in some other church, to improve the chanting. He had all the pots fixed in the wall of one bay of the choir, and the chronicler added, "I do not know that they improved the chanting, but they disfigured the walls, and after a time people wondered why they were there. They are," he continued, "a marvel to all and a jest to fools." In 1665 the Abbé Saint Léger refers to the use of jars in vaults and walls of churches placed there to increase the sound. Our chief knowledge of these vessels was from the examples found in churches when undergoing alteration; but many very ancient instances of built-in pots had been discovered, as at Hierapytna, Saguntum, and Scythopolis. In Sweden a considerable number of these vases had been found. In the interesting church at Bjersjö, contemporary with, and not unlike, our Norman church of Kildwick, Herefordshire, as many as 40 vases were discovered to have been built into the walls, and others in the eastern apse, while yet more were believed to exist behind the chancel arch. Each was placed with the mouth upwards, and covered by an oak board perforated with a trefoil; in front of the series the wall had been built up at a subsequent date. Several examples had been found in French churches since 1842, as at Arles, St. Blaize at Montevilliers, and Fry. These French instances, as described by the Abbé Couhé, M. Viollet-le-Duc, the Rev. Mackenzie E. C. Walcott, and Mr. Albert Way, were generally found inclosed

near or in the angles next the nave; they were laid on their sides, with, in most cases, the mouths facing the interior of church. When the Late 14th-century chancel of the collegiate church of Youghal, Ireland, was being re-roofed in 1851-5, holes for jars were found in the north and south walls at intervals, and four still contained earthenware vessels. The English examples, especially in East Anglia, were numerous, the largest class being that where a series of jars were found to have been built on their sides into sleeper walls beneath the floors of the chancels. To this class belonged the earliest discovery, that made in 1810, in St. Peter's Church, Ipswich, those at Fountains Abbey, and at the churches of St. Peter Mancroft (40 jars), St. Peter per Mountgate (16), and All Saints (16), all in Norwich city, and all, like several other of the investigations, carried out and made by Mr. R. Makilwaine Phipson, of Norwich and Ipswich. Another arrangement of these jars was to build them into the inner part of walls. Of these, specimens had been found at St. Olave's, Chichester (two very small ones, supposed to be Roman jars, as other Roman work was re-used in the church), Upton, near Southwell (3), East Harling (4), St. Clement's, Sandwich (3), St. Clement's, Ipswich (3), and St. Mary-le-Tower, in the same town. One of the most interesting yields was that made in 1873 during the restoration of Leeds church, near Maidstone. Here as many as fifty large earthenware jars were found built into the 14th-century arcade walls behind the framing of a somewhat later roof. They all had convex bottoms, through which holes had been pierced when the clay was wet in regular patterns. The jars faced the interior of church, and were disposed at regular intervals which did not agree with the framing of roof. Some were placed in the Maidstone Museum, one was taken by a churchwarden, and others were dispersed or broken. Mr. Hills exhibited one as a practical illustration of his paper. Respecting the purposes of these jars opinions had widely differed. The general opinion of French archaeologists was that they were intended to increase the reverberations of the voice; but M. Didron, whilst concurring in this supposition, had remarked that the means adopted were "puerile." In England opinions were divided, the theories being that they might be used for ventilation, heating, and acoustics. If for the first-named purpose, he could not understand why they were bedded so deeply in the walls. As for those in the sleeper walls of floors beneath choir stalls, it appeared possible that they might have been filled with burning charcoal, but if so surely in some case there would be traces left or traditions existing of flaps in the floors above for access to them, but of these none were known. The supposition that they were used for keeping relics in was not tenable, he thought. It was possible the mural jars were intended for increasing the sound, but being found useless were walled up and forgotten.

Mr. E. P. LOFTUS BROCK thought these jars were introduced for acoustic purposes, perhaps as the result of the statements of Vitruvius: their utility must have been extremely dubious. To archaeologists the illustrations and specimens were familiar, as they represented the ordinary mediæval pottery in domestic use, discovered in many excavations in mediæval sites. The frequency of their discovery in Norfolk and Suffolk appeared to indicate that some one advanced a theory of their utility, and that the experiment was tried in several churches of the principal towns. Most church architects knew the difficulty of checking an echo rebounding from the west walls of churches; and it might be possible to break this resonance by filling it with pots of this character.

Mr. T. BLASHILL had examined the jars discovered at Denford, and thought their use was acoustical. Some thirty years ago he was told at the Broadway Inn, seven miles from Hereford, that the floor of the chief room used for dancing was laid upon horses' skulls, for the purpose of increasing the sound of the fiddle during dances. A few years since the inn was rebuilt, when it was found that under the floor of this room were three rows of horses' skulls, eight in each row, nailed through the eye-sockets to the beams of the floor. He had heard of a similar instance in Lancashire, and believed it to be a survival of the same custom.

Mr. A. CATES mentioned that in an early edition of Terence was a note by an unknown

commentator of an unknown period, referring to the use of vessels of brass for the purpose of increasing the melody in certain temples. He proposed a vote of thanks to Mr. Hills.

Mr. CHAS. FOWLER, in seconding the motion, referred to the ruined open-air theatre of Taormina, Sicily (Taormenium), where earthenware pots existed under the seats.

Mr. H. H. STANNUS suggested that whereas some of these might be for acoustic properties, those disposed along the nave of Leeds Church, Kent, with pierced bottoms, must have been rude attempts at ventilation—a difficult matter to secure through a wall of loose rubble.

The CHAIRMAN, in putting the vote of thanks to the meeting, remarked there seemed to be three distinct classes of these vases—those used for constructional purposes in vaults, those in walls, and those under the stalls of choirs.

Mr. G. M. HILLS, in reply, said he had intentionally abstained from alluding to vases constructionally used in vaults, which were by no means uncommon. As to the acoustic use of these vases, they appeared to have been firmly fixed, so that they could not vibrate with the sound. Those at Leeds, Kent, could not have been intended for ventilation, for they were buried in a solid wall, with 18in. of masonry between them and the outer wall, and the perforations in the bottoms had all been filled with plaster. It appeared possible that these vessels had some subtle effect on the acoustics of a building, and he could not understand any other purposes for their use.

LECTURES ON HORTICULTURAL BUILDINGS AT THE CRYSTAL PALACE.—II.

(Continued from page 654.)

THE second of the course of lectures to the students of the Crystal Palace School of Gardening and the public, was delivered by Mr. F. A. FAWKES, on Wednesday, the 23rd inst. at 5 p. m. After a recapitulation of the ground covered by the last lecture, Mr. Fawkes said the next point to raise would be in reference to the glass, and how it should be put in. For ordinary horticultural purposes, you will be safe in using English sheet glass, 21oz. to the square foot. A thinner glass, 15oz. or 16oz. per square foot, is often used, but is more liable to damage by hail, and to scorch the plants. Belgian sheet-glass is cheaper than English, but being more speckled, is not recommended. When permanent shading or screening by a semi-obscure glass is necessary, you cannot do better than employ Hartley's rolled plate, varying from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. thick, in which the obstruction is due to corrugations on one side of the glass. Experiments have been made with tinted glass, with the view of arresting the excessive heat-rays, while permitting the light and chemical rays to pass through, but they have not reached a practical stage. The choice of a glass is easy, but not so simple is that of a means of fixing it, for a great many different modes have been tried in which putty is abolished. Putty-glazing is by no means perfect: the putty is apt to peel off, crack, form crevices for the retention of moisture, and cause the woodwork to rot. Then it is troublesome to renew glass when necessary, as well to put it in in the first instance. No doubt putty-glazing is crude and unmechanical, and horticulturists would welcome any advantageous method of superseding putty-glazing, but for purely horticultural purposes no system hitherto invented has proved a successful rival of putty-glazing, and I cannot conscientiously recommend any of them for glazing purposes. In some cases the glass is held in its place by metallic slips, in others by compressible metallic bars, in others between slips of vulcanite or other elastic substance, the glass and vulcanite being held together by wood or metallic capping and screws; in others the glass drops into grooves prepared to receive it. In all these cases, the glass comes into contact with either a metallic or elastic substance. In the former case there must be a sufficient amount of "play," or the glass will break; in the latter case, atmospheric influences will rapidly decompose the elastic substance, when there is far more trouble and expense to replace such substance than to re-putty a house. If there be "play" between the glass and its supports hot air has opportunity for escape; the house cannot be properly

fumigated; crevices for the retention of water by capillary attraction abound, and the glass is liable to subsequent breaking by the freezing of this water. For other than strictly growing horticultural buildings mechanical glazing may frequently be employed with benefit, but for these structures a puttied roof is safest. If putty cracks it is because it gets too hard, and that may be avoided by putting a little tallow in when made—say nine parts good boiled linseed oil, and one part tallow mixed with whiting to required consistency. It is frequently recommended to employ bottom putty only, i.e., imbed the glass in putty, sprigging it at the top with copper tacks. This will prevent trouble from putty peeling at the top, but is not so slightly as the old plan. If top putty be used, it should not cover a large area of glass, and the surface of putty next glass should slope well, so as not to retain moisture. The glass should be cut with a lap of not more than $\frac{1}{4}$ in., or the water will be retained and may freeze and break the glass, and more dirt will be held between the surfaces than if the lap be greater than this. The sash-bars may be from 10 in. to 12 in. apart in an ordinary roof, and the panes from 2 ft. to 2 ft. 6 in. long. These panes should be rectangular; if the lower edge is cut in circular form, as sometimes recommended, the irregular capillary attraction will cause breakage of glass.

There are two other descriptions of roof not yet mentioned, the curvilinear and the ridge-and-furrow; but neither can be recommended by the lecturer. In a curvilinear roof the construction is more costly and troublesome; lateral thrust is not so easily overcome, training-wires are not so easily fixed, and ventilators not so easily adapted as in a straight roof. More important still, bent glass is more liable to break with variations of temperature than straight glass, and if straight glass be introduced the panes must be short and in different places, or they will not follow the curve of roof. An unsightly appearance is the result, and heat is lost and rain drifts in more than when the glass is in one plane. By a "ridge-and-furrow" roof is meant one composed of a number of small spans each not more than about 5 ft. wide. The chief objections are: it has a number of valley-gutters, and these are always difficult to keep watertight; such a number of valleys and ridges, in proportion to the area and the construction necessary to support these, form unnecessary obstructions to the light; and it is never necessary to have a ridge-and-furrow roof to cover ordinary growing-houses.

In discussing the details of these houses, the question of stages or stands for plants, &c., must not be omitted. The objects of a stage are: that it shall bring the plants nearer the glass; shall place them in such a position that they shall be more easily attended to; shall raise them away from any obstruction, such as hot-air pipes, &c.; and shall afford a means of easily draining them from superfluous moisture. The ordinary lattice wood stage is very suitable. It may be made of deal laths, say 3 in. by 1 in., having a space of $\frac{1}{2}$ in. between them, carried on bearers at short intervals, these bearers being supported by legs or brickwork. Sometimes a solid stage is advisable, when stone, slabs of concrete, or, more usually, slate is employed. These, having a raised margin and provided with drainage holes, can be used as shallow boxes (as for placing pots or plants in a damp bed of sand or moss), when wood boxes would be liable to rot, but are much more expensive than wood. A cheap form of solid stage may be constructed by taking an ordinary lattice wood stage, fixing a fillet on edge, so as to make a raised margin, and then line the interior with zinc (say, No. 20 B.W.G.), taking care to provide drainage holes for the shallow watertight box thus made. Iron stages are seldom used in growing-houses, but in show-houses are mere panels of perforated castings supported horizontally by a framework and legs of iron, or by other support. In planning stages for growing-houses be careful to study economy of space and convenience. Never have two paths where one will suffice, but at the same time do not let the stages be inaccessible. Let the distance of your stages from the glass be taken in conjunction with the length and size of the plants which will be placed upon them. Well-planned stages will cover the maximum space, will be accessible in every part, will present a neat, uniform appearance, and will exactly suit the plants they are intended to sup-

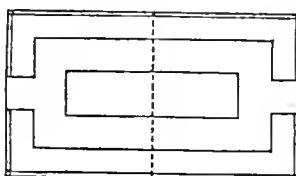
port. The proper height for the top of stage is about 30 in.; if lower, a good deal of stooping is required to attend them; if higher, they are less accessible and look awkward. Fig. 17

FIG. 17.



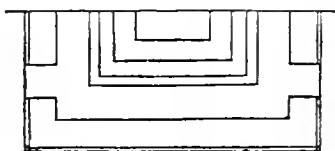
shows a suitable plan of stage for narrow plant-houses up to 12 ft. or 13 ft. wide. We have a path 2 ft. 9 in. wide, and this, with $\frac{1}{4}$ in. on each side occupied by woodwork, allows, in a 13 ft. house, 4 ft. 9 in. width of stage on each side of path. Market-gardeners prefer such houses about 11 ft. wide, permitting stages on either side each 3 ft. 9 in. wide, so that the plants and ventilators are readily accessible. For houses over 13 ft. wide, a span-house should have the staging disposed as in Fig. 18. Where one plant-house

FIG. 18.



succeeds another, it is better not to allow the two paths to converge into one at the division, but make them continuous, so as to obviate waste of space. (See dotted line shown across centre of Fig. 18.) There ought to be plenty of head-room in the paths and for the doors, and this will also regulate the width of your side stages. The centre stage may be either flat or tiered, depending on the width of this stage, the plants to be grown on it, and the light from glass. In lean-to or three quarter span-houses of a moderate width and not too short, the mode of arranging the staging shown in Fig. 19 is very

FIG. 19.



suitable. If the house is too short, the return ends may be omitted. Although the width of steps depends to some extent on the plants grown, it may be remarked that a great number of very narrow steps is not so economical in space as a smaller number of wider ones.

Ventilation is the next consideration in a glasshouse. As a consequence of the increase in volume with the raising of the temperature and *vice versa*, the displacement of the air produces horizontal as well as vertical currents, and so by a proper arrangement of openings and heating apparatus we may procure a renewal of air in our greenhouses. It is necessary that the fresh air brought in shall be warmed before it comes in contact with the plants, if possible. We must therefore place the inlet for renewal low, and also the means for heating it low, and must arrange that the current shall find its exit as high as possible. A heavy wind may neutralise the effect of this arrangement by causing the air to come in at the top and go out at the bottom, but this may be prevented by varying the size of inlets and outlets. As a rule, outlets may be of smaller combined area than the inlets. Both should be along the whole length of a house, except in the case of the top ventilators of a span or three-quarter span-house, which may be arranged alternately on each side of ridge. The usual form of ventilator is a framed light, hinged at the top and opening

from the bottom outwards. Sliding sashes have almost gone out of fashion except for frames, low pits, and roofs which have at times to be practically stripped. A roof containing sliding lights is abnormally heavy and affords great obstruction to the solar rays, and the sliding lights themselves develop great friction. The same objections apply to ordinary window-sashes used as upright lights. Ventilators pivoted in the centre are sometimes used, but are not so simple nor efficient. Casement ventilators may do for show-houses, but nothing can beat the ordinary lights hinged from the top. The size of ventilators will depend on requirements of plants; but for ordinary purposes the lower inlet ventilators may be about 2 ft. 6 in. deep, top ventilators about 2 ft., the width in either case corresponding to the distance apart of rafters, in a sashbar roof about 5 ft., in a sash roof about 4 ft. "Hit-and-miss" ventilators may be used in brick walls immediately in front of hot-water pipes, either in conjunction with vertical lights or where none exist. All ventilators should fit closely and butt against fillets. We have seen that it is necessary to have an uninterrupted area of top and bottom ventilation. Unless there is a great number of lights to be moved, it is advantageous that each ventilator shall open and shut separately, rather than all should move simultaneously. If the separate plan be adopted, then the ordinary "set-open," consisting of a bar having notches or holes in it setting on to a fixed pin, may be used. For separate top lights a quadrant bar terminating in an eye may be fixed to each light; a cord attached to the eye, and passing over a pulley fixed to the purlin or principal, will be sufficient to open the light. A counterbalance weight or hook in the wall may be used to keep the light open. A "set-open" for single roof-lights is shown in Fig. 20. When, to save time, or because they

FIG. 20.

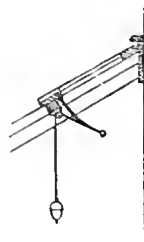
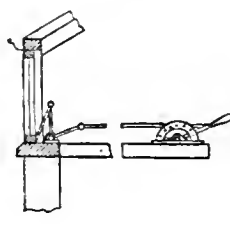


FIG. 21.



are inaccessible, a range of ventilators has to be opened simultaneously, a round bar may be fixed to plunger blocks immediately in front of the ventilators, and two jointed arms fixed on each ventilator, and keyed securely on to the bar. In Fig. 21, a side view of one jointed arm and a section of the bar, and a light is shown. Upon partially rotating the gear, the jointed arm is straightened, and the light is forced open. A handle keyed on to the bar, and moving in a quadrant, can easily actuate the bar. The same apparatus may be used to actuate top lights. Care should be taken that the arms are all securely keyed on the shaft or bar; otherwise there may be a tendency to wring, and some lights may be closed while others remain open. Sometimes toothed quadrants are used for the simultaneous opening of lights, but these double jointed arms are far better. In vineries, cucumber houses, &c., provision must be made for training the plants over the glass, and trees are also often trained upon walls. For roofs the usual practice is to stretch the wires in a vertical direction, parallel with the rafters and sash-bars, so that the wires strengthen the roof and facilitate painting and repairs. In fixing such wires, say, in a lean-to roof, take two flat iron bars turned edgewise, and suspend them at back and front by holdfasts at intervals, bolted through the back wall and into the front mullions. Then stretch wires by radisseurs to these two bars. The wires can thus be at short or irregular intervals along the bars, and at any time the distances apart may be altered. The wire used may be No. 12 B.W.G., and may be from 10 in. to 12 in. below roof. If the roof be a span instead of lean-to, the flat bars will require to be held fast to the mullions on each side, and the wires strained between them after being passed through eyebolts, screwed to the ridge-plate, or

taken over an iron bar. Wires against a vertical wall are better placed horizontally, and may be 10in. or 12in. apart, each fastened to a staple at one end, and to a radisseur at the other, passing through guiding-eyes at intervals of 10ft. From 100ft. to 150ft. of wire may be strained in this manner with ease.

Painting is by no means an unimportant part of greenhouse construction. The woodwork should be well seasoned and thoroughly dry before any paint is applied. Any woodwork prepared at a distance from its destination should be well primed before it leaves the shop. Before it is fixed, those parts which come in contact with brickwork, and which cannot afterwards be accessible, such as the under part of sills, the back of wall-plates, &c., should be well painted with good oil-colour. After the woodwork is fixed, it should again be well painted. In all, no fewer than four coats of good oil-colour should be employed. The best finishing colours for horticultural work are stone colour and white. Bright prominent colours should never be employed in either growing- or show-houses. Such colours are certain to artistically kill all the plants and flowers, and it is, after all, the rich colouring of foliage and flowers, not the colours of woodwork, which we wish to make prominent. Horticultural buildings have very trying atmospheric influences to contend against, therefore protection by periodical painting is an absolute necessity. Supposing houses are properly painted when they are erected, they should have one coat outside within at least a year; after this, two coats outside every three years. When new panes of glass are put in, the woodwork left bare by the operation should be painted. In none of the diagrams to which I have already drawn your attention, is a provision shown for enabling vine roots to have simultaneously an outside as well as an inside border. As a vinery or a house with such borders possesses several distinctive features, I will give you a few notes regarding the construction of a vinery. Although some authorities advocate an inside vine border only, yet it is generally advantageous to allow the border to be outside as well as in, and to do this you require either to build the front wall of your vinery on arches, the crown of the arch being just under the soil, or to support the front part of your vinery on short iron pillars at intervals, the space between the pillars from the wood and glasswork down to a little under the level of the soil being filled by slabs of slate, as shown in Fig. 22, which is a section of front

required. About 2ft. 6in. to 3ft. is a very fair depth for a border, and the total width may equal the width of the house. The layer of rubble may be from 6in. to 12in., in accordance with the ease or difficulty in draining. In some instances it is advocated to run hot-water pipes through or under vine borders; but this you will scarcely ever find necessary. In planning your vinery it is advisable, if you can, to have part, at least, of your border above the ground level. Next to the vinery, the house most frequently required is the forcing-house proper, and, in this house the beds are raised to the necessary temperature by hot-water pipes placed underneath them. The path in horticultural buildings may be composed of stone, slate, bricks, tiles, concrete, or wood. The most favourite solid path is a tile one. Builders' ordinary 6in. or 9in. red and buff Staffordshire tiles, carefully laid diagonally, in cement, upon a good bed of concrete, form, at reasonable cost, a neat, durable, easily cleaned, agreeable-looking path. If such a path does not come against a dwarf wall, an edging, such as a stone curb or edging tiles, of which there are several standard patterns, may be used. Failing this path, or in positions such as on any inside vine border, where a permanent path cannot be laid, a very suitable strong lattice-wood path may be easily constructed of battens, say 4in. by 1½in., laid transversely on quartering, with ½in. spaces between, and a neat nosing on each edge; 2ft. 9in. is a very good width to allow for a path in a growing-house; 3ft. is, perhaps, better if you can afford to have it. If you are very much cramped for room, 2ft. 6in. only may be occupied by the path. You must be guided, however, by whether you have staging or any similar obstruction on each side, or an open path such as in a vinery.

(To be continued.)

FULHAM UNION INFIRMARY COMPETITION.

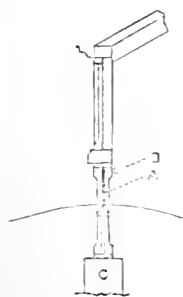
THE Fulham Board of Guardians met last Tuesday, and after some discussion of the report of the professional adviser, have awarded the first premium of 100 guineas to the authors of "Experience" in circle (Messrs. Giles and Gough), and the second premium of 50 guineas to the authors of "Simplicity" (Messrs. Young and Hall), in accordance with the recommendations of Mr. Currey. The discussion of the merits of these designs turned mainly, we understand, on the questions of cost and accommodation, and at the last meeting

departments by colour on the plan. With regard to plan, the competitors appear to have generally adopted the pavilion principle of distribution, and several of the authors have adopted four pavilions, two for each sex, and the administration block between, the pavilion being connected only by a corridor. The general arrangement shows the administration block facing Margravine-road with blocks on each side, and receiving wards; a few face the Fulham-road. The pavilions have in some cases been made to contain three wards each, and we hope the committee will insist on a good aspect to insure the direct action of the sun's rays. With regard to accommodation, the infirmary had to be designed for 360 patients, exclusive of separation wards for lock and infectious cases, the females being slightly in excess. The entire space allowed to each patient was for day and night wards 850 cubic feet, or not less than 72ft. of superficial floor-space, and 6ft. of wall to each bed. Each ward was limited to 32 beds, and to have windows on each side. We believe the guardians have strictly followed these conditions, and will select a plan capable of future extension, and of being rendered fireproof, and we trust that mere ornament will be discarded. As the designs, in all numbering about 30 sets, have not been made public, we can only now furnish our readers with the general characteristics of the two premiated plans. The site, which is a parallelogramic shaped piece of ground, at one end abutting towards the Fulham-road and fronting Margravine-road, adjoins the union workhouse, and measures 665ft. long in frontage, with a depth of 179ft. This proportion almost necessarily bound the competitors to a certain distribution of the plan, and we find most of them have adopted an arrangement in which the blocks are placed at right angles to the front.

The authors of "Experience" in circle, Messrs. Giles and Gough, have, we understand, a centre administration block with pavilions, two on either side, the separation wards for infectious cases being placed at the extreme ends, allowing room for future additions. The wards are 96ft. long by 24ft. in width, and have windows on each side. There is a wide space between the pavilions. A day-room is attached to each ward on the ground-floor, and on the upper ward floors is attached an isolation ward for special cases, besides a ward-kitchen, w.c.'s, and baths. The authors' estimate is £39,750, which includes ventilating apparatus, gas, and fittings. The external treatment is plain, and the elevations are designed to harmonise with the workhouse building, which is red brick, relieved by stone quoins and window dressings of a massive character.

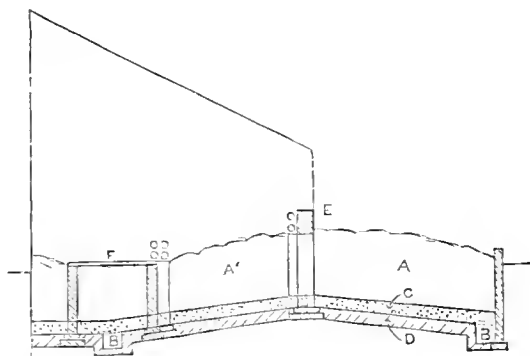
The second design, "Simplicity," by Messrs. Young and Hall, of Southampton-street, is planned on the same principle. In the centre, the author places the administration block, with the residence of the officers in front, and on the right and left runs a corridor 8ft. wide, which gives access to pavilions of wards. The main entrance in this design is at the angle of the Fulham and Margravine-roads. The corridor connects the ends of the pavilions on the north side. The wards are 24ft. wide, the beds are placed in pairs between the windows, a space of 6ft. of wall is allowed to each patient—exclusive of doors, or a superficial area of 72ft., and a cubic space of 936ft. There are 28 male patients provided for in each ward, and 30 for the female wards. At the ends of each ward adjoining the corridor end is a spacious staircase and lift in the well-hole on the right-hand side of entrance, and a ward scullery on the other side, while on the opposite side of corridor is a projection for a day-room on the ground-floor, and an isolation ward to each of the upper floors. The corridor is closed, though the authors recommend in their report an open one. At the outer and extreme end of each ward are single w.c.'s, well isolated bath-rooms, and lavatories are also shown in good positions. The author places his receiving-wards at the connection of corridor near entrance, one to each sex, and the infectious cases are provided for at the extreme ends of the blocks. In the centre of the south block is the dispensary, and the arrangement of the administrative blocks, the kitchen, laundry, and offices are pretty complete. The external design is substantial, plain white stocks, with red brick arches, &c., being the main relief to the principal decorations. The authors' estimate is £40,923.

FIG. 22.



wall of vinery, having inside and outside border. A represents the slate slab, B iron pillar at each mullion, and C brick or concrete base. The drainage of your border must also be efficient. If the natural soil is too retentive, and there is no other way of accomplishing the purpose, you must prepare the bottom of your border in something else, as shown on Fig. 23, where A is outside border, A' inside border, BB drains, C rubble, D concrete bottom, E front wall on arches, and F the paths supported by piers at intervals. First put down a layer of concrete, then a layer of rubble with, perhaps, some small transverse drainpipes, then turf to prevent the compost filling up interstices of the rubble, then the soil of the border itself. In most cases a rubble bottom will be sufficient for drainage, and at the same time will form a barrier for the roots, in which case the concrete layer will not be

FIG. 23.



it was resolved, that the authors of these designs should meet and confer with the guardians upon them on the following Thursday. By the conditions of the competition, the Guardians did not bind themselves to carry out any or either of the designs, and it is probable they may find modifications necessary to meet their views. With regard to cost, the conditions state that the author placed first will not be entitled to carry out the work without a guarantee from a substantial contractor that he will carry out the same at a price not exceeding the architect's estimate by more than 10 per cent. The drawings are made to a small scale, 1-16 of an inch to the foot, and many competitors have sent a plan of one ward to an eighth-inch scale. No perspectives were to be sent, and the drawings, we understand, are in line only without colour. A few authors have distinguished the

BUILDING STONES OF SCOTLAND.

AT the meeting of the Edinburgh Architectural Association, on the 16th November, 1881, the president Mr. McLachlan occupied the chair, and in a few words introduced the lecturer, Mr. Gowans, who then proceeded to read his paper on the "Building stones of Scotland." No inquiry can be more interesting or of greater importance to the architect and builder than that respecting the nature of the material which they have to use in the buildings they may be entrusted to design and erect. From the Solway on the south to the Pentland Firth on the north this country is full of a variety of rocks suitable for building purposes, and this is shown by the massive, elegant, and enduring structures of past ages, edifices of so much value both historically and architecturally. When the appliances for quarrying were of the most primitive kind, and the means of conveyance to any distance a work of great difficulty, the architect was forced to adopt a style of building suited to the material nearest at hand; but now with railways interspersing the country he is not tied down to any particular stone or material, but may adopt that which he finds best suited for his purpose. What the architect has to look for is a stone that will be *durable, strong*, and of a colour which will best bring out the architectural features of his design. With the view of noticing stones that have been used in some of the oldest structures before referred to, as well as those of more modern date, I have had cubes of sandstones and granites prepared, so as to bring before the Association in a practical way some information respecting those stones most useful for building; and, to do so, I would begin by noticing the building stone that has been used in our own city. In the older buildings, such as Heriot's Hospital, Holyrood, and the residences of the Old Town erected centuries ago, the supply was drawn from quarries in the immediate vicinity, an example of which is shown in specimen No. 1, taken from the old red sandstone found on the southern side of the town, which has been tested by time, and proved to be of the most durable kind. In the New Town, when quarrying appliances were better understood, other quarries were brought into use, such as Craigleith, Ravelston, and Redhall. These were chiefly used before the canal and railways afforded the means of bringing stone from greater distances. Then Binnie and Humble by the canal, and later on by railway such quarries as Denmore, Polmaise, and Plean in Stirlingshire, Dalmeny in Linlithgowshire, Fairloans, near Hawick, and the quarries of Lanarkshire, such as Overwood, Giffnock, Auchinclee, and Dalzell, specimens of which are now before you. The respective qualities of the stones I have referred to I will now notice; and taking together Craigleith, and Redhall, as occupying the same position geologically, (being of the lower sandstones of the carboniferous strata, or perhaps better known as the carboniferous limestone groups) their analysis may be taken as an index of what goes to constitute stone of the most enduring kind, viz.:—

Silica	98.3
Carbonate of lime	1.1
Iron and alumina	0.6
	100.

To specify examples of these in the city, as affording proof of their durability, I would notice—1. Craigleith, as shown in the Old University, and many of our finest squares and streets in the northern portion of the New Town, while a notable example, not only of the stone but of what I consider the best masonry in the city, is the tenement at the northern corner of Randolph Clif. 2. Redhall, St. Paul's in York Place, and St. John's, in Princess-street, as public buildings, are good specimens of this stone as to durability and quality, the carving on them being as sharp now as the day it was chiselled. 3. Humble and Binnie quarries belong also to the carboniferous limestone group amongst the shales. The Humble stone was greatly used some thirty-five years ago, and specimens of it are to be found all over the city, but it was abandoned through being unable to compete with other quarries. 4. Binnie may be set down as a stone of the first class. The first prominent specimen of it was the New Club in Princess-street, built about forty-five years ago, and adjoining it the palatial building of the Lin. Association of Scotland. The following public buildings were also taken from it, viz.:—

Scott's Monument, National Gallery, the Bank of Scotland, British Linen Company's Bank, Commercial Bank, Donaldson's Hospital, and the Post Office. Owing to this quarry being situated among the shale beds, the best fakes are saturated with bitumen, and this is so abundant that I collected a quantity and sent it to the Exhibition of 1851 in the shape of black candles, which the jurists simply noticed in a very short paragraph. Stones that have been extensively used since the advent of railways are those of Dunmore, Polmaise, and Plean. These all belong to the upper part of the carboniferous limestone group, the two former, however, lying above the Plean sandstone. These stones have been greatly used, not only in this city, but in Glasgow, and from Stirling northwards. They are pure sandstones, having a large proportion of silica in their composition. Buildings from Dunmore are New Post Office, Bank of Scotland, Merchants House, and Union Bank extension, Glasgow. These stones are preferred for their pleasing colour and durability, while the cheapness of dressing them overcomes the expense of bringing them from such a distance. The Dalmeny stone is of more recent introduction, but perhaps one of the best tests of its durability is that of Dalmeny Chapel, which was no doubt built out of the same strata, so long ago that little or nothing is known of its history except what can be obtained from its architectural character. Another stone in the immediate neighbourhood, is that of the Hailes, which has been worked for 200 years at least. This stone, owing to its laminated structure, is used greatly for foundations of buildings, piers, steps, &c. A stone which was used in the renovation of St. Giles's Cathedral about fifty years ago, (now being so admirably restored to its original architectural beauty through the munificence of Dr. Chambers and the careful superintendence of Mr. Hay) was taken from a quarry lying to the west of Burntisland, called Callaloe. This quarry was for a long time abandoned, until it was reopened by the late Mr. Bryce for the erection of Fettes College. The stone is durable, but owing, I believe, to the expense of quarrying and difficulty of dressing, it has not continued in use. Another stone in the same district as the above is that of Grange, which has been long in use, particularly in Leith, and a specimen of which is to be seen in Dalkeith West Parish Church, built about forty years since. This stone belongs to the carboniferous series, below the shale, and about twenty fathoms above the Burdiehouse limestone. In mentioning Burdiehouse I am reminded of the Straiton stone, which lies almost in the same position geologically as the Grange, and Dalloch in Fife. Another stone which has been brought into Edinburgh, and which is of excellent quality, is that of Fairloans, near Hawick. It is capable of a high polish, and greatly used for monumental purposes. It will be observed from the following analysis it is formed nearly of the same chemical ingredients as Craigleith and Redhall; and this refers also to such quarries as lie in the Bannockburn district, such as Dunmore, Polmaise, and Plean:—

Sand	95.64
Oxide of iron	1.62
Carbonate of lime	1.20
Carbonate of magnesia	0.52
Moisture	0.60
Loss in analysis	0.42
	100.0

Going westwards into Lanarkshire, and treating of stone used largely in Glasgow, as well as brought to this city, the Kenmore Quarries may be first mentioned. They belong to the carboniferous limestone, and lie above the Bishopbriggs coal-beds. They were worked to a great extent for many years, but now, I believe, are abandoned. A section of this rock may be seen at the upper end of the Queen-street Tunnel, Glasgow. Of the best stones, among many others in this county, are Giffnock and Overwood, both near Glasgow; also Auchinclee and Dalzell, and the Wishaw Quarries, all of which are among the upper beds of the coal measures. Among the buildings erected from Giffnock Quarry, in Glasgow, are the Academy, Herald Office; from Overwood, new Municipal Buildings, Greenock; City of Glasgow Bank, and new Stock Exchange, Charing Cross Hotel, and Clydesdale Bank, Glasgow. Another stone of reddish colour, which lies immediately over the coal measures in the bottom of the new red sandstone, near to

Hamilton, is of good quality, and is used extensively in that and the surrounding districts. This stone is exposed in a quarry which may be seen from the Caledonian Railway Glasgow line. Before leaving this county, Bellside Quarry may be noticed. It lies in the true coal formation. Going south and west we pass through stone strata, both yellow and red in colour. Of the latter, the Ballochmyle stone, of which the magnificent viaduct on the South-Western Railway is built, is a fair specimen. Further on, we get into the old red sandstones of Dumfriesshire, of which specimens are submitted. To the east there are the yellow sandstones of Langholm Hill, as well as the red sandstones found in the Hoddam district, all of which are good building stones.

Coming back to the north of the Tay, the old red sandstone is found to overlie the country from Lochlomond along the face of the Gramscians to Montrose, where stones for building purposes are to be found. The most important workings of this strata are those of the quarries which supply Dundee. Mylnefield Quarry may be noted for a stone not only durable but capable of resisting an enormous pressure without fracture—so much so that in the erection of the Ballochmyle bridge, before referred to, that stone was carried across the country at great expense to form the ringhead of the centre arch, which has a span of 180ft., and a height from the bed of the river to the keystone of the same dimensions. In mentioning this quarry, one is surprised that in restoring the Tay Bridge such stone as this is not used, instead of a combination of artificial material such as brick and iron. The crushing strength of this stone is given at 425 tons per square foot.

In speaking of Forfarshire, I cannot fail to notice the quarries which supply pavement, not only to this country but to all parts of the world; and as one of the industries of that county, and as showing the development of that trade, the Carmyllie Quarries, near Arbroath, fifty years ago, were worked by the aid of a single-power crane and a windmill for pumping the water from the bottom of the working, the few stones got in that way being carted a distance of about seven miles across the moors to Arbroath for shipment. About twenty-five years ago, in connection with the late Earl of Dalhousie and a friend, I made a railway from the main line to the quarry, which has had the effect of developing the trade to such an extent that, instead of the windmill and the old crane, there are now ten planing machines, besides stone-cutting machines, moulding machines, &c., worked by seven steam engines, showing the extensive use that is made of that stone not only for paving, but for steps, piers, &c. Specimens are now laid before you. The crushing strength is given at 500 tons per square foot. In speaking of the old red sandstone as useful for paving, the Caithness stone must not be overlooked, and for wear and tear it takes precedence of all others. As another branch of industry the development of this trade is quite as important as that of the Forfarshire stone before referred to. As an example of the value of this stone when subjected to continued wear and tear, the pavement in front of the New Club may be quoted, which was laid down forty-five years ago. Another example showing the same quality of durability, and also the size of stone that can be produced, is that in front of the Register Office, which was laid when the screen wall of that building was set back some thirty years since. The crushing test of this stone is given at 420 tons per square foot. In referring to sandstones, the length of this paper precludes me from giving in detail a description of the numerous quarries and the immense quantities of good stone that lie along the eastern edge of the Moray Firth, of which Elgin Cathedral is a most notable specimen. Besides the care which the architect and builder should take to make themselves acquainted with the nature of the substance of which the stone they are to use is composed as to its durability, it is of importance, where great weight has to be carried, that its power of resistance to pressure should be known, as well as its tensile strength. The difficulty, however, is to ascertain from the compression of small cubes the relative strength of what the same material would be if enlarged in size. This was very forcibly brought under my notice by taking part with the late Mr. Buchanan, C.E., in testing stone and brick for the chimney of the Edinburgh Gas Company at the North Back of the Canongate,

erected in 1845. These tests were made in the most careful way, by crushing cubes of 1-inch square of stone from the following quarries:—

RESULTS OF TESTS.

Crushed at	
Craigleith	315 tons per sq. foot.
Humbie	240 "
Hailes	225 "
Redhall	215 "
Binnie	182 "

A second test of Craigleith showed that before being crushed to powder it sustained a pressure of 440 tons per square foot. The appearance after fracture of the different cubes was that of a pyramid or wedge, and this led me to assert that if the cubes were enlarged a greater increase of strength would be gained; and further that if the pressure was vertical to the line of cleavage a greater resistance would be got, so that such a stone as Hailes, which is a laminated stone, would increase in strength according to its surface, more in proportion than that of a liver rock stone, such as Craigleith, Redhall, or the other stones that were tested. This led to discussion and further trial, the result being that with a 4in. cube from Hailes quarry the resistance was equal to 567 tons per square foot. It may be worth while to give the results of the experiments we made in testing the brick. A great many different kinds of bricks of different composition were tried, the result being as follows:—

No.	Description of Specimen.	Dimensions.			Weight.	Crushing Weight on each brick.	Crushing Weight per sq. foot.
		Length.	Breadth.	Thickness.			
0	Common fire-brick.	9	4½	2½	7½	89½	311
1	Extra size and quality from Mr. Livingston, brick work, fireclay, and ironstone.	10	5	3	10½	153	440
2	Do. do.	9½	4½	2½	9 5-16	140	448
3	Do. do.	9½	4½	2½	9 5-16	89½	287
4	General Quality	9½	4½	2½	9	63½	204
5	Do. do.	9½	4½	2½	9	140	444
6	Same quality as specimens sent to Glasgow	9½	4½	2½	7 4-16	51	150
7	Common stock brick taken at random from a building	9½	4½	2½	8	51	150
8	Do. do.	9½	4½	2½	8	25	78
9	Common general quality bedded with milled board.	9½	4½	2½	2	51	168
10	Do. bedded with clay	9½	4½	2½	9	140	448
11	Do. do.	9½	4½	2½	9	153	489
12	Stone from Hailes Quarry	4	4	4	5 11-16	63	567

As to tensile strength, this is also important to the architect where corbelling, steps, piers, &c., have to be used, as well as in stones which have to be placed over voids, where both crushing and tensile strain are combined. The following were the results, after careful and repeated experiments:—

Breaking weight.	
Craigleith stone	453 tons.
Hailes stone	336 "
Redhall stone	326 "
Humbie stone	283 "
Binnie stone	279 "

Although I did not test Arbroath and Caithness pavement, the following may be taken as safe:—

Arbroath	567 tons per square foot.
Caithness	417 "

As to the resistance to pressure and tensile strain, the architect and builder should, after satisfying themselves as far as tests can, keep in view that the stability of the structure depends a great deal upon the proper constructive use of the material. Unless stones are fairly bedded, there will be weakness and fracture, and unless the style of masonry adopted admits of every stone taking its equal share of the superincumbent weight put upon it there will be failure. This leads me to notice what I have observed with regret in the architect or engineer mixing the character of the masonry in such a way that one stone has more to bear than another. I have seen viaducts, for instance, built with rubble masonry of all sizes in the piers, while the corner-stones were made of increased dimensions, the result being that when the strain came, these corner-stones were frac-

tured by the load pressing unequally upon them. But this leads me away from my text, so I hesitate to go further.

Another consideration for the architect is using stone which absorbs a great quantity of moisture. I have found, for instance, extensive buildings erected in a wet country with a stone which absorbed moisture to such an extent that the dampness which penetrated the walls not only rendered the house unequal in temperature, but led to the decay of the timber which passed into the walls; and caused what was called "dry rot," but what was really nothing else but wet rot, or timber taking consumption from lying in a damp bed. Vitruvius, the Roman architect, 2,000 years ago, says some very wise things both as to stone and timber. He recommends as to stone that it should be quarried in summer, and seasoned, by being allowed to lie two years before being used, so as to allow the natural sap to evaporate and test the stone as to its wasting; and for timber, he says, it should not be cut down in the spring but in the autumn, when nature is dormant. But this, again, I feel is leading away from my subject, so I come back to treat on Granite. Following up the northern district, I may take, first, what has been done by the well known firm of Messrs. Macdonald, Field & Co., from their extensive quarries all over Aberdeenshire. Fifty years ago the uses of this enduring material were confined chiefly to local purposes, although long before then a considerable export trade was done in street pavement, as well as more important works, such as lighthouses, docks (Portsmouth), bridges (Waterloo and London). The development of its various uses, both red and grey, was brought about principally by the energy and enterprise of this firm, while by the introduction of machinery that obdurate but enduring material can now be dressed with the greatest accuracy and finish at a cost greatly less than could be done when operated on by hand. Other gentlemen who have developed this trade were the late Mr. Gibb, and latterly and at present Mr. John Fyffe, whose quarries of Kemnay and Cove, near Aberdeen, are the largest in the country for the production of stone used for curb and paving, as well as for the larger blocks required for such works as the Thames Embankment, part of which he supplied. There is so much to interest and instruct in a visit to the works of Messrs. Macdonald and the quarries of Mr. Fyffe, that members of the Association could not spend a more useful holiday than in going to see the various applications of machinery in dressing and polishing such a stubborn stone, where columns and such like are turned with as much apparent ease as that of the wooden baluster of a staircase. Specimens of granites from the quarries of Messrs Macdonald, Field & Co.; Mr. Fyffe, and Messrs. Shearer, Field & Co., are on the table, as well as a stone showing a very singular junction of colour, one half being of a beautiful red, the other grey; and this, I understand, divides the hill in a straight line from top to bottom. Returning to the south, I have to mention the extensive quarries and dressing machinery of Messrs. Shearer, Field & Co., and Messrs. Newall & Co., at Dalbeattie. The Dalbeattie granite is obtained from deposits on both sides of the river Urr, near the town of Dalbeattie, in Kirkcudbrightshire. In colour it is a bright, clear grey. It is a hard, close-grained granite. The close aggregation of its different minerals is a very important feature in it, and makes it well adapted for engineering and building purposes. It is also very suitable for ornamental purposes, as it is uniform in the grain, takes a fine polish, and is agreeable in colour. This granite was brought to the front for engineering and paving purposes about twenty years ago by Mr. Hugh Shearer, of Great George Street, Westminster. He had the first contract for the supply of the granite for the Thames Embankment at Westminster, and got it approved and introduced into that great national work. Since then he and his firm have steadily and energetically used it in many other important works, such as docks, bridges, fortifications, lighthouses, and fronts of buildings. The same granite crosses the country much in the route of the Portpatrick Railway, and was used for the principal viaducts on that line on to Creetown, where at Kirkcudbright extensive quarries were opened by the Liverpool Dock Trust, who not only built their dock walls with it, but the dock offices and sheds. It is worth noticing that the engineer

who first opened up these quarries adopted a style of building by using the blocks at random, of all shapes and sizes, the same as was done by the Roman masons, and which, apparently, has the same endurance as to structural stability.

I come now to speak of the value of this material with regard to its strength. While tests have been made to ascertain its resistance to pressure, too much dependence must not be placed on results given in text-books. Granite, like other material of which I have had experience, has a cleavage the same as sandstones have, although this is not the popular opinion, and would be condemned by the orthodox geologist, as it touches on the theory as asserted of granite being an igneous and not an aqueous rock. I mention this not for the purpose of geological dispute, but to reiterate what I have before asserted as to sandstone—viz., that to use granite so as to get the greatest resistance to pressure, the stone should be used so that the force should be at right angles to the cleavage or bed of the materials. That brings me to this, that granite, like sandstone, laid upon its natural bed, will increase in strength in the ratio of its superface. However, I repeat as to crushing that if granite is fairly bedded on an equal and resisting foundation no load can in ordinary circumstances crush it. It may be safe enough in dealing with granite, to take from 684 to 848 tons per square foot as a fair test of its strength. The remarks I have made as to granite apply also to other rocks such as trap, Graywacke, and mica-schist rocks, which are to be found in districts where sandstone may be too expensive to use. The method of using these for building is admirably shown in Hawick, Galashiels, and places where such stone is readily found. If properly treated nothing can be more enduring or more suitable for harmonizing with the landscape of the district in which it may be placed. A popular fallacy is that these rocks draw damp. This is not the case, they condense the atmosphere in the same way glass does, and if this is provided for in the building, there is not the slightest danger of any water penetrating the walls. In acknowledging the honour you have conferred upon me in asking me to bring this paper before you, I feel that the short time I have had for preparation has not allowed me to give the subject the justice it deserves, neither would one lecture be sufficient to exhaust it. I feel very much in the position of a hewer who has merely roughed the stone, and who has not had time to continue the operations, necessary to give that finish to the surface which might develop beauties and results that could never be seen in the rough. The selection for use of a material such as building stone goes much further than ordinary observation. Enduring structures speak not only of the habits of the people, but of the civilisation they have attained. The enduring Pyramids of Egypt, the ancient buildings of Greece and Rome, the Temples of Cambodia (which country has no history except in the elaborate limestone buildings which remain), show that the profession of an architect has to do with what every nation should prize, that is, to all time their architecture should faithfully represent, as far as it can, the people with whom it originated.

The lecture was illustrated by specimens of the various stones referred to.

At the close Mr. Lorimer proposed, and Mr. Whitelaw seconded a vote of thanks which was heartily accorded. Mr. Gowans having replied, the meeting dispersed.

BEDFORD PARK SCHOOL OF ART.

THE new school of art at Bedford Park, Chiswick, of which we give a perspective illustration and description elsewhere, was opened on Saturday evening last. Mr. Jon. T. Carr, the founder of the colony, gave a dinner at the well-appointed club to the members of the committee and a few guests. An adjournment was then made to the new school of art, where a soirée took place in the large galleries, followed by some speaking. The paintings and drawings exhibited included Miss Clara Montalba's picture of the golden "Piazza of St. Mark's, Venice, inundated," and two fine paintings by Mr. G. F. Watts, R.A. Mr. Walter Crane and Mr. T. M. Rooke were represented, the latter lending "King Ahab's Coveting." Messrs. E. Blair Leighton and H. M. Paget sent contributions, and a river scene was shown by Mr.

F. W. Hayes. Several members of the school committee lent examples of their work, including, for example, a seascape and boating incident by Mr. J. Nash, and some of Mr. E. Hargitt's landscapes. Messrs. Bernard C. Collier and T. E. Harrison were among the contributors. Several engravings and paintings were lent by residents and friends, including Messrs. Moncreu Conway, A. Dawson, Maurice B. Adams, E. R. Hughes, and A. Smith. Mr. W. G. Connell lent some engravings by Albert Durer, and Messrs. Bedford Lemere & Co. exhibited a selection of views taken from their series of photographs illustrating the buildings of Bedford Park. At the soirée, a selection of music was prepared under the direction of Mr. C. J. Harcourt, including a four-part song by a male voice choir, in flageolet solo by Mr. Lazarus, and a song by Miss José Sherrington. At the subsequent meeting in the same galleries,

The Right Hon. A. J. Beresford Hope, M.P., who had been asked by Mr. Carr to preside, expressed the great pleasure he felt in being present, and his gratification at becoming personally acquainted with one more of the noble network of institutions which was spreading the knowledge of art throughout the country. He was gratified to find such a school established in the midst of the dwelling-houses at Bedford Park, which had combined artistic elegance with the conditions necessary for health and comfort. They were, he thought, taking part in the inauguration of a school of art, not of the ordinary kind, but one which would probably take a foremost part amongst its brethren. He was sure those who came to it to study, would not regard the time spent within its walls as a mere pastime. Those who entered art schools might be divided into three classes: those who went there for technical education—a noble band of self-helpers, to whom he did not purpose just then to speak; those who went there merely for drawing lessons, and to whom also he should prefer to say no more; and a third class, to whom he would now address himself—those who, whether they had taken up the study of art as a profession in the highest sense of the word, those who entered thoroughly into the work, and intended to derive from the instruction all the advantage they could gain. Education in art involved a great deal more than a mere mechanical facility in transferring to paper or putty the form which the student had placed before him. He could emphatically assure them that he was not inviting them to join in what would merely be a source of pleasant and refined amusement, and holiday pastime. This art education was a great instructor of the mind and soul, as well as of the hand in the laws of colour, in measure, in proportion, in the relation of thing to thing in all that formed the judging faculty in man, teaching him to perceive and analyse. Proportion was indeed at the bottom and root of all things, physical, moral, and spiritual, developing the reasoning and judging faculties, teaching men to reason, and preventing them from being led away by first impressions. A very eminent surgeon of the day, who began life in an artist's studio, told him how much benefit he had gained in the practice of his profession by the training of the hand in neatness, and of the perceptive faculties in discrimination which he received in the study of water-colour drawing. So in architecture. Delicate discrimination, which enabled the designer to satisfy the eye with some subtle moulding or curvature, was only to be learnt by the careful and assiduous study of drawing. He would implore the student to remember that success was only to be gained by hard plodding work. Precept upon precept, and in every sense of the word line upon line, must be their motto, for those beautiful works of the great artists which seemed to have been produced with so little pains were probably the quintessence of deepest study. A design in outline was what it was, because the artist had been enabled by continuous study to know with how few touches a desired effect could be produced. Some might say that in adopting, as he had done, such hard assiduous study, he had taken very high ground, and that the majority of the students were not going to be great painters. He supposed that in the room there were in all probability no Michael Angelos, no Rubens, no Turners; but was it not a miserable excuse for a student to offer that he had not done, and could not do, his best because others in the world could probably do better. He besought them not to

be discouraged by any adverse circumstances, even by failure at the first, but to enter for the examinations with good heart, good will, good temper, great determination to succeed, and a dogged principle of assiduous drudgery.

Mr. T. Armstrong, the recently-appointed director of the art department of South Kensington Museum, said, with his very short experience of seven weeks in public life, it would be presumptuous in him to talk of the vast machine governed from South Kensington, but he might indicate the tendency of that central institution. No absolute change would be made, but he believed there would be some fresh developments to suit new requirements. His wish was to encourage and stimulate modelling from the figure, and also drawing from the figure, and also to promote the formation of life classes. The painting of still life may have been a little overdone, in centres where it was possible to obtain living models. The tendency of the department would be, he believed, more and more not to make painters of pictures, but to foster the study of design in connection with the industrial arts and manufactures—an object which he trusted the technical schools now being formed would help to produce. It was an evidence of the great stride that decorative art teaching had of late years made in England that he had received recently at South Kensington two deputations from the French Government of gentlemen and experts who had come to report respectively on the financial and executive systems of our art schools. In Paris, it was now thought that we were getting ahead of them, especially in design for furniture; and, altogether he considered there were good grounds for hoping that we should, before long, take a good position in art matters. The new school in which they were met was very comfortable, (and that was a great matter) and very well appointed with an excellent selection of casts, and, he believed, excellent masters. The dwellers at Bedford Park were much indebted to Mr. Carr, who was the Moses who had brought them out of the desert and wilderness of filth which lay behind them to the east. They had he had seen a very good church, a comfortable club, an aesthetic "pub," excellent stores, and last, but not least, this beautiful school of art.

Mr. George Augustus Sala proposed a vote of thanks to Mr. Beresford Hope for his conduct in the chair and for his encouraging address to students, and coupled with it thanks to Mr. Armstrong for his remarks. As he heard the latter gentleman he was reminded of Haydon, the real master of Landseer, and of his struggles for many years to induce the Government to establish schools of art. Haydon wore out the stairs of Downing-street by his persistency; but at last, in two lines, the Duke of Wellington told him that "there was no chance of the Government giving a halfpenny for the purpose." In an amusing speech, Mr. Sala said this was his first visit to Bedford Park, of whose very existence he had been ignorant. Ladies and gentlemen appeared incredulous; but London was so vast and one's opportunities of research so limited, that who could say there was not a Ghetto, a seraglio, a very Pompeii, to be discovered within its limits? But more than 40 years ago he went to school at Turnham-green, at a Pestalozzian school kept in Bolton House, since reduced to a shell, and he recollected that an ornate design of his was worked out in plaster for an Italian gentleman in Leather-lane, Holborn, and was placed over the doorway of the school, where it remained for many years. It represented Minerva rewarding the young gentlemen of Bolton House School with cornucopie, compasses, and beehives.

The vote of thanks was suitably acknowledged by the Chairman.

TESTING TRAPS.

LAST Saturday a series of experiments to test the merits of the various closet-traps in the market was made at Messrs. J. Pullen and Son, of Penton-place, Kennington-park-road. Messrs. Pullen and Son desired to prove the correctness of the experiments which have been published respecting their trap, and appointed a committee of practical plumbers to finally test the subject. Owing to the number present, and the difficulty experienced by several of the visitors present of examining the action of the traps on a scaffolding erected for the purpose, the results of the

tests were very inconclusive, and many came away rather dissatisfied with what they saw and heard, or rather with what they did not see nor hear. An adjournment of the meeting was made to Monday last, when we had a better opportunity of examining in detail the experiments made.

It will be remembered that some plumbers lately expressed doubts of the accuracy of Mr. P. J. Davies's reports of his experiments, and these tests have been made for the purpose of placing them above suspicion. The tests we saw bear out in the main the results published in our issue of Oct. 21, page 540.

The scaffolding erected in Messrs. Pullen's yard surrounded a 4in. soil-pipe, or funnel as it is called by the trade, about 45ft. high, and into these were short branches for the traps. The distance from the plug in the upper basin to the water-line of trap was only 6½in., and not, as stated, 18in. The experimenters commenced with a trial of the old-fashioned O-trap, a form of trap better adapted for large volumes of water than the "Helmet" trap of Messrs. Pullen, which has a rounded bottom and holds less water. Measuring, we found that the seal or dip was 1½in. The basin, one of Underhay's, made by Bolding, was filled with water, and the momentum of the rush left ½in. seal. The second test was with Pullen's "Helmet trap." The water seal was 1½in. Having been filled with water, and the plug of the basin raised, the water seal was found to be ½in., and this seal could not be reduced. The next test was made upon an ordinary S-trap, one of Beard and Dent's cast-lead S-traps. The water seal was 2½in., and the trap was used without an air-pipe on the outlet. When the plug was raised the water in the basin rushed through the trap and unsealed it, leaving about ½in. space between the dip and water-line of trap. A close inspection further showed that the loss of water by the momentum of the rush from the basin is partly made up by a portion of it which falls back into the trap, but this is not enough to reseal the trap. A 2in. air-pipe was then fixed, and the first basinful released left a ½in. seal, and another trial unsealed it to the extent of 1½in. Another test with a 3in. aperture gave a similar result, the trap becoming unsealed, and the same experiment repeated with a pipe upon the aperture did not improve matters. The "Eclipse" trap was next tried for momentum. There was a dip of 1in., and the basin plug being raised, the first rush unsealed the trap to the extent of ¾in., although air was supplied through the soil-pipe.

After these tests to show the momentum of the water on the various traps, the ordinary O-trap was tested for siphonage. The water was thrown down from the top of the soil-pipe about 20ft. above the trap. With ventilating aperture stopped up, the trap was unsiphoned with the first charge. A second trial with the valve shut, left the trap unsiphoned, but there was more drag, and the seal was reduced to a less amount. With the ventilating aperture on the top of trap open and the valve closed, the charge of water unsealed the trap to the extent of ½in.

The "Helmet" trap, with a seal of 1½in., after two or three tests, retained a water seal of ½in. under all conditions. The "Eclipse," on the other hand, became unsiphoned to the extent of ½in., with the ventilating aperture closed, while with it open, the trap maintained its seal of about ½in.

The experiments, which were conducted with the object of trying severely the seals of the various traps under sudden flushes, showed that the O-trap, whatever the faults of the old form may be, has at least the advantage of preserving its seal under the usual conditions; that as regards momentum of water, its water seal cannot be destroyed, and that it is not so easily siphoned out as other forms of unventilated traps. With regard to clearing action, we prefer the "Helmet" O-trap of Messrs. Pullen; the rounded water-way or bottom is better acted upon by the flush; it retains less water, and the form and construction of the trap give it many of the advantages claimed for the siphon. When large quantities of water are used, therefore, in valve closets and sinks, the O-trap has certain advantages over the S-trap, and it is in reference mainly to these points that the experiments are chiefly conclusive.

THE CABINET TRADE.

ON Wednesday night a largely attended meeting of journeymen engaged in the cabinet trade, including cabinet-makers, chair-makers, carvers, cabinet turners, and shop-fitters, was held at the Loyal United Friends' Hall, Banner-street, St. Luke's, "to take into consideration the present position of cabinet-makers, and the best means of improving the social condition of the operatives engaged in the cabinet trade." The chair was taken by Mr. Negus. Mr. J. Pither moved, "That, seeing the great want of organisation in a large number of shops in the cabinet trade, and the severe competition between many of our employers, this meeting is of opinion that were the men in our trade unionists, our social position would be improved, and the remuneration received for our labours greatly increased." Mr. Cammage seconded the resolution. Mr. H. Ham, in supporting the resolution, said that in 1850 the exports in the cabinet trade amounted to £182,619; in 1860, to £221,619; in 1870, to £231,000; and in 1880, to £480,521. In the face of that how could it be said that trades unionism acted in restraint of trade? In conclusion, he admitted that they were now better off, as they got 9d. an hour instead of 6d. as formerly. Mr. Jolliffe said that in some shops men were paid so badly that they had to work 12 and 13 hours a day to make a week's work. The resolution was unanimously carried. Mr. E. Elger moved, "That owing to the great disadvantages under which we labour, and the many evils existing in the cabinet trade, this meeting pledges itself to use its best endeavours to better their position by strengthening the ranks of unionism, and promoting a thorough union of the workers in the cabinet trade." Mr. W. Clarkson seconded the motion, which was carried. It was resolved to hold a delegate meeting, and the proceedings closed.

THE ACTION OF WATER UPON LEAD PIPES.

DR. W. SEDGWICK SAUNDERS, the medical officer of health for the City of London, has translated from the French of M. Belgrand, a pamphlet on the action of water on lead pipes, and presented it to the City Commissioners of Sewers at their meeting on Tuesday last. Having traced the employment of lead conduit pipes from the time of the construction of the first Roman aqueduct in the year of Rome, 412, the writer says: "Only within the last few years an attempt has been made to alarm the public, by endeavouring to show that the use of lead pipes is dangerous; the water, it is said, is impregnated with a small quantity of lead, which creates a slow, but pernicious action upon the health of the consumer. This year the 'war against lead,' the name given to this crusade, has made great development, and caused considerable uneasiness in the minds of Parisians." After giving particulars of a series of experiments undertaken in conjunction with M. Felix le Blanc, a distinguished chemist and gas examiner, M. Belgrand, continues: "Upon the whole, there is absolutely no danger of poisoning from the use of water flowing through leaden pipes. It would, doubtless, be very difficult to compel, as has been suggested, the Parisian householders to replace the 1,500 kilometres of lead branches at present existing in their property, since it is found that the interior of the pipes is perfectly smooth, without a trace of injury, and coated with a thin crust of adherent deposit, which prevents the contact of the lead with the water. I do not think that any other mode of distributing water can be recommended, even to nervous people; the iron pipes so much used in London, owing to their low price, are less suitable for Paris, first, because the necessary pipes and connecting pieces are not to be found in commerce, but especially as accidents from frost, more to be feared in Paris than in London, are more formidable with iron pipes than with lead." Dr. Saunders, in his preface, takes exception to one of the author's suggestions, saying:—"I object to the lining of one metal with another, such as tin upon lead, as proposed by M. Belgrand, for two reasons: first, because when different metals are brought into contact a galvanic action is set up; second,

because block-tin pipes have been known to have been eaten through by water in consequence of the presence of nitrates (De Channont)."

ORNAMENT.

MR. H. H. STATHAM lectured to the members of the Birmingham and Midland Institute on Monday night, in the new lecture theatre, on "Ornament." He said they were living in a time when a great deal of attention was paid to the ornament and decoration of their houses, and it was worth while to consider what they meant by ornament—whether there were any principles of better or worse, right or wrong, in connection with it. He defined ornament as an artistic design, which was added to some other object in order to give fresh interest or beauty to that object. That was an important point, because ornament being an art, which was always relative to the object to which it was applied, its suitability to its position and to the object to which it was applied, was a very important factor in deciding whether they should approve of it or not. The various forms which were made use of in ornament, all fell into two divisions in their application—the first being what he called surface ornament, or ornament which was employed to diversify a surface which would otherwise be bald and uninteresting; and secondly, what he called functional ornament, which was ornament so applied as to emphasise and bring out the various parts of the subject. There were also two other divisions of ornament—viz., abstract ornament, or all forms which did not imitate any object in nature, but were simply ornamental forms; and natural ornament, or that which was founded upon the imitation of natural forms. All ornament, to have a right to rank as such, must show evidence that it was intended for the position which it occupied. He showed that the essential features of abstract ornament were the repetition and alternation of different forms. With reference to natural ornament, he said if they wished to use natural forms they must not copy nature merely, but must use the natural forms in such a way as to bring them into harmony with the artificial position in which they meant to place them, and the material in which they were used. He deprecated the imitation of the human figure for architectural ornamentation, but for grotesque effects he considered that some forms of animals were permissible. He thought it was important for them to seriously consider the question of ornament, and one of his reasons was that a proper understanding of what was in good and bad taste in this matter meant a habit of applying the mind to the fitness and the unfitness of things. In many things the English were stronger than other nations; but as a nation the English were remarkably deficient in the perception of what was vaguely called taste.

LONGLEAT.

GREAT preparations are being made at Longleat, the magnificent seat of the Marquis of Bath, for the approaching visit on the 6th December, of the Prince of Wales. About eight years ago the renovation of some of the principal rooms was commenced. They are now nearly completed; they consist of drawing-room, saloon, upper and lower dining-rooms, billiard-room, library, and ante-library, (the latter will be finished next year). These rooms have all been completely stripped, and restored in a very elaborate manner. The new ceilings are all very rich in design, painting, and gilding, chiefly mythological subjects. The drawing-room walls are hung with old rich brocade silk, surmounted with a fine old painted frieze, about 3ft. deep, and very rich ceiling and cornice. The door architraves are of old Indian marble inlaid with cornelian and other stones, and capped with dove marble. The saloon has a massive marble chimney piece (about 6 tons weight) Italian alabaster architraves to the doors, and the walls hung with rich tapestry and velvet. The upper dining-room walls are covered with old stumped and gilded leather, surmounted with a painted frieze, and richly panelled and painted ceiling and cornice. The door architraves of black marble, doors, shutters, and dado of oak enriched with painted decorations of fruit, &c. The chimney-pieces have exquisitely carved

caryatides, &c., the entablatures being relieved with gilding. The lower dining-room is refitted with the old oak panelling and pictures, and has a richly panelled ceiling, frieze, and cornice. The billiard-room walls are hung with rich brown brocade silk. The door architraves of very richly carved marble. The doors, shutters, soffits, and backs and elbows are of Italian walnut richly inlaid with olive. Ceiling richly panelled, painted and gilded. The new library, (which was formerly the drawing-room) has a very rich ceiling, doors, shutters, &c., same as billiard-room with walnut architraves, &c. Book-cases in walnut inlaid with olive, carved cornice and capitals, &c. The wall spaces between book-cases, doors, windows, &c., are filled in with walnut panelling. The ante-library will be finished next year in a similar manner. Several bed-rooms have also been renovated. One has just been converted into a dressing-room for the Princess of Wales, the walls being hung with richly embroidered satin. A great deal has been done also in restoring the roofs of the mansion, and nearly all new plate glass windows inserted. The inlaid doors, shutters, carved marble architraves, and some of the chimney-pieces have been made in Venice. The decorations have been done by Messrs. Grace and Son, and the whole of the constructive and joiner's work by the estate workmen, under the able direction of Mr. W. Buckenham, who has for many years had the direction of work carried out at Longleat.

CHIPS.

The Metropolitan Board of Works will consider at their meeting to-day (Friday) a recommendation of the works committee, that the sewage reservoirs at the Crossness pumping stations and Barking outfall works be enlarged as proposed by the engineer to the board, Sir Joseph W. Bazalgette, at an estimated cost of £160,000.

An inquiry was held at Devizes on Tuesday week, before Capt. R. C. T. Hildyard, R.E., an inspector of the Local Government Board, into an application for sanction to borrow £700 on account of the waterworks. It transpired that neither the town clerk, the borough surveyor, nor members of the council had any plans or knew anything about them. The estimated cost of the works at the well was £275, whereas £623 was expended, and even then the supply was exhausted by 15 minutes' pumping. The inspector said the supply, 45,000 gallons per day, was absurdly small for a population of 7,000.

The tower of the Congregational church in Oxtou-road, Birkenhead, is about to be completed from designs by Messrs. Brattan and Son, of that town.

The parish-church of Brimscombe, near Stroud, was reopened on Thursday, the 17th inst., after restoration. Messrs. Wilson, Wilcox and Wilson, of Bath, were the architects, and Messrs. Wall and Hook, of Bisley, the contractors; the cost has been about £650.

A new block of village homes is about to be built at Whitley, Northumberland, from designs by Messrs. Dockwray and Thompson, of Newcastle-on-Tyne.

A chapel is about to be added to Whiteland's training college, Cheltenham-terrace, Chelsea, from the designs of Mr. A. J. Pilkington.

The cost of cleansing the streets of the City of London for the year ended at Michaelmas last was £22,154. The expense of paving was: asphalt, £18,647; granite, £10,853; and wood, £7,632.

The foundation-stone of a new Swedenborgian Church was laid at Soodland, near Rochester, last week. Mr. Henry Bridge is the architect and builder.

The local board of Newhaven, at their last meeting, decided to take the water supply of the town at once into their own hands, irrespective of any claims under a local and private Act of Parliament recently procured by Messrs. Lambe and Card.

A loan art and industrial exhibition is proposed to be held in Swansea, on the model of the very successful one which recently took place at Cardiff, through which £1,500 has been handed over to the free library after paying all expenses.

The engineers, contractors, and officials employed in the construction of the Leen Valley branch line of the Great Northern Railway were entertained at dinner at Linley, near Nottingham, last week, by Mr. R. Johnson, chief engineer to the company, in celebration of the completion of the undertaking. Mr. H. Lovatt was the contractor, and Mr. Madeley the brickyard manager. Mr. H. W. Sadler acted as chief local engineer to the company.

CONTENTS.

The Tewkesbury Abbey Church Restoration	681
The Female School of Art	681
London Squares and Open Spaces	682
"A Beam from St. Mark's"	683
Royal Institute of British Architects	685
Lectures on Horticultural Boddings at the Crystal Palace.—II.....	685
Fulham Union Infirmary	687
Building Stones of Scotland	688
Bedford Park School of Art	689
Testing Traps	690
The Cabinet Trade	691
The Action of Water upon Lead Pipes	691
Ornament	691
Longleat	691
Chips	691
Our Lithographic Illustrations	692
Competitions	692
Sir Henry Thompson on Art	705
On the Decoration of Wall-Surfacing	705
Building Intelligence	705
Architectural and Archaeological Societies	706
Archaeological	707
Schools of Art	707
To Correspondents	707
Correspondence	707
Intercommunication	708
Legal Intelligence.....	709
Stained Glass.....	709
Our Office Table	710
Meetings for the Ensuing Week	710
Tenders	711

ILLUSTRATIONS.

ST. AUGUSTINE'S CHURCH, CROYDON.—TWO THATCHED MEDIEVAL BUILDINGS.—DETAILS OF INNER TEMPLE LIBRARY.—CHISWICK SCHOOL OF ART.—"FONTHILL," HENLEY-ON-THAMES.

OUR LITHOGRAPHIC ILLUSTRATIONS.

ST. AUGUSTINE'S CHURCH, CROYDON.

THIS church is to be built in a new district which has grown up on the south side of the town. It will stand well on the slope of a hill by the side of the Brighton-road. It has been designed on the model of some of the old churches of Surrey and Sussex, and like many of them, will depend for its effect more on its grouping and quiet colouring than on any richness of detail. The materials will be flint, with a proportion of Bargate-stone, Box-stone being used for dressings. Internally, the church will be faced with chalk ashlar. Its chief feature is the central tower, and it has been the architect's object to design this so as to be no obstruction internally. It will be carried by columns of hard Portland stone of no very great diameter, great attention being of course paid to the construction of the arches connected with it. The part to be built at once includes the chancel with its aisles and vestries, which are below, the tower, and the two transepts. The contract has been let to Mr. Carruthers, of Reigate, the amount being £5,258. The architect is Mr. J. Oldrid Scott.

TWO THATCHED MEDIEVAL BUILDINGS.

IN connection with the correspondence in our Intercommunication columns during the last few weeks, the drawings which we give to-day will be found of interest, as giving two original examples of thatched roofs to Medieval buildings of architectural importance. The first, from Norfolk, is Edington Church, a building specially inquired about by one writer and referred to by Mr. T. Drew, R.H.A., of Dublin. This picturesque structure has a western tower of much character and usually classified with the round towers of the county. It is, however, octagon above the ringing-floor level, with groining of rough carr-stone like that used at Witlow Church, close by, which building also has a tower of circular plan. The interior is enriched by a wood Decorated-period screen in the chancel of Geometric character, with shafts and caps. The chancel is low and small in design, though large enough, perhaps, for the church; it is, however, by no means well kept, not to say dirty. The hour-glass bracket on the Jacobean pulpit is original and figures on our sheet. The church stands away from the road in some fields on the top of a small eminence, and has a churchyard overgrown with furze and heather which, with the Scotch firs on the west, add to the picturesque, though barely sacred, character of the place. The other example is taken from the West of England, and illustrates the unique little 14th-century dwelling or fish-house, at Meare, in Somerset. This is certainly

well described as "a most interesting architectural curiosity." It originally consisted of two floors, the upper story being reached by an external staircase, as seen in our sketch, the upper apartments being provided with windows of good tracery and moulded arches and jambs. The ground-floor, doubtless, was used for fishing-tackle and stores incidental to the uses of fishermen, and it is said, the men for whom the building was erected, and by whom it was occupied, worked in connection with the Abbey of Glastonbury, for the purposes of supplying fish from the Abbey ponds, situated north of Meare, and adjoining the Brue. The fish-house has an open timbered roof, which is kept in repair by the proprietor, Sir Charles Taylor. The solid oak and carved alms-box, which we give, is from the vestry of Meare Church, where some armour and other curiosities are preserved. The Manor, or Abbot's house at Meare, said to have been built by Adam de Sodbury, in the reign of Edward III., adjoins the church, and is used as a residence for the farmer renting the grounds of the parish. The ancient kitchen and hall are well preserved, and two sides of the quadrangle remain. The western wing contains the hall, and is nearly perfect. The hall occupies the first floor, and is 60ft. long by 22ft. wide. The traceried windows are admirable examples of Decorated work of the best period, and the hooded fireplace is a very good example, as will be seen by our drawing. The fireplace in the kitchen is a good plain one of large size. The kitchen opens directly from the entrance-porch in a curious way. The sketches, which we publish herewith, are by Mr. Maurice B. Adams—some of the particulars of the fireplace being taken at the same time by Mr. W. Talbot Brown.

INNER TEMPLE LIBRARY.

WE gave a view, plans, and some details with a description of the Inner Temple Library in the BUILDING NEWS for Nov. 11th, and to-day we complete our illustrations by publishing a detailed sheet, giving the main portion of the entrance front to a large scale, and including some particulars of the ironwork to the gateway. Mr. R. W. Edis, F.S.A., is the architect from whose designs the work has been executed.

CHISWICK SCHOOL OF ART.

THIS new school of art, which has recently been erected at Bedford Park, Chiswick, from the designs of Mr. Maurice B. Adams, A.R.I.B.A., architect, was opened on Saturday last. The style of the facade is in harmony with the houses and other public buildings on the estate, but a distinctive character has been aimed at as the outcome of the purposes for which the school has been erected. Red brick is exclusively employed, and green slates cover the roofs. The present building is intended as only part of the ultimate whole, and has been arranged on plan with this view. It consists now of four studios, each about 32ft. by 20ft., and divided by an entrance hall and staircase, those on the upper floor communicating by arched openings through a centre small studio or painting-room. An office is placed within the entrance lobby, so as to command the doorways on all sides, and thus a screen is formed between the entrance archway and hall. This screen is in pitch-pine like the staircase, which is painted in clear peacock blue colour, and glazed with a dull varnish. The treads, which are 5ft. wide, are in teak; the school-fittings, donkey-stools, presses, desks, &c., &c., all wrought in pitch-pine, were made by Messrs. Robertson, of Alnwick, who also made the large balanced black-board and lecturer's gallery. The heating throughout, excepting in the directors' room, is by means of hot-water pipes. The lighting and ventilation arrangements were carried out by Mr. T. Elsley, of Great Portland-street, from plans supplied by the architect. The walls inside are tinted in brick-reds and grass greens, the woodwork being coloured in similar tints to harmonise. The shutters to the first-floor windows are for the purpose of concentrating the light, and these are painted in party colours after the Dutch fashion. The basements are by Messrs. Burt and Potts, and open inwards. Mr. E. S. Burchett, of the South Kensington Schools, and Mr. F. Hamilton Jackson, late of the Slade Schools, are the art masters. A north light is secured to all the class-rooms throughout the building.

"FONTHILL," HENLEY-ON-THAMES.

THIS small house has been erected and completed by Messrs. Braid and Co., from the designs of Messrs. J. and J. Belcher, of 5 Adelaide-place, E.C., for the small sum of £1,625. It consists of basement, under part, ground-floor, and offices as shown on sketch plans, and six bedrooms on first floor with bath-room, w.c.'s, and housemaid's closet and sink, &c., and two good rooms in roof. The drawing represents entrance-front from the roadway, the principal facade overlooking, from the side of a hill, the Thames and valley.

COMPETITIONS.

BIRKENHEAD.—It has been decided to extend the time named for sending in the competitive sketch designs for the New Town Hall competition from the 31st December next to the 22nd January, 1882, at twelve o'clock at noon.

HINDLEY.—A special meeting of the Hindley Local Board was held on Wednesday, the 26th ult. It was resolved that the sewerage system which should be adopted by the board should be that of filtration, with precipitation if necessary, and that the deciding of any scheme should not bind the board to carry out that particular scheme. The sewerage schemes which had been invited to be sent in, and which numbered 10, were then carefully examined, and it was decided that the premium offered, £60, be awarded to the author of plan No. 7, under the motto "Health," but that the board do not bind themselves to carry out the scheme. The following were the authors: No. 1, "Indicator," by Henry Bancroft, Manchester; No. 2, "Non Nobis Solus," by Winstanley and Ashworth, Manchester; No. 3, "Simplicity," by James Lomax, Bolton; No. 4, "Complete," by Gottle and Beesley, London; No. 5, "Endymion," by J. S. Caldwell, Hindley; No. 6, "Simplicitas et Utilitas," by Newton and Smith, Manchester; No. 7, "Health," by T. and J. H. Nuttall, Bury, Lancashire; No. 8, "Salus Populi," by George Heaton, Wigan; No. 9, "1881," by J. F. Tyler, Parbold; No. 10, "Practical Experience," by Goodison, Atkinson, and Forde, Liverpool. It was decided to send the plan "Health" to the Ince Local Board for inspection. A letter was read from the Ince Local Board asking for more detailed information than was given on the plans, but the clerk said that he sent all the plans they had to Ince. Messrs. T. and J. H. Nuttall, Bury, sent a communication tendering their thanks to the members of the board for awarding them the premium, and asking if the board were inclined to allow the scheme to be placed in their hands, &c. The letter was ordered to be acknowledged.

PHILADELPHIA, U.S.—The committee have awarded the first prize of one thousand dollars, for the proposed "Meade Memorial," to Mr. Alexander Milne Calder, sculptor, of that city. The model is an equestrian statue of the general in uniform. The horse is superbly modelled, and the figure full of graceful repose. Mr. Calder, who is a native of Aberdeen, is at present engaged upon the sculpture of the new public buildings at Philadelphia.

CHIPS.

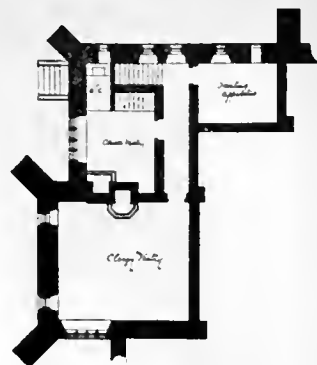
At Tuesday's meeting of the City Commissioners of Sewers, it was resolved to consider a report by Col. Haywood, the engineer to the commission, prepared two months since, as to the cost of constructing the uncompleted moiety of Arthur-street East, from Padding-lane to St. Mary-at-Hill, so as to afford a new approach from London Bridge to Billingsgate. In the course of the discussion, Mr. J. S. Scott, commented on the extraordinary difference of the estimates for this work. Thirteen years ago an estimate was given of £88,000. Mr. Horace Jones, the City architect, proceeding on exactly the same lines, made the cost £526,000, and the City engineer had reported it as £336,000, whereas Mr. Scott said he did not believe it would exceed £200,000.

A new wing, containing schoolrooms and dormitories for 28 boys, has just been added to the Brentford district schools at North Hyde. They are built of malms brickwork, and consist of four schoolrooms on the ground-floor, each about 22ft. by 50ft., and accommodating 72 boys; and on the first and second floors, four dormitories, each 22ft. 9in. by 50ft., bedded for 36 boys. The architect was Mr. E. Monson, jun., of Acton.

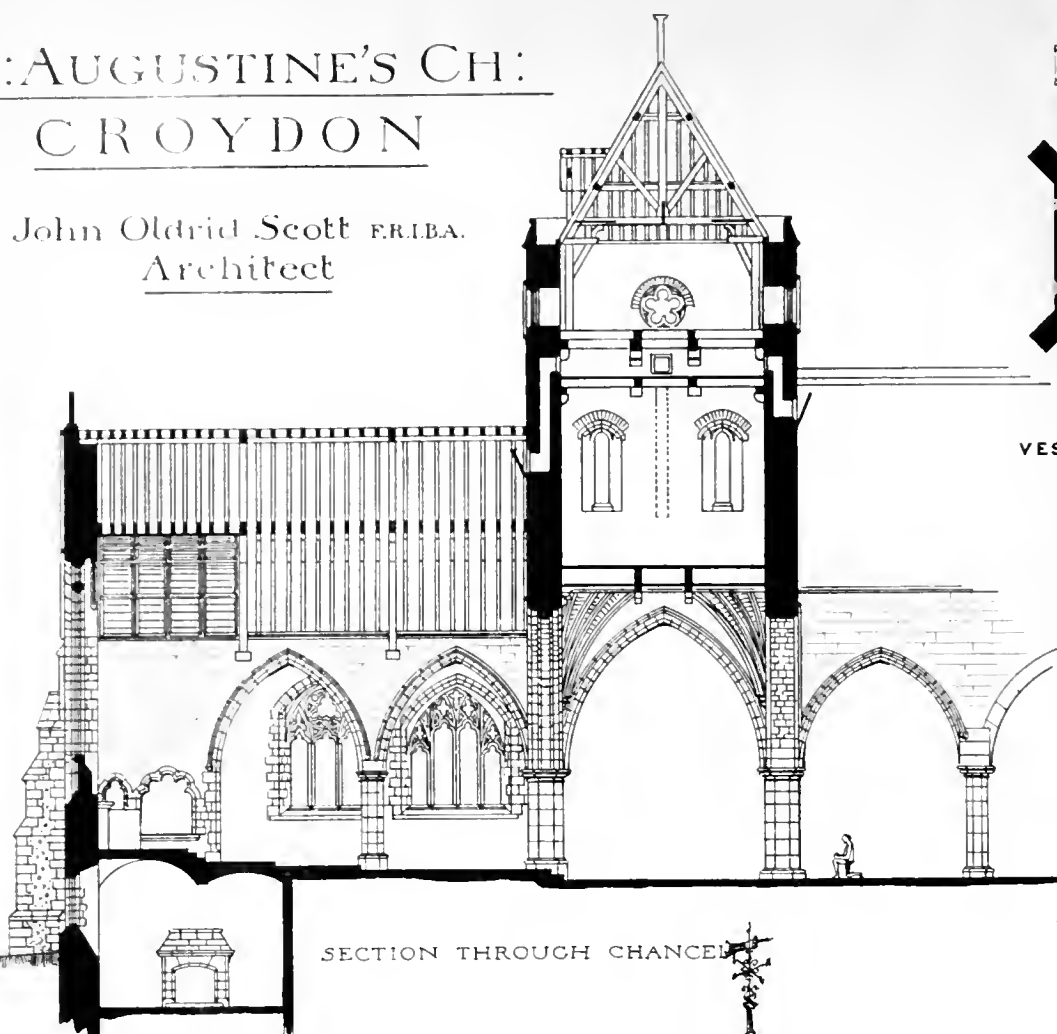


S: AUGUSTINE'S CH: CROYDON

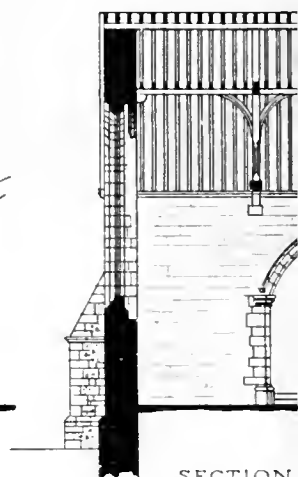
John Oldrid Scott F.R.I.B.A.
Architect



VESTRY PLAN



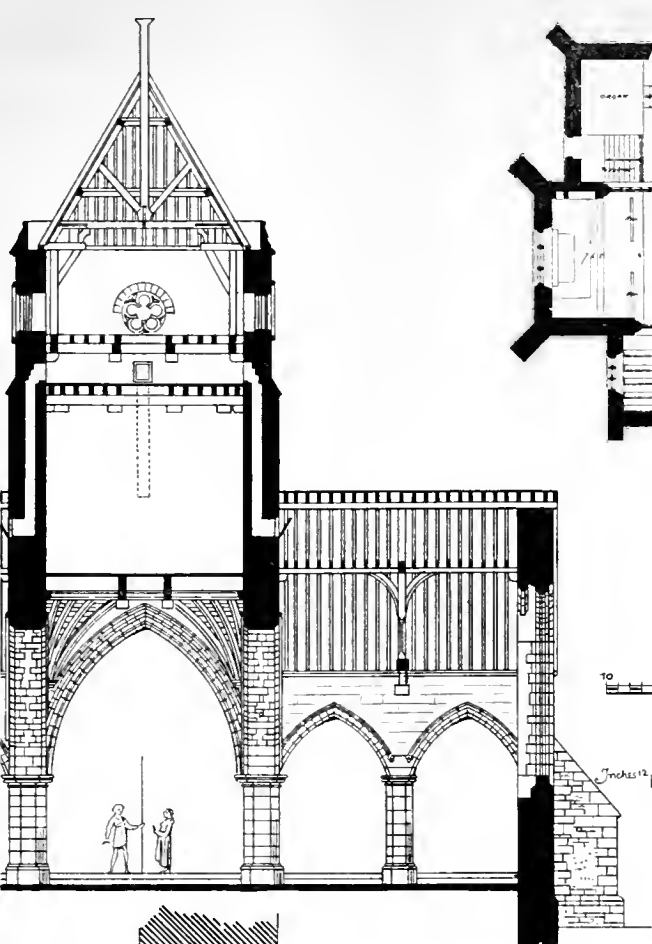
SECTION THROUGH CHANCEL



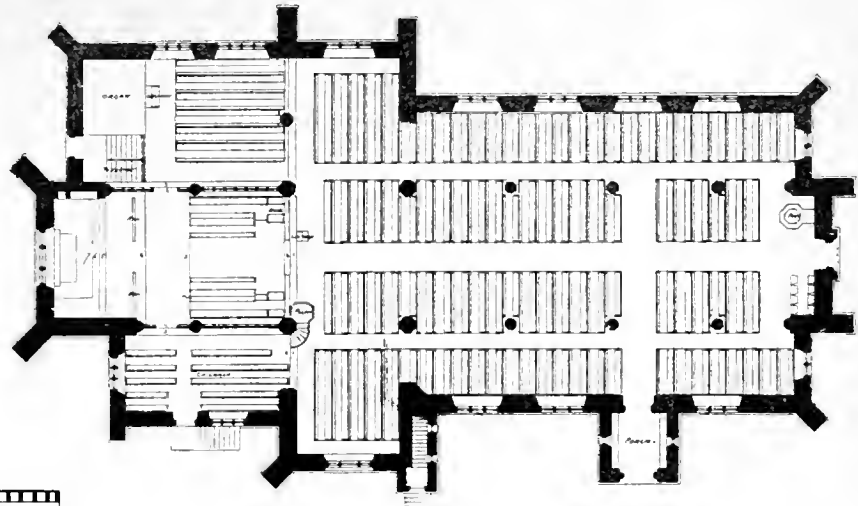
SECTION

MAUPICE B ADAMS dec.



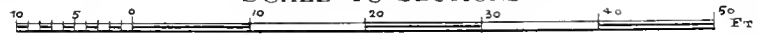


ROUGH
CONCEPTS

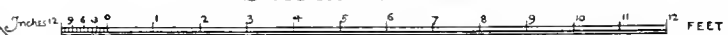


GROUND PLAN

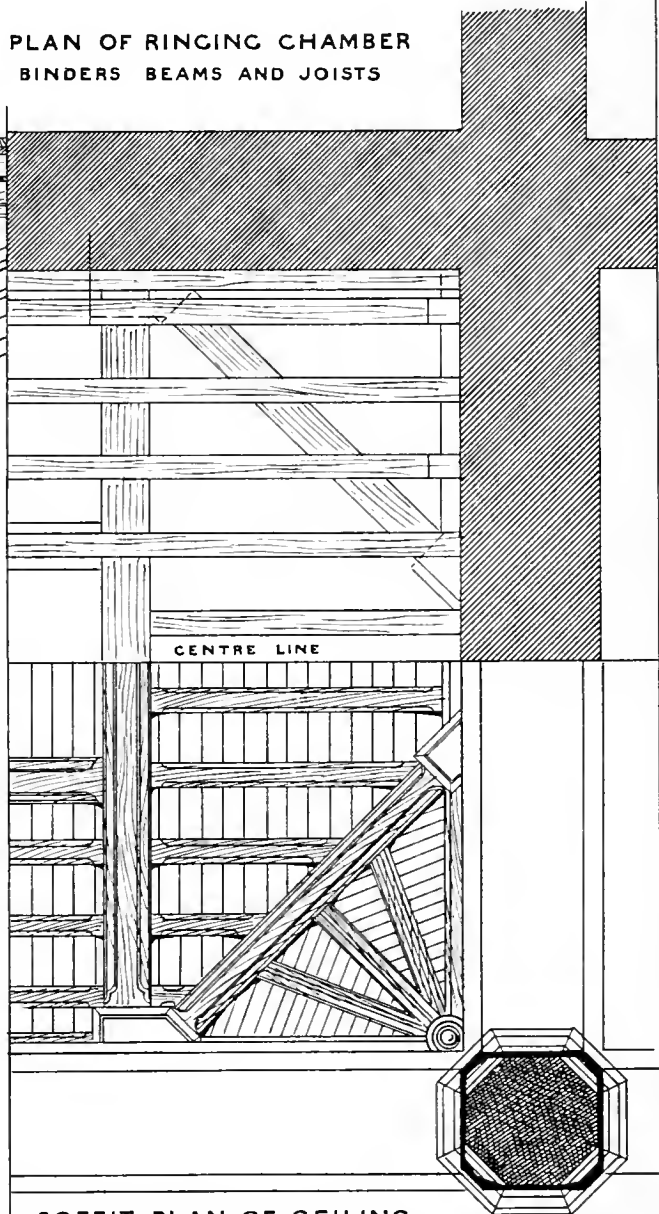
SCALE TO SECTIONS



SCALE TO DETAILS



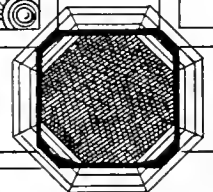
PLAN OF RINGING CHAMBER
BINDERS BEAMS AND JOISTS



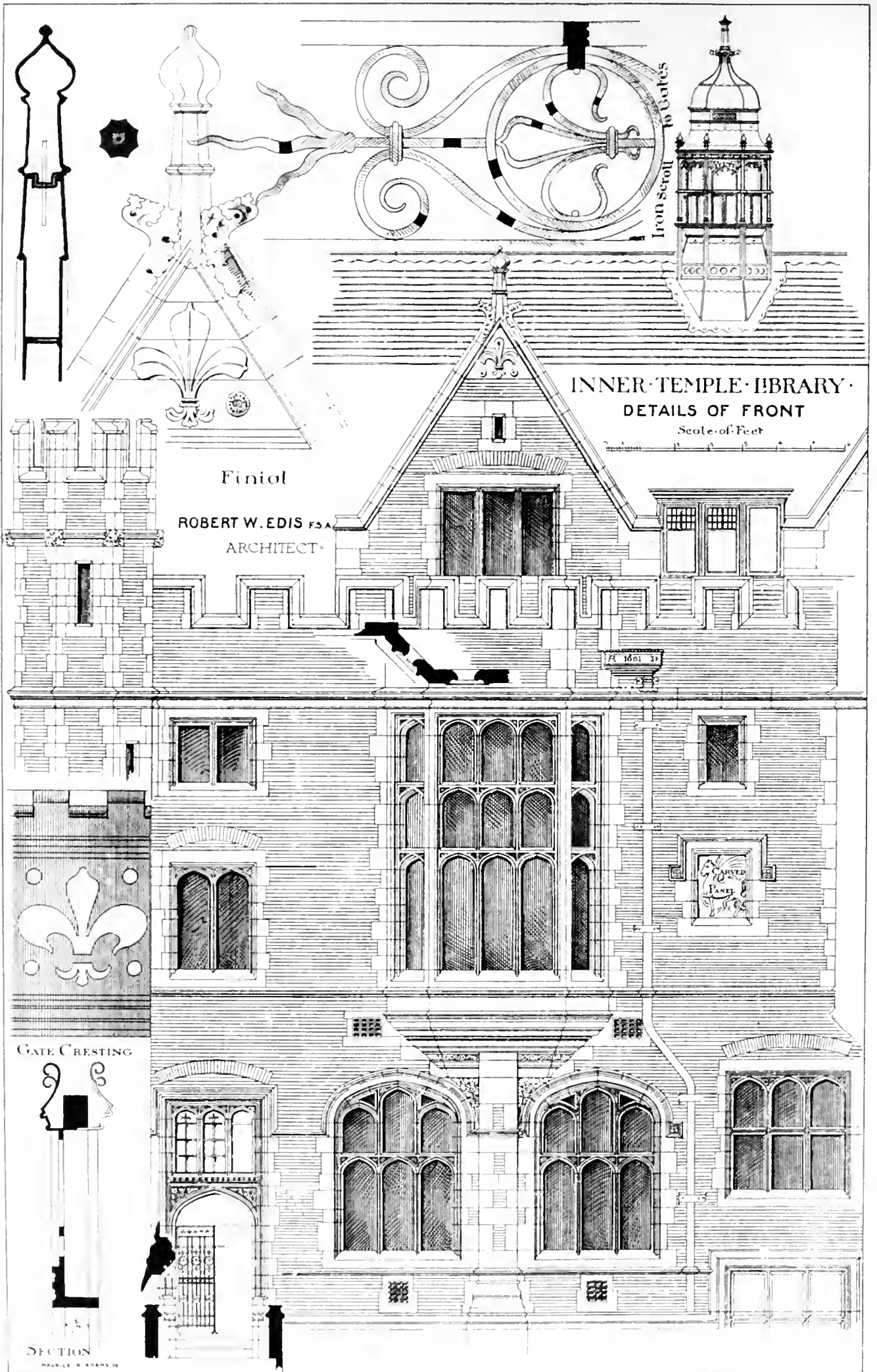
SECTION SHOWING
SPANDRIL IN TOWER

TOWER DETAILS

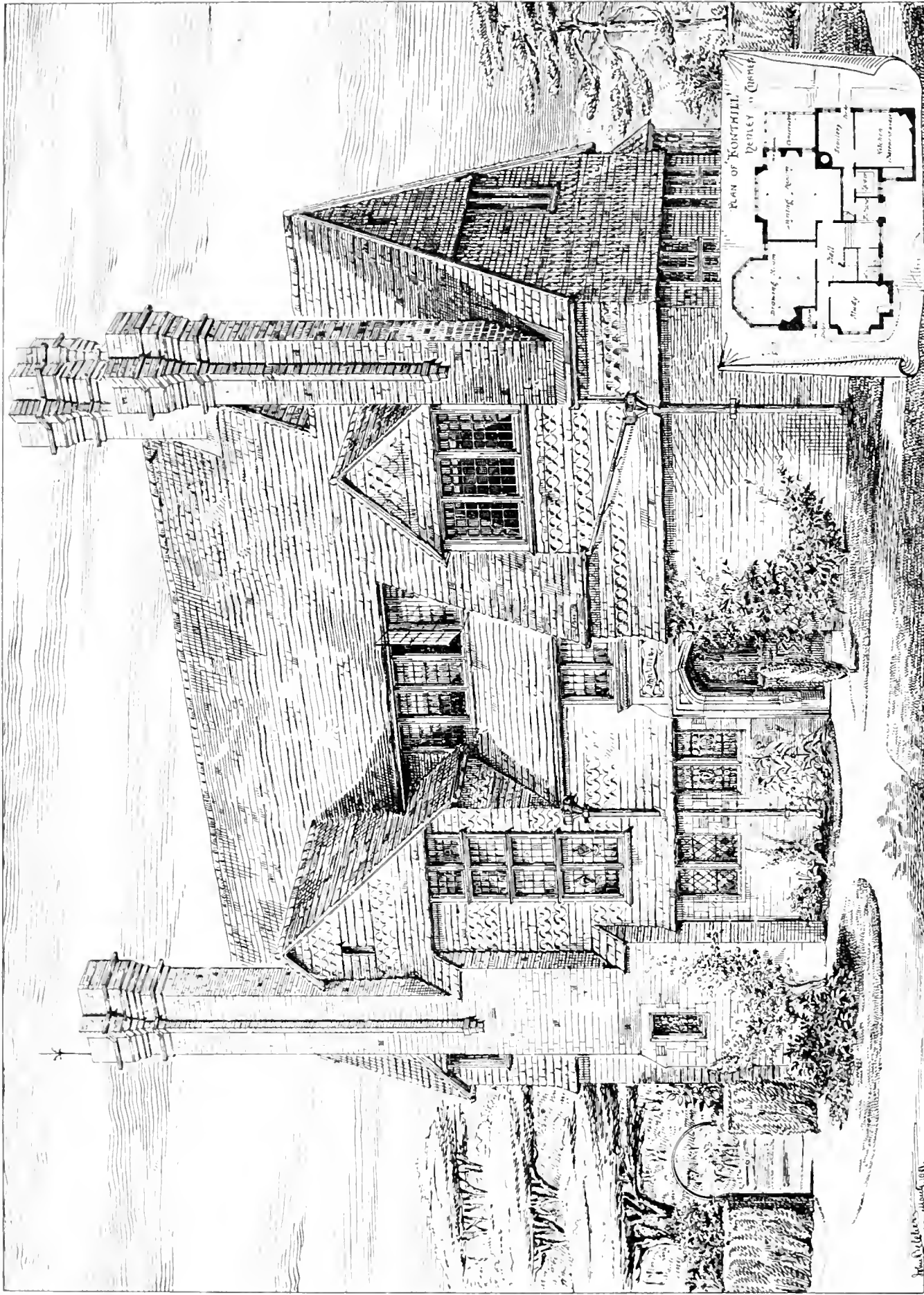
SOFFIT PLAN OF CEILING











"FONTHILL", HENLEY-ON-THAMES. J AND J BELCHER ARCHITECTS.

Photo. Litho. by Messrs. Agnew & Sons, 6, Queen's Square, W.C.

The Building Pews, Nov. 25. 1881.

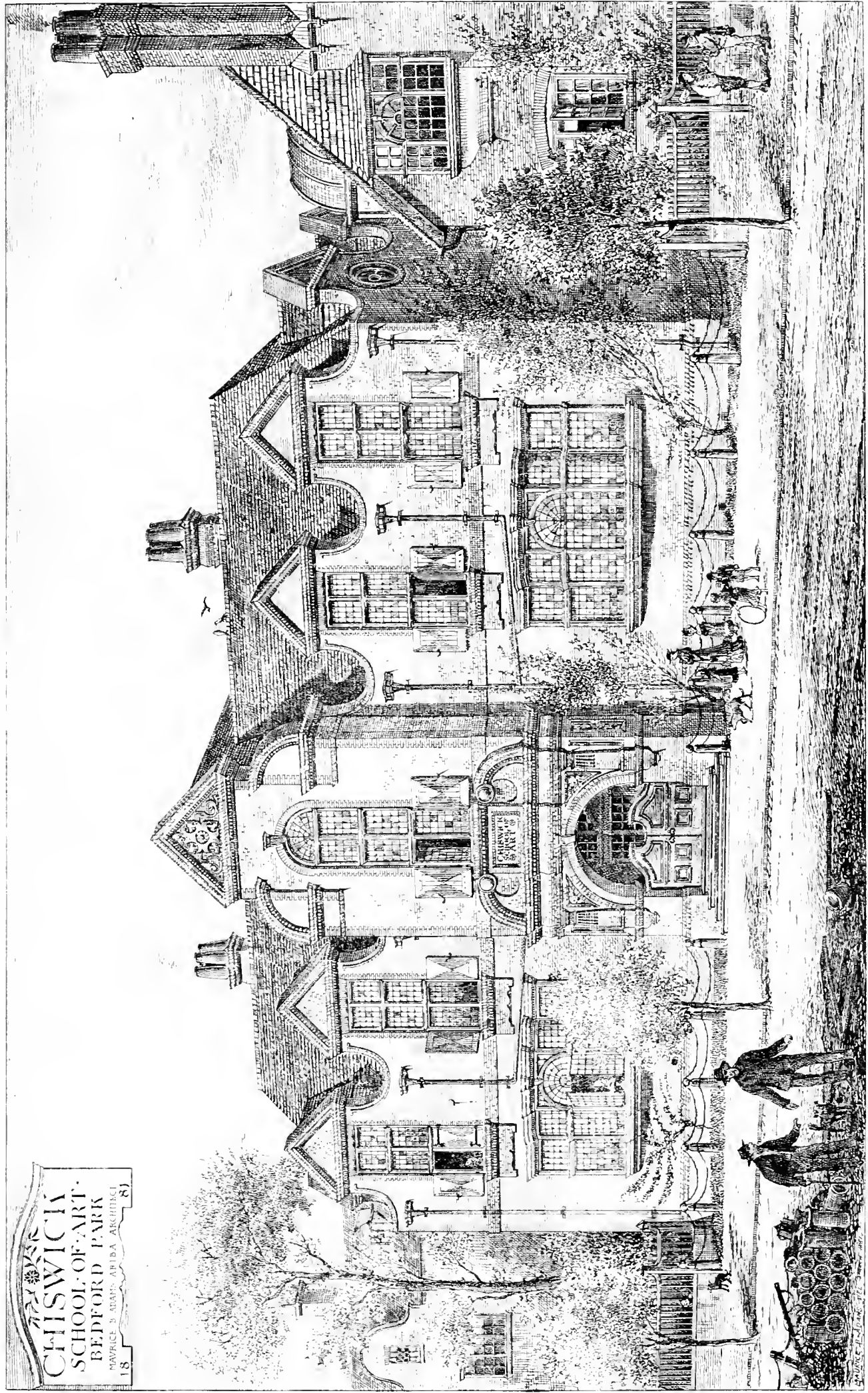
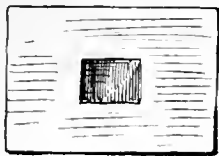


Photo lithographed & Printed by James Akerman, 15, Queen Square, W.C.

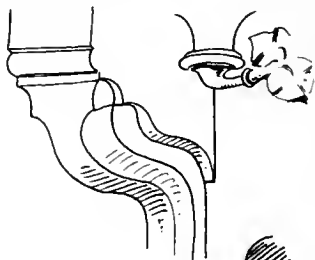
CHISWICK
SCHOOL OF ART
BEDFORD PARK
MAVRICE & STAFF: ARTIDA ARCHITECTS
18

PLAN OF BOX TOP



The Fish House Meare Somerset.

JAMB CORBEL TO HOOD



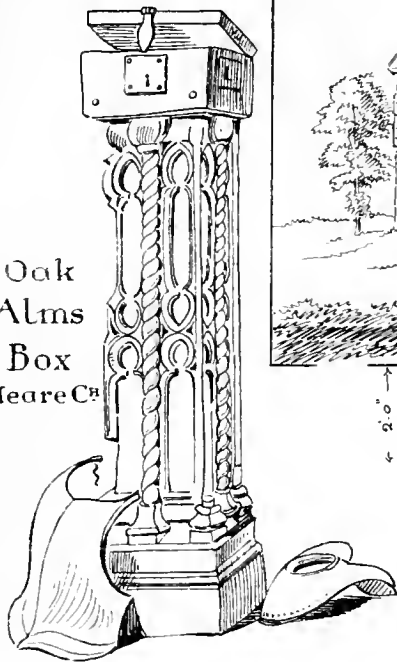
The Fish House Meare Somerset Aug 15 79

PLAN OF FIRE-
-PLACE HOOD

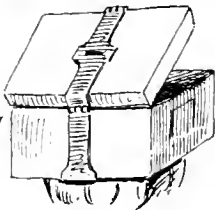


Hooded Fireplace
Meare in the house of
ADAM DE SODBURY
Abbot of Glastonbury

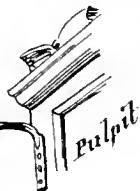
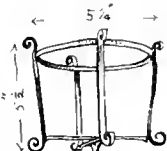
Oak
Alms
Box
Meare Ch.



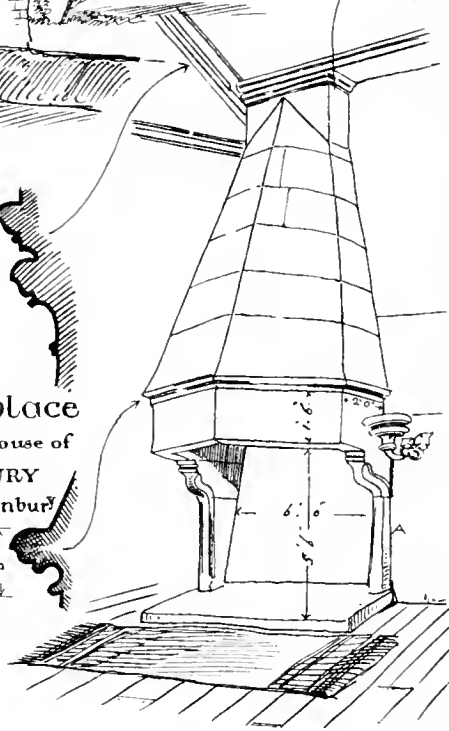
BACK VIEW
OF BOX.
memory sketch



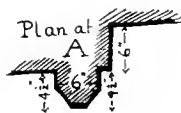
Hourglass Stand
Edingthorpe Church



GENERAL VIEW



Plan at
A



Edingthorpe Ch.
Norfolk



Two Thatched Mediæval Buildings and Details from them

SKETCHED BY
MAURICE BADAMS
ARCHITECT



SIR HENRY THOMPSON ON ART.

ON Wednesday evening the distribution of prizes to the successful students of the City School of Art took place in the School-Hall, Skinner-street, Bishopsgate. The Rev. W. Rogers, in opening the proceedings, referred to the history of the institution, which originated in 1842 in connection with the silk-weaving industry of Spitalfields; and was the first school of art founded in London. It had been removed, and had enjoyed a home in Skinner-street Schools for 15 years; and now arrangements had been made in the Common Council, for the absorption of this School of Art in the City and Guilds of London Institute, with a view to its further development and usefulness.—The honorary secretary, the Rev. R. H. Hadden, then read the annual report, which showed that the number of students had increased; and the prizes were presented to their recipients by Miss Thompson. The Science and Art Department, several of the civic guilds, the Baroness Rothschild, the committee, and others were the donors of the rewards. One prize, gained in national competition for painting groups from nature, was taken by Maria Adams. This ceremony concluded, Sir Henry Thompson addressed the students, and, after a reference to the career of the school, dwelt upon the office of art in the improvement of workmanship, and noted how enormously art enhanced the value of common things. He said art made the difference between a carpenter and a carver in wood, or a mason and a sculptor. The question of exports and imports was in the air, so to speak; but he would not go into that question, except to say that we had been exporting enormous quantities of raw material on which the profits were small, but which might assume great value in association with art-work. In illustration, he pointed out that a farthing's worth of iron would furnish material for several 5s. watch mainsprings; a pound or two of wool, with a little camel's hair, would make an Indian shawl worth 100 guineas; and a little clay, with a few other small materials might be made worth its weight in gold. The workman became a true artisan by the application of art to his labour. Art, however, should be cultivated for its own sake, as well as for its value in industries. The multiplication in recent years of art galleries and of artists was almost appalling; and one was prone to ask, how on earth are we to find new subjects? His advice to artists under these circumstances was that, more than ever, they should seek their inspiration entirely and directly from nature. Let them admire the works of the masters, but they would do little if they merely copied. (Hear, hear.) The slavish imitations of M. Angelo and of Raphael produced a deterioration of the painting of the world in the age that followed, as men neglected the sources of inspiration of those great artists. It might be asked how one could go to nature in this murky city. He thought there were many charming corners in this city. There were few places better for the artist than the banks of Old Thames; and he had seen from the Adelphi effects on the Thames such as our watery climate gave, and such as rivalled many a scene in Venice. Each should look at nature for himself or herself. It was the brain that saw. The eye was the outcome of the brain, and as much an optical instrument as his spectacles. The best brain and eyes made the best picture. "Still life" was an attractive department of painting, and its charm arose from colour combinations and the association of ideas—or, in other words, poetry. An old boot was, for instance, a fine subject. A new boot would be a detestable subject, for that it never had any associations with humanity. A pair of old squire's boots, say with a riding-whip athwart them, called up multifarious associations of the hunting-field—a fine morning, red-coats on horseback, the "tally ho," and "the death." Had he his time over again, he should go more to nature and less to art.

ON THE DECORATION OF WALL-SURFACING.

THE one way in which *not* to subdivide the walls of a room, writes Mr. Lewis F. Day, in the *Furniture Gazette*, is into two equal parts; but in the hands of an artist even such a device

may result in a satisfactory effect. An example of this is to be found in the court-room of what is now the Palais de Justice at Bruges, where the upper half of the walls, panelled in oak, is just about equal in extent to the lower half, which is hung with tapestry. The success of this dangerous experiment is probably due to the fact that the tapestry (an admirable modern reproduction of the original old work) is in marked contrast to the woodwork, and is made in a way complete in itself by a bold cornice surmounting it, whilst the upper wall is of the same material and colour as the panelled ceiling, and falls in with it; so that one compares, not the two equal halves of the wall-surface, but the tapestry with the oak—that is to say, the lower half of the walls with the upper walls and ceiling—losing sight of the fact that the wall is really cut in half. And if the spectator does not observe the fact, but only the satisfactory effect, surely the artist has proved himself an artist.

In the days when oak panelling was in vogue, it was no uncommon thing to break up the whole of the walls with panelling more or less elaborate in design; and this was often very successful in effect, although, perhaps, on the whole, less so than when a broad band was left above it to be painted or covered with tapestry. There was, at all events, less monotony in such a device, which also led the way to a lighter treatment of the ceiling.

An interesting example of a panelled room exists at the Château de Blois. The chamber known as that of Catherine de Medici, is panelled from skirting to cornice in narrow panels, all of the same size, about three times as high as they are wide, the stiles between (taken together with the mouldings) being about equal in width to the width of the panels. There are four rows of these tall panels one above the other; and it is worth noting that the three uppermost rows are carved with graceful arabesques of most varied designs, whilst the lowermost tier of panels is decorated in the simplest and most rigid fashion.

The wood-panelled walls of the rooms built about the time of Queen Anne were sometimes admirably designed, if one looked at the panels simply in relation to the proportions of the wall; but they seldom allowed for the furniture which was to come; and very often there was no furnishing such a room without disturbing that symmetrical arrangement of panelling, whilst the decoration of such large panels, partly hidden by furniture, partly in such prominence as distinctly to deserve ornamentation, is as difficult a problem as ever the house-decorator is called upon to solve. It might safely be laid down as a rule of design that the walls against which furniture is to be placed, should never be so elaborately decorated that one is tempted to regret that portion of them which is hidden by it.

A still more serious consideration in the decoration of a room than the furniture are pictures. Upon them must depend the whole scheme of decoration. Are there to be pictures or not? What are they? and how many of them? Wherever they occur, the walls must be simply a background to them, and no decoration is to be tolerated which is in the least detrimental to their effect—all of which is a further reason for dividing the walls horizontally, so that the dull colours that best set off the paintings may not be carried up to the cornice, but may, on the contrary, be relieved by a gayer and lighter treatment, which, yet not coming immediately in contact with the pictures, does them no hurt whatever.

Perfect decoration must, of course, be designed to fit the room, and every constructional feature must be taken into account by the designer; and, equally of course, the constructor should, by rights, bear always in mind the ultimate decoration of the building. But, whether owing to the exigencies of economy, of taste, or of convenience, or to whatever cause it may be due, it is in practice often impossible for the decorator to hit upon any scheme of design which shall fit in in every particular with the constructional features with which he has to deal, these having, apparently, been put together without any coherent plan. All one can usually do in such cases is to recognise the more important features of construction, and to ignore the minor ones; but there will always be a sense of dissatisfaction with the design when the eye falls upon these irreconcilable features.

Building Intelligence.

ALTON.—A new spire and tower have been added to All Saints' Church, Alton, at a cost of £780. The walls of the tower are of Selborne-stone, with horizontal bands of rough flints introduced, and dressings of Bath-stone. The terminations of the labels of all the windows have been carved with the heads of saints by Mr. Gomm, of Blackwater. The spire is covered with pressed Broseley tiles, which are fastened to the coating of boards by galvanised nails. Mr. F. C. Dyer, of London, was the architect, and the work has been executed by Messrs. J. H. and E. Dyer.

BURTON-ON-TRENT.—A new brewery has just been completed at Burton-on-Trent, for Mr. T. Sykes, of Liverpool. It is erected upon land belonging to the Marquis of Anglesea, near the Midland Railway, upon the south side of the town, and comprises, in addition to the complete brewery buildings, the necessary stores, stables, &c., together with roads and boundary-walls. The contractors for the building have been Messrs. T. Lowe and Sons. Mr. J. Stanyon has acted as clerk of works. The whole work has been carried out from the designs and under the superintendence of Mr. J. B. Everard, C.E., of Leicester.

COCKERMOUTH.—Christ Church, Cockermouth, was opened on Sunday last, after being closed for four weeks, for the purpose of cleaning and decorating the interior. The chancel ceiling has been distempered a rich blue, with gilt stars of various sizes. The timbers are coloured with a light pink picked out with various tints of the same colour. A neat design is stencilled on the under side of all the rafters in vermilion. Round the chancel walls is a dado in deep chocolate with black base. On the top is a very effective stencilled rail in vermilion, with stencilled tiles in buff. Above the chancel arch is a large Maltese cross, in the centre of which is the sacred monogram on a gold ground; the spandrels of the arch are diapered on a light blue ground, the fleur-de-lis and a cross alternately. Mr. Dobie, decorator, of Cockermouth, had the contract. The work has been carried out from designs of Mr. W. C. Jennings, architect, Cockermouth.

LONDON.—The church of St. Thomas, Charterhouse, Goswell-road, was reopened on Thursday last. The building, which was in a dilapidated condition, has been thoroughly repaired, and the whole of the interior has been artistically decorated. An ornamental tile pavement in the chancel and sanctuary takes the place of the old deal floor. The chancel is fitted with new stalls for clergy and choir, and new screen, the compartments of the latter being filled with open tracery, as well as the fronts of choir-desks. The lower part of sanctuary walls has been panelled, and a new altar has been provided. All the new woodwork is of pitch pine. The seats in nave have been entirely rearranged, so as to form proper passages, and new vestries have been made at west end of church for clergy and choir. The work has been executed by Messrs. John Allen and Sons, of 24, Kilburn Park-road, Kilburn, from the designs, and under the superintendence, of Messrs. Medland and Powell, architects, Rolls-chambers, 89, Chancery-lane, W.C.

LOSTWITHIEL.—A new Wesleyan chapel was opened at Lostwithiel last week. It is in the Gothic style. On the east side of the chapel there is a schoolroom, which opens into the chapel at the further corner, and at the intersection of the roof of the schoolroom and the roof of the chapel there is a tower with spire. The tower is in three stages, and the steeple is of Bath stone, surmounted by a vane. The quoins and dressings are granite, and the walls are of Derrycombe stone. The walls and roof are plastered internally. The roof is Gothic in form, with moulded cornice and ribs. At the end, and above the rostrum, a moulded arch opens out an organ and choir gallery, at the back of which is a rose window. Mr. James Hicks, of Redruth, was the architect; Mr. Philp, of Lostwithiel, was the builder; and Mr. Brown, of Lostwithiel, the mason.

NEWCASTLE-ON-TYNE.—St. Mary's Catholic Cathedral, Clayton-street, Newcastle, after being restored and decorated, was reopened last

Sunday. The restoration consisted of new flooring, newly varnished seats, and renovation of the stonework, executed by Mr. John Foggin, contractor, Newcastle, and painting and decorations by the firm of Lavers, Barraud, and Westlake, of Endell-street, London, W.C. The decorations are of the fifteenth century period of art. The nave-roof has been painted red and buff, with decoration on the main timbers. A border in light red, on buff, runs over the arches, terminating at the top of each column, with a crowned M under a small canopy. The aisle-roofs are painted buff, with the timber a neutral green. The Litany of the Blessed Virgin is written upon scrolls in the nave, and upon a ribbon under the wall-plate in the aisles. Borders have been painted round the windows, and pictures of the Stations of the Cross by Mr. Westlake are to be placed under canopies between each window. The chancel-roof timbers are of light red, with buff ornament, the chambers of buff and black, and the front member of rafters bear a number of fleurs-de-lis in gold. The panels are diapered with quatrefoils in grey, the centre of which contains a gold star and fleur-de-lis alternately. The walls of the chancel have borders in green over the arches, and they have been diapered with a rose and lily, each having the inscription beneath, "Ave Maria." The figures of the Blessed Virgin and St. Gabriel under canopies, representing the Annunciation, have been painted by Mr. Westlake. There are also four figures of angels under canopies, holding scrolls with inscriptions from the first part of the Litany of the Blessed Virgin. The whole of the work has been executed under the supervision of Messrs. Dunn and Hanson, architects, of London and Newcastle.—All Saints' Church, Newcastle, was reopened on Wednesday. The building has been repointed throughout; the parapet partially rebuilt and strengthened in the other parts; the roof reslated; the steps at the main entrance, side entrance, and approaches are new and intersticed with cement. As to the interior of the church, the old flagging of the portico has disappeared, and in its place is an artistic concrete cement floor with various coloured bands, by Messrs. W. B. Wilkinson and Co., to whom the cement-work in portico, aisles, morning chapel and approaches was entrusted. The great feature of the internal restoration lies, however, in the decorations which have been introduced, executed by Messrs. Adam Robertson and Son, of Newcastle and Alnwick. The entire work of restoration has been entrusted to and carried out under the direction of Mr. Thomas Reay, Grey-street.

NEWNHAM.—The restoration of Newnham Church was effected six years since, but early this year, the 27th of February, the church was nearly destroyed by fire. Plans prepared by Messrs. Waller were approved, the work was given to Mr. A. King, of Gloucester, by whom the destroyed church had been restored, and in a little over the six months which have since elapsed the church has been substantially re-erected and completed on the former lines. Nothing of the original church remains except the two lower stages of the tower, the north porch, and the 11th-century font. The preservation of the porch is due to the thick internal doors of oak, which resisted the flames. Externally the church presents a good appearance. The roofs are covered with Broseley tiles. The pulpit has been entirely executed, under the supervision of the architects, by Mr. Henry Frith, of Gloucester, who has also done the stone-carving in the other parts of the church, and the wood-carving of the bosses to the roofs. The decoration of the chancel was carried out by Mr. Hyett, of Gloucester.

WARMINSTER.—Christ Church, Warminster, which has been closed for some time for extensive alterations, was reopened last week. The west gallery has been pulled down, and the old lobbies beneath have also been taken away. The ceiling has been removed, leaving a lofty open-timbered roof. Two rows of Bath stone arches have been thrown up to support the edifice, making a lofty and well proportioned nave with aisles. The chancel arch has been elevated, and considerably embellished. The old sittings have been entirely removed, and have been replaced by low seats of pine wood. The decoration of the walls is not yet complete. Mr. Vids, of London, has been the architect, and Mr. J. Gilbert, of Warminster, the

contractor; Mr. John Ponton, having been the sub-contractor for masonry, &c., and Mr. Grant for plastering and colouring. The carved work in wood and stone was done by Mr. Harry Hems, of Exeter. The beams of the roof were stained by Mr. Luke, and the seats by Mr. Edwards. Mr. R. R. White executed the gas-fitting.

WESTMINSTER ABBEY.—The restoration of the three portals of the north transept of Westminster Abbey outside the principal entrance in St. Margaret's Churchyard, the total cost of which amounts to about £20,000, are now completed, with the exception of a few minor details in connection with the central portal. The restoration have been executed from the designs of the late Sir Gilbert Scott, and the work has been carried out by his son, Mr. John Oldrid Scott. The elaborate carved work on the eastern, western, and central portals is of the Early English type of the reign of Henry III. The sculptured figures, which have been executed by Mr. Brindley, of Westminster Bridge-road, embrace on the arch to the left the Patriarchs from Adam to Solomon, and on the right all the Major and Minor Prophets. In the central portal is a life-size figure of Christ in a halo of glory, surrounded by the emblems of the Apostles, and beneath, on the two panels, are represented a series of incidents in the life of Christ. Above and round the arches are the figures of a number of angels playing on various musical instruments, and erected at the base are the life-size figures of the Twelve Apostles. Care has been taken in the present restorations to use a durable stone from the quarries of Chilmark, near Salisbury.

CHIPS.

The members of the Oxford Architectural and Historical Society, in their last Saturday round of visits, went to St. Edmund Hall, said to have been founded by Saint Edmund le Riche, and to St. Peter's-in-the-East, the earliest facts of which date from the reign of Henry II. On Tuesday evening last an evening meeting was held at the new museum, when a paper on "Windsor Castle" was read by Mr. Parker.

For the first time since the establishment of the Ipswich School of Science and Art a local prize fund has been provided, in addition to the medals and prizes offered by the Government department at South Kensington, the sum of fifty pounds having been subscribed for that purpose by gentlemen in the town and neighbourhood.

A new Congregational Chapel was opened at Turnham Green on Wednesday week. It seats 450 persons, is Gothic in style, and cost £3,400. It has been built from the plans of Mr. T. Lewis Banks, A.R.I.B.A., of Finsbury Circus. The contractor was Mr. Thomas Brunsden, of Watford.

The foundation-stone of a new church at Fynnongroew, near Llanasa, was laid last week by Lord Mostyn. The church will seat 300 persons, and will cost about £1,300.

The Nottingham School-board, last week, appointed the following as architects for new schools about to be built at Dab-park, Radford, and elsewhere, subject to their design meeting the approval of the board:—Mr. A. N. Bromley, Messrs. Evans and Jolley, Mr. A. H. Goodall, and Mr. George Hine.

An extensive range of stabling has just been completed for Mr. Meek, at Cross-Deep, Richmond. They are Classic in style, and are constructed of white facing bricks, with Box Ground-stone dressings and a Portland-stone central pediment; inside they are faced with Cliff's white-glazed bricks, above a plinth of coloured bricks. In the central pediment is a clock by Messrs. Gilet and Blind, of Croydon, and above it a turret, containing three bells. A gardener's cottage and other buildings have been carried out in harmony with the stables. Messrs. Crickmay and Son, of Westminster and Weymouth, were the architects, and Mr. Messon, of Twickenham, was the builder.

A three-light Perpendicular window in the south aisle of Southover Church, East Sussex, has just been restored at the cost of the lord of the manor. Mr. C. F. Badgman, of Lewes, carried out the work.

The town wharf at Maidstone is being extended by 100 ft., and the levels throughout will be altered. The contract has been taken of the local board by Mr. H. Towsley.

It has been decided to restore the nave of the Early Norman church of Manningford Bruce, from plans prepared by Mr. J. Loughborough Pearson, R.A. The estimated outlay is about £1,500.

ARCHITECTURAL & ARCHAEOLOGICAL SOCIETIES.

BRITISH ARCHAEOLOGICAL ASSOCIATION.—The first meeting of the session 1881-82 was held on Wednesday week, the Rev. S. M. Mayhew in the chair. The discovery of a Roman Villa, evidently of considerable extent, at Wingham, Kent, was announced. Aided by a grant from the Kent Society, the villa is being excavated by Mr. Dowker, and already three rooms with tessellated pavements, have been uncovered, while the fourth has a hypocaust. The work is very fine, the walls in one room being lined with mosaics. Funds are much needed for the prosecution of the researches. Mr. Loftus Brock, F.S.A., also reported the efforts made by the Association with respect to the safety of Stonehenge since the meeting there last year, and read a letter from Sir Ed. Aubrey, the owner, who disclaimed all intention of "restoration" in the works undertaken there by him. There are but for the safety alike of the monument and the visitors. Nothing permanent will be done until the spring. In the discussion which followed several speakers referred to the somewhat unfair remarks that have been made with respect to the intentions of Sir Ed. Aubrey, whose efforts to uphold Stonehenge deserve thanks from antiquaries. Mr. Way exhibited some medieval pottery from Southwark, the Rev. S. Maude a unique denarius of Gallienus with the name of Germanicus on the reverse, and Mr. R. Soames a drawing of remarkable sculpture in Brixworth Church. It is called an eagle, and is supposed to have been brought from the Roman Villa which existed close to the building, where it is now built into one of the walls. Mr. G. R. Wright, F.S.A., exhibited some drawings of Mulgrave Castle, Yorkshire, and described some of its curious windows. The first paper was on the Bourg ez Zifair, Cairo, by Professor Hayter Lewis, F.S.A. This is one of the angle bastions of the wall of Cairo, now almost covered by sand. It has an octagonal central chamber 26 ft. in diameter formed of neatly cut stone. It dates, probably, from the time of Saladin. Mr. J. W. Grover, F.S.A., in the discussion which followed, alluded to the appearance of the pointed arch in a developed state here, and to the magnificent Museum of Egyptian Antiquities, at Bouak. The second paper was by Mr. Gordon M. Hills, and was on the measurements of Ptolemy applied to the northern part of Britain. He identified Hornsea Lase, E. coast of Yorkshire, as Ptolemy's "Portus Sinus," and Penrith as the starting point of the 10th mer. S. 144, the second station, he placed at Gullaber, near Tebay.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—The annual report of the Birmingham Architectural Association states that the session just ended was commenced and carried on with as much average success as any previous one, but the Committee consider that each session should be more successful and more beneficial to the members than its predecessor, and, therefore, cannot regard the past session as having been entirely satisfactory. The Committee remind the members that the success of the Association, and the attainment of its chief objects, depend almost entirely upon individual activity, and that the Association will not reach the flourishing and prosperous condition in which it ought now to be, as long as such a large proportion of the ordinary members regard its interests with indifference. During the session five members resigned, and eight new members were elected. The total number of members is now forty-four, of whom twenty-nine are ordinary, and fifteen honorary. The balance shows a total income and expenditure of about £60, but is so far satisfactory that the balance against the treasurer has been reduced from £18 0s. 4d. to £12 8s. 7d. It appears that the subscriptions to the London A. A. for 1879-80 and 1880-81, in all £13, are still unpaid, but on the assets side are £10 arrears of subscriptions. The officers for the year are:—President, Jethro A. Cosins. Committee: Chairman, H. H. M. Connell. Ordinary Members of Committee: F. W. Cross, T. Jones, W. H. Kendrick, W. G. Mancl, J. P. Osborne, A. Reading, and E. Wood. Hon. Treasurer, R. B. Morgan. Hon. Librarian, O. Essex. Hon. Secretary, Fred. G. Hughes, 3, Temple-row West, Birmingham.

LIVERPOOL ARCHITECTURAL SOCIETY.—The second ordinary meeting of this Society was held

at the Royal Institution, Colquitt-street, on the evening of the 16th inst., the President, Mr. Charles Aldridge, F.R.I.B.A., in the chair. The prizes for drawings submitted at the various meetings of the class of construction and design during the last session were awarded to the successful students—the first to George Hornblower, and the second prize to Richard Holt. The paper for the evening, entitled "Recent Notes from the Continent in Pen and Pencil," was then read by the author, Sir Jamea A. Picton, J.P., F.S.A., and was illustrated by numerous sketches of features of interest at the various places visited by him. A discussion followed, in which the President, and Messrs. Boulton, Barr, and Morton took part, the meeting terminating with the customary vote of thanks to the author of the paper.

ARCHÆOLOGICAL.

ARCHÆOLOGICAL DISCOVERIES IN NEW MEXICO, UNITED STATES.—During the past two years, Major J. W. Powell, United States Ethnologist, has had several parties at work at different points in the Western States, exploring some of the pre-historic remains of the old Pueblo or house-building races. One party, in charge of Colonel James Stevenson, visited the isolated Indian tribes still inhabiting portions of New Mexico, and the collections made of objects ancient and modern are the most extensive and complete of any ever gathered together in that section. In the ancient Pueblo of Zuni the natives retain their purely aboriginal character. These people live in stone houses, piled upon each other like immense bee-hives. The Zunians manufacture a fine grade of pottery, entirely uninfused by civilization, and ornament it with designs in colours. The ruins in the vicinity are very extensive, covering hundreds of miles, and point to a former population of millions of souls. The collections made by Mr. Stevenson comprise many thousands of modern clay vessels, implements of stone, utensils and articles of clothing and of ceremony, and also a vast number of pre-historic relics from the ancient ruins. During the present year these explorations have been continued, and within the past three or four months the most important discoveries have been made. For many miles the stone bluffs of one of the canons have been found to be literally honeycombed with thousands of human habitations, now fallen to decay, and Mr. Stevenson is yet exploring them and gathering together information for future publication.

SCHOOLS OF ART.

METROPOLITAN DRAWING-CLASSES.—The annual presentation of Queen's prizes and certificates to the students attending these classes was made at the City Guildhall, on Tuesday evening, by Earl Northbrook. The Lord Mayor presided, and in opening the proceedings remarked that he had found those workmen the most valuable who devoted their evenings as the students before him had done, to the practice of mechanical drawing. Mr. W. Bushbridge, the instructor of the classes, read the annual report, which was of a very satisfactory character. During the year there had been nearly 1,000 students in the various classes, of whom 656 obtained certificates at the Government examinations last May, the latter number including 208 who gained Queen's prizes. In building construction, nearly one-fourth of the Queen's prizes awarded to the whole of the United Kingdom were obtained by students in these classes. The report added that a greater amount of liberality on the part of the Government would give such an impetus to technical education as would fit the English workmen to withstand any amount of competition with foreign labour. A resolution pledging the meeting to promote the welfare of the classes was moved by Mr. John McGregor ("Rob Roy") and seconded by Mr. Sheriff Ogg. Lord Northbrook, in distributing the prizes, referred to the inestimable advantages of technical education such as was afforded by these classes, which, he said, were doing a good, sound, practical work, which must be greatly to the advantage of the working men of the Metropolis, and ultimately to the country at large.

"To a practical man with a taste for mechanics, and the bumps of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Twopenny of all newsmen, or post free 2½d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is 6s. SHILLINGS for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33f. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL., Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—W. C. H.—B. S.—B. and B.—J. W. and Co.—W. and Co.—T. W.—C. P.—W. and Son.—F. and Son.—T. E.

JAS. HUNTER. ("Plaster of Paris.")—APPRENTICE. (Write Lockwood and Co., 7, Stationers' Hall-court, for list.)

"BUILDING NEWS" DESIGNING CLUB.

RECEIVED.—Zell, Percy Thompson (there is no entrance fee. The drawings are returned after the review appears, and the same motto is used for every set of drawings sent by one competitor), Hotspur, G. E. H. (all drawings are returned).

DRAWINGS RECEIVED.—Buathorne, "I Fain would Climb, but that I Fear to Fall," Hotspur, Folle-Farig.

Correspondence.

WHY PROVINCIAL ARCHITECTS DO NOT JOIN THE R.I.B.A.

To the Editor of the BUILDING NEWS.

SIR,—At the opening meeting of "the Royal Institute of British Architects," the President, Mr. G. E. Street, R.A., said:—"There is again another class which might be more largely represented here, and this is the class of provincial architects. Some of our most distinguished members practise in the provinces, but the number of these who belong to us is very small."

One cause of this is easily explained. I know that many provincial architects, in common with myself, consider that the Institute did not treat us fairly, when some few years since they raised our subscriptions to the amount paid by the London members. The advantage of the Institute are very small indeed to provincial architects. Living at a distance from London they can but very seldom attend the meetings, or use the rooms and library—in fact, all the return for the subscription is a copy of the Transactions, and the very doubtful benefit of writing "F.R.I.B.A." after their names. I am afraid, Sir, the general public, our clients, know but little of the R.I.B.A., and give less heed to those mystic letters, for one constantly sees very inferior men, who do not use them, doing as

well, if not better, than their professional brethren who are members of the Institute, and is it not a fact that the leading members of the profession who can use the letters "R.A.," "A.R.A.," and even "F.S.A.," do not write "F.R.I.B.A." after their names, though surely the last should be deemed more honourable and appropriate than the "F.S.A." Is it that they are ashamed to use them? If the Institute really wishes provincial architects to become members, it should offer sufficient inducement and equivalent advantage.

I should rejoice to see membership of the Institute as the recognised guarantee of the status of architects; but such is not the case now. If a provincial architect is asked to join the institute he says "Cui bono?" and with reason. I know men of very good standing who laugh at the idea of seeking membership, and say, "Why should I pay a subscription to keep up a London institution which does not benefit me?"

It is a mistake to suppose that the public look upon membership of the Institute as a guarantee of professional standing, though such ought to be the case, and is in other professions.

It may be said, "It is all very well to find fault; but what do you want or propose?" Well, Sir, I would say—

1st. Go back to the old system of making the subscription of country members more in accordance with the use they can make of the Institute.

2nd. Give them a greater voice in the council.

3rd. Have provincial branches, and hold congresses and meetings in provincial towns, that the provincial public may know more of the R.I.B.A.

4th. Seek union with provincial architectural societies.

In a word, throw off the metropolitan exclusiveness of the Institute. If the much-respected and admired president, whose straightforward and vigorous address charmed us all, will set his practical mind to alter and improve the present state of things, he will confer a lasting benefit and obligation upon the profession, and that he can do so, no one more firmly believes than your obedient servant,

A PROVINCIAL ARCHITECT.

BIRKENHEAD TOWN HALL COMPETITION.

SIR,—Permit me to call your attention, and that of the referee (Mr. Barry) to a feature of the above, which I fear has not received the attention it deserves.

You are doubtless aware that the first competition is for sketches only, five of which are to be selected, and finally worked out by their authors; Clause 5 of the instructions saying, "In order to obviate the possibility of the sketch designs lodged in the preliminary competition being made use of by the competitors invited to take part in the final competition, such sketch designs will not be allowed to be seen by any one except the council and referee, and will be retained until the final competitive designs have been sent in."

This seems fair until the fact is considered that the said council contains, amongst its members, two architects, and the father of a third, all likely to be competitors, and yet in a position to see the plans sent in by others, and to make such use of their contents as they may see fit. Surely the gentlemen alluded to should not be permitted to see the sketches at all.—I am, &c., C.

PRELIMINARY COMPETITIONS.

SIR,—Is your correspondent, "A. B. C.," a professional? for his suggestions are, to say the least of them, most remarkable, as coming from such a source. His proposal is what is called in the lower ranks of betting men, "squaring the mag."

His experience is greatly different from mine if he usually finds in a large competition like the one he names that, say, out of 100 or 170 designs (which I anticipate there will be at Glasgow) there will not be ten or even six sets of plans of tolerably even merit.

The parties selecting will certainly not make such an invidious distinction as he suggests—i.e., to select them in the order of merit, say, from 1 to 10, in progressive order; and I also greatly doubt if any one of the ten will think so little of his own production as to give it, in his estimation, ought but the first rank. The author

rities have very properly forestalled any such prejudging, by refusing any exhibition or criticising in advance of the designs.

Should any of the competitors distrust his own chance, he can decline the contest, to the better chance of the remainder; and this is possibly what "A. B. C." desires.

I make a counter-proposal. Say, let the three best work out their chances without further payment or fee—for the prize is a great one—and the remaining seven retire, on being paid the total honorarium amongst them. This is no doubt an insane and unlikely proposal; but it is the very embodiment of equity, compared with "A. B. C.'s" proposal—viz., that, say, seven competitors should voluntarily sacrifice their chances for the sole and entire benefit of three men, who thus reduce the odds of 9 to 1 to 2 to 1, and are further handsomely paid for thus bettering their chances at the expense of the "scratched."—I am, &c.,
Nov. 26.

VIGILANS.

THE ADMIRALTY BUILDINGS.

SIR,—The lately-published description of the contemplated rebuilding of the Admiralty, &c., is so very circumstantial, that it appears to me there must be a design made for the same. I hope, however, this is not the case, and that there will be a public and quite open competition for the new structure. A Government which prides itself on free trade should be consistent, and let us architects have the benefit of the principle. At the present time there is remarkable slackness of work in the profession, and there never was a time in which so much talent was seeking development; and, therefore, it would be an excellent thing just now to have a good national (or international) competition. I fear a Board of Works job is imminent, however.—I am, &c.,
M.

TESTING TRAPS.

SIR,—I expected to find at the experiments conducted on Saturday a trap and w.c. fitted up as they should be under ordinary circumstances; but I was disappointed, for the bottom of the trap was 15in. below the top of the floor (when it should have been 10in.), and did not leave enough to taft over; also, instead of the water being laid on to the w.c. in a proper manner, it was supplied over the top of the basin with a rubber hose, and a dribble of water not equal to a stream, through a 2in. pipe. The consequence was (under these extreme circumstances), when Mr. P. J. Davies jerked up the handle and dropped it as if it was a hot iron instead of a w.c. handle, the trap nearly lost its seal; but, strange to relate, when another gentleman (under a strong protest from Mr. Davies, who said no one should touch the handle but himself), lifted the handle and dropped it in the ordinary manner, the trap had a proper seal.

Now, I contend (what has been proved in hundreds of cases), that if a ∇ -trap is fixed under a valve w.c. close up to the floor, as it should be, with a 2in. airpipe, and a proper regulated supply of water to the w.c., it is an impossibility for it to lose its seal. I admit the water does pass through the trap with such a velocity that it thoroughly secures it and the soil-pipe too, and sometimes displaces some of the water in the trap, yet if fixed under ordinary circumstances the water supply always makes up the deficiency. If a trap is not fixed as under usual conditions, what is the value of the test?—I am, &c.,
J. W. HART.

21, Dorset-road, Clapham-road, Nov. 21.

SIR,—I take the castigation of your correspondents, together with your foot-note, and promise to be more careful in future. Fortunately, however, the error of 18in. instead of 11in. does not in the least affect the point at issue; 14in. being more than sufficient for the purposes of my argument.

It will help those of your readers who have not had time to study the question, to understand the points at issue better, if they will try the following simple experiments, one of which is quoted by Mr. Davies on page 510, and again in his letter upon page 608.

Place a Beard and Dent's ∇ - or half ∇ -trap upon a bench, fit to it an improved hopper-basin and charge the trap; then place into the basin a closet-plunger, and fill it with water. Now remove the plunger, and you will find the trap unsealed—it has momentually out. Repeat the experiment, but, this time, hold against the front of the outgo, about an inch down from the top, a piece of wood; you will now find the trap will not unseat, simply because the piece of wood has resisted the momentum.

Now, in the place of the ∇ - or half ∇ -trap, fix a Dubois or Sutcliffe ∇ -trap, with basin, &c., as before: repeat the first experiment, and you will find the seal scarcely affected, and why? Simply

because the curved form of the outgo has, like the piece of wood, resisted the momentum, and the outer leg is not long enough to cause siphonic action. Now, add 2ft. of soil-pipe to the outer leg; you will now find a considerable drag upon the seal, but not enough to unseat it—the siphonic action is not yet strong enough; add another 2ft. to outer leg and the trap will siphon out every time; then cut a hole in top of outgo, and you will again find your seal secure.

There is, however, one most important point which must not be lost sight of in carrying out these experiments, viz., the manner in which the plunger is removed from the basin. Its removal should be made to represent as nearly as possible the action of a valve-closet, this may readily be done by passing the plunger up against the sides of the basin. If, however, instead of this, the plunger is pulled through the water, an action is produced which represents nothing in practice, but which causes a vacuum into which air rushes and forces out the seal.

Now these simple experiments, which may be tried by any one in half an hour, show very clearly the difference in the action of the ∇ - and ∇ -siphons, viz.—

1st. That the ∇ is not untrapped by momentum, but by siphonage, which can be prevented by ventilation.

2nd. That the ∇ is untrapped by momentum, which cannot be prevented by ventilation, but which can be greatly checked by resistance offered at the outgo. This resistance occurs when a ∇ -trap is fixed into a long soil-pipe with a short branch; it has, however, then to contend with siphonic action as well, and it is under such circumstances that ventilation can assist it.—I am, &c.,
DANIEL EMPTAGE, S.E.

Margate, Nov. 21.

CHIPS.

An inquiry was held at West Malling, near Maidstone, on Friday, before Captain Hildyard, R.E., one of the inspectors of the Local Government Board, into an application from the rural sanitary authority for sanction to borrow £1,000 for the drainage and sewerage of West Malling. Mr. W. S. Norton produced and explained the scheme which had already been partly carried out. The inspector expressed an opinion that £1,000 would not be sufficient to complete the works, but said it would be possible to obtain a further loan.

A new Baptist school at Ebbw Vale was opened on Monday. It accommodates 250 scholars, and cost £300. Mr. Wilputte was the honorary architect, and the contract was carried out by Mr. Evan Thomas, of Ebbw Vale.

A public improvement, consisting of a wide road from the Chiswick vestry-hall to Grove-park station, has just been completed at the cost of the Duke of Devonshire. The plans were prepared by Mr. Henry Currie, surveyor to his grace, and the contract has been carried out by Messrs. Nowell and Robson, of Kensington.

At the annual meeting of the governors of University College, Bristol, held last week, it was reported that plans had been prepared for the council by their architect, Mr. Hanson, for the erection of a new wing, which would be carried out as soon as £2,000 more was subscribed in addition to the £4,500 already promised towards the cost.

The surface drainage of Teddington has just been completed under the superintendence of the surveyor to the local board. The contract has been carried out by Mr. Pillar, at a cost of about £1,900.

After having been closed some time for extension and improvement, the Leeds Library was reopened on Monday. On the north side of the principal room a large apartment has been built as a supplementary reading or writing-room. The room is lighted from the ceiling in the evening as well as by day, for after dusk the gaslight is, by an ingenious arrangement, thrown down from between two glass roofs, so as to avoid any damage to the books or discomfort to visitors from gas-fumes or excessive heat. At the end of this new room there is a smaller one, reserved for exceedingly rare works, which include the Benedictine edition of the Fathers, Nichol's "Leicester," the Domesday Book for Yorkshire, and many ancient manuscripts. The structural alterations have been carried out from the designs of Mr. Thomas Ambler, architect.

Truth says that two important conditions have been insisted upon by the Lord Chamberlain's department previous to the year's inspection of theatres:—1, the construction of a concrete wall, or partition, over the proscenium arch and between the stage and the auditorium; 2, a constant double and distinct supply of gas to the stage and to the auditorium.

Entercommunication.

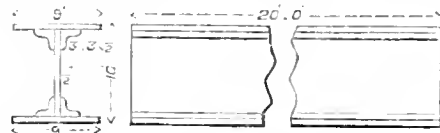
QUESTIONS.

[6784.]—Extras.—In a case where an architect orders certain extra works to be done by the contractor without first obtaining the consent of his client, is that client bound to pay for such extra work, and, if not, from whom is the contract or to obtain payment?—NVRMEL.

[6785.]—Selection by Architect.—When a certain price is allowed in specification for different articles to be selected by architect, what is the ordinary custom in the profession in regard to payment for same? If the architect orders certain things and instructs the seller to make out his account, charging the same to the contractor, then the architect has no guarantee that such articles have ever been paid for, and the seller may come upon him at any time for payment as the person who ordered them. Then, again, supposing the architect pays for such articles himself at the time, does he deduct the same from the contractor's tender at the rendering of the final accounts? If so, he will not get his percentage on such payments. Besides, it occurs to me such additions to an architect's account when rendered to his client would certainly appear very unprofessional, but if not entered in his accounts how is he to obtain payment? Will an older practitioner suggest?—NVRMEL.

[6786.]—Waterworks.—Will some correspondent kindly say what head (above top of highest house) would be required to supply a town with water, having sufficient pressure to throw water from a fire-hose to the top of such house, length of main one mile, 6in. pipe, required supply 60 gallons per minute?—PRESSMAN.

[6787.]—Breaking Weight of Girder.—Kindly inform me of the formula for working out the breaking weight of a girder as per annexed sketch? Also formula



for working out the breaking weight of other girders made up in the same way, but different depths and widths?—INDUCTUS.

[6788.]—Laying Tiles in Exposed Roof.—Can any reader inform me the best way of laying the tiles in a roof in a very exposed situation?—J. L. SMITH.

[6789.]—Scantling for Tile Roof Rafter.—What is the proper scantling for a tile roof rafter of Sit. bearing at 45° pitch?—YOUNG 'US.

[6790.]—Clubs.—Will any of the readers of the B. N. kindly inform me which are considered the best arranged clubs in London, and in what works any plans of them can be seen?—SMITH.

[6791.]—Rubbings of Ornaments in Low Relief.—Can any one give practical information as to the best modes of getting impressions or "rubbings" of low relief ornament such as that on the Runie and Irish crosses, &c.? There is, of course, the old-fashioned method with heel-ball and rubbing. Is there not some improved way? What is the method called "taking a squeeze"?—Q.

[6792.]—Chancel Screen.—Is it unusual to put a Perpendicular screen into an Early English church, or is it considered the proper thing for the screen to suit the building? The church is a modern one, and its general characteristics are Early English. Have noticed that a few modern churches about here have rather a mixed style, having Perpendicular East windows, the rest being Decorated, &c. A Perpendicular screen would be preferred if not out of the ordinary way.—YORKSHIRE.

[6793.]—Luminous Powders, &c.—In Part 14, fourth series, of the Art Workman there is an article on Luminous Powders. Could any of your readers give me information as to their suitability for rendering walls or surfaces for advertising or other purposes luminous in the dark, where procured, cost, &c. 2. Similar information desired regarding luminous paint, recommended recently in the postal department for encircling the openings in wall letter-boxes when situated in dark places, and if to be had in different colours. Ditto regarding luminous wall-papers.—MAC.

[6794.]—Problem.—I should be glad of a solution of the following seemingly simple problem. I have given it to half a dozen men, and have had six different replies. A. purchases a lease of 14 years' for £1,050. The rent for the first ten years is to be £25 a year, and for the last four £300 a year. At the end of the first ten years A. agrees to sell the lease to B. at a proportionate price to what it cost him. What is the sum that B. must pay?—COCKER.

[6795.]—Memorial.—I should be grateful for your advice in the following matter:—A fund has been subscribed (£150) to raise a suitable memorial to a deceased gentleman. The question is, What form is it to assume? For one reason or another, the following are out of the question—Monument over grave, stained glass window, mural tablet in church. If we decided upon a marble bust or portrait in oil to present to his family, what class of artist could we command for the sum at our disposal? What else can you suggest?—MEMORIAL.

[6796.]—The Sanitary Institute Examination of Surveyors.—In the BUILDING NEWS of Nov. 11 is a paper of questions for the above, which I dare say not one in ten of the existing local surveyors could answer off hand; and, perhaps, there would be small practical advantage in their being able to do so, for knowledge is as available in a book of reference as carried to and fro in the brain, provided a man can bring it to bear when wanted. Nevertheless, since cramming is in the order of the day, I should be glad to know what books it would be advisable to read with a view to passing the above

examination, and also where the Sanitary Institute "hangs out."—SLEEPY SAM.

[6797].—**Villa.**—Having a country villa to design for a speculating gentleman to cost about £1,200, I shall be glad if Mr. Hugh McLachlan, "G. H. G.," or some other of your experienced correspondents will answer the following:—1. As a sea view and better land view would be obtained from the first floor, would it be advisable to put the drawing-room on that floor instead of the ground-floor? 2. Would it be best to have a service door to dining-room from pantry, or in a villa of this size would a second door take up too much room, and the ordinary door be used as service door? 3. Would it be necessary to have a cloak-room and lavatory, with w.c. attached, on the ground-floor? 4. Can you recommend me a really good and comprehensive modern book on house planning and designing?—A YOUNG ARCHITECT.

REPLIES.

[6743].—**Architect's Account.**—Though it is very unusual for a client to ask to see the complete detailed bill of extras and omissions with the builder's prices, I cannot see how an architect can refuse to show it when demanded unless on the ground that it is private and privileged and that the builder will not give his consent to the client seeing it, when the dispute might be left to the builder to settle.—HUGH McLACHLAN.

[6747].—**Thatched Churches.**—Theberton church, Suffolk, has a thatched roof, and is otherwise very interesting. In the next parish, Leiston, are the remains of the abbey, which are well worth a visit, and are still very extensive. Here cattle are stalled in the very place where the high altar stood, and no care whatever is taken of the ruins, though the stonework is beautifully moulded and carefully wrought.—T. GOODMAN, Southend-on-Sea.

[6749].—**Commonplace Book.**—In reply to the question by "L. E. K.," a few hints as to a system of my own may be of some use. Since I entered the profession, some five years ago, I have adopted the following plan:—I keep separate memorandum books for the chief points connected with architecture, as surveying, perspective, quantities, valuing, architecture generally, &c., &c., and range from book No. 1 to No. 9. I also keep an index-book separate, and when noting anything special put it down in its proper book, at the same time entering it in the index book under its proper heading; saying, see Book No. —, page —; or see BUILDING NEWS, January —, page —, or any other book, &c., &c. By this method I have entered up the "Commonplace Column," and other special pieces in the BUILDING NEWS at various times, and thus having one general reference book, I can at a moment's notice find something mine or ten pieces on the subject wanted. I have found this system to act very successfully, and can endorse Mr. "G. H. G.'s" remarks as to the benefit of keeping a commonplace book.—MAX W. BLAKELEY.

[6753].—**French Casements.**—There is nothing better than oak for the sill, English, notwithstanding its roughness of grain, to be preferred. It would require at least a dozen sketches to show what "Reader" asks for, the windows having to open both outwards and inwards, with sections of all joints; there are several methods of keeping out the weather, more or less effectual and expensive. Some casements have fixed muntins at meeting stiles, and others are without them, therefore unless it was known pretty nearly what "Reader" required, sketches might be made to little purpose. Smith's watertight casement bar may I believe be had from both Messrs. Archibald Smith and Stevens and Messrs. Smith and Turner. For fastenings use spagnolette bolts; they can be obtained from all the leading furnishing ironmongers.—HUGH McLACHLAN.

[6753].—**Measuring Brickwork.**—I believe not. With regard to measuring for labour only I am not too well versed to give an opinion; but for labour and materials in and around London, it is the rule to deduct all openings except flues and hollow walling, the last being taken and entered as a separate item in the bill.—HUGH McLACHLAN.

[6765].—**Glazed Earthenware Flue Lining.**—Is it not also liable to get cracked and broken by the heat? I have heard so; but perhaps this would only happen if the chimney caught fire.—C. F. M.

[6768].—**Fifteenth-Century Plate-Armour.**—Commencing at the crown of the head, there is the helmet, or, if it is without a visor, the basinet. Close-fitting bascinets were often ornamented by a jewelled *orle* around them. See, for instance, the effigy of Sir Richard Peyton in Tong Church, Shropshire. (The helmet or head-piece of a horse is called the chamfron or chamfraine.) The *gorget* or *gorgerie* of plate is the portion round the neck, and the epaulet-like protections to the shoulders are the *pauldrons*. Then comes the breastplate-coirass. The *ere* braces protect the upper portions of the arms, and the vambraces the lower parts. Between them the elbows are covered by the *coules* or elbow-plates. On the hands are worn the gauntlets. Below the waist and protecting the hips is the skirt of *taces*, and across the buttocks is girt the military belt or *cingulum*. This was often extremely rich in jewels. Covering the tops of the thighs are the *tuelles* or *tuites*. The thighs themselves are encased in *cuisse*s, and the shins in *jambes*. The knee-plates are called the *genouilleres*. The scale-like coverings for the feet are the *sollerets*, and across these at their junction with the *jambes* occur the spur-straps. The sword, of course, is suspended from the left side by the transverse belt, whilst upon the right hip is the *misericorde* or dagger.—HARRY HEMS.

[6769].—**Early-English Woodwork.**—The most complete and finest example of Early English woodwork in England are undoubtedly the magnificent series of oak miserere seats at Exeter Cathedral. There are half a hundred of them, all (save one) dating from Bishop Bruere's time (1234–44). They exhibit a wonderful diversity of treatment—foliage and figures being carved with masterly skill. Portions of the stalls in Salisbury Cathedral are also excellent samples of work of this date, but their misereres are not carved with the vigour those at Exeter evince, and the foliage upon them shows little variety. The stalls themselves are particularly interesting—in that the dog-tooth ornament occurs thereon. I believe this is the only genuine instance of Early English

dog-tooth in wood. In Henry VII.'s chapel at Westminster Abbey there is one Early English miserere bracket. It is crudely carved and very inferior, in artistic power, to the Exeter or Salisbury examples. I may say here that whilst at both the two cities just mentioned the passing visitor is perfectly welcome to inspect and examine the cathedral and its details at leisure, the facilities at Westminster Abbey are not quite so great. Recently I was on my knees before the stalls in Henry VII.'s chapel when suddenly a stern voice at my elbow cried, "The public ain't allowed to touch those there, sir." "All right," I replied, "I merely want to find an Early miserere, which should be here somewhere amongst all these late ones." "I don't know nothing about 'em being early or late, sir," retorted the verger, civilly enough, "but we never lifts up those back rows at all, nor let's anybody else. There's one here. That's an old 'un, but you mustn't touch 'em. Can't possibly be permitted, sir. If you're an architect and wants a private view, you'll have to come, you know, sir, away from public hours and see the clerk of works. My instructions is imperative, sir, to see none on 'em touched. Very sorry, sir! Thank you, sir, exceedingly." Fortunately by the time this harangue was through I had completed my inspection, and the conscientious official and I parted good enough friends. In Edward the Confessor's Chapel, in the same Abbey, the old Coronation chair is a well-known specimen of 13th century woodwork. It dates from 1272, and is, I suppose, by far the earliest specimen of a chair in England. There is, or was until recent years, an Early English roof over the nave of Hales Owen Church, in Shropshire, a sort of wagon roof with tie-beams. At Stanton Harcourt Church, Oxon, there is an oak screen of about A.D. 1260. If I mistake not, the old broached spire of Almondsbury Church, Gloucestershire, still exists. The wood framing of this spire is Early work (1250). Perhaps the very earliest example of ecclesiastical woodwork in this country is at Compton Church, Surrey. In that building a piece of screenwork may be seen which was placed therein during the transition period from Norman to Early English.—HARRY HEMS.

[6776].—**Transferring Oak Carving to Paper.**—"A Northern Student" must put his question more definitely. He may have them photographed on to paper—may draw them on paper—or may wrap them up in paper and take them home under his arm. Or is it papier-mâché counterparts that he requires?—HARRY HEMS.

CHIPS.

Two corner-stones of the new building which is being erected by the Upper and Lower Wortley Liberal Club were laid on Monday. The building, which will be of brick, with stone dressings, has been designed by Mr. James Thornton.

A new girls' school is to be built at Porth for the Lanworno School-board, and alterations are about to be made to Miskin schools, Mountain Ash. The architect in both cases is Mr. Moses Cule, of Pen-trebach.

The local board of Liversedge have adopted plans of Mr. Charles Gott, M.I.C.E., of Bradford, for a main outfall-sewer, about one and a third miles in length, including 450 yards run of tunnelling.

The guardians of the Strand union last week adopted a report by a committee recommending the erection of fresh offices, in lieu of those in Tavistock-street, at an estimated cost not to exceed £10,000. A vacant plot of land in Maiden-lane was suggested at the meeting as a suitable site.

The local board of Ashford, Kent, after much discussion and several visits to other sewerage works, have decided, subject to the sanction of the Local Government Board, to adopt, for the disposal of the town sewage, precipitation, by means of sulphate of alumina and lime, and filtration, by passing the effluent through land.

The Church of St. Mildred, Bread-street, Cheap-side, one of those rebuilt by Sir Christopher Wren, will be reopened on Sunday next, the 27th inst., after internal and external restoration, under the superintendence of Mr. Thomas Milbourne, architect. The stone paving has been repaired by asphalt, in order to render the church dry, and all the monumental stones have been relaid in their places; the open stoves have been replaced by hot-water coils, the whole of the upholstery and furniture of the church has been renewed, and the organ reconstructed with considerable additions.

The foundation-stone of a new schoolroom, attached to the Congregational Chapel, in Carmarthen-road, Swansea, was laid on Tuesday week. The building will be 60ft. by 40ft., and will seat about 400 children, and the contract has been taken for £500, by Mr. Thomas White, of Swansea.

A new wing, added to SS. Mary and Modeven's Roman Catholic schools, Burton-on-Trent, was opened on Monday week. The cost has been £350; and Mr. Hodges, of Burton, was the contractor.

The town council of Burton-on-Trent have under consideration a report from Mr. B. S. Brundell, C.E., of Doncaster, as to the measures which should be taken for the protection of the town from flood. He recommends that the embankment at the south portion of the town be extended from the Bond-end mills to Soho, and points out that all these works are comparatively valueless so long as the council permit fresh buildings to be erected in the floodway of the river.

LEGAL INTELLIGENCE.

LIGHT AND AIR CASE.—(Lawes v. Carter. Before Mr. Justice Fry.)—The plaintiffs in this case, who are freeholders of Nos. 10 and 11, Lincoln's Inn-fields, sought to restrain the defendants, the seedsmen of Holborn, from interfering by their buildings with the light and air enjoyed by the plaintiffs on the ground and first floors of their premises at the back. Whetstone-park, which is only 17ft. wide, interposes between the back of the plaintiffs' premises and some new buildings erected by the defendants, 58ft. in height, in place of some older buildings alleged by some witnesses to have been 28ft., and by others 36ft. or 38ft. high. Mr. Glass, Q.C., Mr. Cookson, Q.C., and Mr. E. Cutler were counsel for the plaintiffs; Mr. John Pearson, Q.C., and Mr. Phipson Beale for the defendants. The Judge dismissed the action with costs, holding that as part of the new building which was opposite the back of No. 10, Lincoln's Inn-fields, had been thrown back behind a courtyard 28ft. wide, it did not cause a greater diminution of light than the old building, and that the interference with the light of No. 11 was so slight that a Jury would find difficulty in assessing the damages.

YOUNG AND CO. v. THE MAYOR AND CORPORATION OF LEAMINGTON.—The hearing of this appeal against the judgment of Mr. Justice Williams and Mr. Justice Mathew was resumed on Monday in the Court of Appeal. The plaintiffs claim a balance due of between £6,000 and £7,000 for completing the waterworks for the Corporation of Leamington, and the latter refuse to pay, on the ground that the contract entered into with the plaintiffs by their engineer, Mr. Jerram, was not under their corporate seal. Mr. Mellor, Q.C., quoted cases decided in the Court of Queen's Bench and the Court of Common Pleas in support of his contention that a municipal corporation were not authorised to provide waterworks for the supply of water to a town, and submitted that in the present case the Corporation acted in their second capacity as the Urban Sanitary Authority under the Public Health Act of 1875, and could not be held responsible for the observance of a contract which had not been sealed in the usual way.—Mr. Justice Brett asked would the learned counsel submit that there was English law to inflict rank and palpable injustice upon anyone?—Mr. Mellor said the judges would hold, no doubt, that in common law no rank and palpable injustice could be permitted. He admitted that there was hardship in the case, but the plaintiffs should have taken the precaution to have their written contract sealed with the common seal. If this protection were not afforded to the ratepayers, public bodies might enter into contracts involving ruinous expenditure.—Mr. Dugdale followed on the same side.—Mr. Harrison, Q.C., replied on the whole case. He submitted that the Corporation were liable; that they were receiving profit and benefit from the money of the plaintiffs, and that they were bound by the law of agency by their engineer, Mr. Jerram, having entered into a written contract with the plaintiffs. The Corporation of Birmingham, for instance, had constructed waterworks of their own, and it was quite within the powers of the Corporation of Leamington to provide a water supply of their own, as they were doing in this case.—Mr. Dugdale denied that the Corporation of Birmingham had built waterworks. They had simply obtained a special enactment to enable them to purchase waterworks.—The Court reserved its judgment.

STAINED GLASS.

WESTMINSTER ABBEY CHAPTER-HOUSE.—Shortly before his death, Dean Stanley proposed a scheme for filling the windows of the Chapter-house of Westminster Abbey with stained glass. For the first of these he sketched a plan of appropriate subjects and met the cost of providing it. The window will shortly be completed and placed in position. A second stained-glass window has been promised by the Queen as a memorial to the late Dean.

Mr. Under-Sheriff Burchell sat last week to assess the damages in an action for breach of promise brought by Miss Hewson, a barmaid at the Gaiety Restaurant, against a young architect named Truefit. The Jury assessed the damages at £150.

Last Friday a new Conservative Club, intended for the use of members of the party resident in Radcliffe and Pilkington, was opened. The building is in the Gothic style, of red brick, having on the ground-floor a large reading-room, to be used for political or other meetings. On the first floor there is a billiard-room, with smaller apartments for committee meetings, &c. The total cost of the building, exclusive of furnishing, has been £1,750, and it has been erected by Mr. J. Allen, contractor, Radcliffe, from the designs of Mr. W. Dawes, architect, Manchester.

Our Office Table.

MESSES. SLATER AND CO., of Oldham, are the makers of a patent adjustable apparatus for doors well worthy of the attention of the profession and the public. The apparatus in question is a draught-preventer or flap, which is fixed to the bottom rails of doors on the outside, and by the pressure of a cushion which fits to the threshold of the doorway, makes an air-tight joint when the door is shut, while when it is opened the flap rises sufficiently to clear the carpet or rug. A model of the "draught-preventer" was exhibited some time ago at the Agricultural Hall, and we may here more particularly describe the apparatus, as we have seen it in use at 70, High Holborn. The invention consists simply of a hinged rail or flap hung along the bottom of door. When the door is opened the apparatus has the appearance of a weather-board projecting at an angle, and sustained in that position by a spring. When the door is closed the rail catches against a plate in the rebate of the frame, and assumes a vertical position, the bottom of it pressing against the carpet and excluding all draught and dust. It is so simple in action that it cannot get out of order, and can be fixed in a few minutes to any door. We can cordially recommend the apparatus of Messrs. Slater to all householders and tenants who have doors which admit draught—a source of constant colds and discomfort in every house. The builder and the architect will welcome this very useful and not unsightly addition to the doors of a house which have invariably to be made to clear thick carpets and mats. We may add that the price for doors up to 36in. is only 6s., and the apparatus can be made in best tanywood or oak from 10s. 6d. The only necessities for ordering the apparatus are the width between the door jambs outside, the position of the hinges of the door, and its thickness. It can also be fixed to folding-doors.

We believe that up to the present the Government have decided not to attempt to deal during the ensuing year with the water supply of the metropolis. The Home Secretary is of opinion that local government must first be established in the metropolis before the water question can be successfully dealt with. Another question which must come on, however—if only in the committee-rooms of the House of Commons—concerns the lighting of London. Three different companies have given notice of their intention to ask Parliament for the right to supply public buildings and private houses in the metropolis with the electric light; and they seek to obtain the usual power of breaking up the streets and interfering with sewers. These will be resisted by the whole strength of the gas companies in London. The Corporation of London and the Metropolitan Board of Works will also take action on the subject, and it is almost certain that they will oppose giving the promoters of the electric light the powers which they ask.

THROUGHOUT Germany the birthday of the Imperial Princess (the Princess Royal of Great Britain and Ireland) has this year been celebrated with special honours. The most striking feature of the celebration was the opening of the new museum of art and industry, in which she has taken an interest for so many years. The new museum is described as a huge square building, erected at a cost to the State of about £150,000. Its architectural style is mainly Classical, and the walls within and without are profusely decorated with sculpture and mosaic. The art treasures already arranged within its walls have been derived from various public and private sources, from the State collections that have hitherto partially served the purpose for which the new and more comprehensive museum is now intended, and from the cabinets of Prussian sovereigns, princes, and other collectors.

DEAN STANLEY has had his will in most things since his death. The successor he named has taken his pulpit. The improvements he desired in the abbey are for the most part to be carried out. The Queen is going to erect one of those windows which the late dean desired to see put in position. But in one matter he is to be defeated. He desired to restore Ashburnham House to the Abbey. But the proposed com-

promise has failed; the house is to be used for Westminster School, and will very probably lose some of its best characteristics. Westminster scholars are hardly the best custodians of an architectural monument.

A SUPPER to the workmen, on the occasion of raising the timber for the roof for his new residence in Portland-square, Carlisle, was given by Mr. Caleb Hodgson, on Tuesday evening last, in the Red Lion Assembly-room. About 60 sat down with Mr. Tom Beatty (of Beatty Brothers, contractors, who had charge of this job) as chairman, supported by Mr. Councillor Corbett; Mr. Graham, clerk of the works, occupying the vice-chair, supported by Messrs. Halliday and Black, contractors for the joinery work. After supper there was a plentiful supply of ale and spirits. The loyal toasts having been given, Mr. Hodgson's health was proposed by the Chairman, and drunk with musical honours, and very cordially responded to by Mr. Corbett, in the absence of Mr. Hodgson. The architects, Messrs. Hetherington and Oliver, were proposed by Mr. John Beatty, who urged the workmen on all occasions to assist the architects in carrying out their designs by good, clean work, so that they might share the pride in an edifice as well as the architects. The contractors were proposed by the vice-chairman, and suitably responded to by the different trades then present.

MR. JOSEPH NETTLEFOLD, managing director and principal proprietor of the great screw-making firm of that name, in Birmingham, died on Tuesday, of apoplexy, at Pitlochrie, Perthshire. Mr. Nettlefold was a Londoner by birth, but had passed the greater part of his life in Birmingham, where he succeeded to his father's interest in the screw-making business of Nettlefold and Chamberlain, in partnership with the present President of the Board of the Trade. On the retirement of the Chamberlain family a few years ago, Mr. Nettlefold assumed the entire management of the concern, which was amalgamated in 1880 with several smaller undertakings of the same character, and converted into a joint-stock company under the name of Nettlefold's (Limited), with a capital of a little over a million sterling. Mr. Nettlefold was a prominent member of the Unitarian connection, and a Liberal, but took little part in public affairs. It is but a few weeks since he announced his intention of presenting his valuable collection of David Cox's pictures to the Birmingham Art Gallery, and this gift had been preceded by other public benefactions, including the site and a material part of the cost of the King's Heath Institute.

THE LORD MAYOR, attended by the Sheriffs of London and Middlesex, will open the Smoke Abatement Exhibition, on Wednesday, Nov. 30, at three o'clock p.m., at the Royal Albert Hall. The opening ceremony will be followed by a private view, and the Exhibition will be opened to the public on and after Thursday, Dec. 1, from ten to four. A great portion of the Exhibition will be shown in action.

LORD DERRY, SIR STAFFORD NORTHOTE, and the other trustees of the Peabody Fund, have been summoned at the Clerkenwell Police Court for allowing certain houses in the vicinity of Brunswick Square, Bloomsbury, to remain a nuisance and unfit for human habitation. The houses had been condemned on sanitary grounds, several fatal cases of fever having occurred in them, and an order was made that the houses should not be used for habitation until further notice. It was explained, however, on behalf of the trustees, that they were not really responsible for the state of things that existed. They had arranged for the destruction of the buildings under the Artisans' Dwellings Act, but the Home Secretary would not grant an order for their demolition until there was a batch of fifteen. That number would soon be reached, when the whole of the buildings would be demolished, and new ones erected in their place.

THE fifty-sixth election of pensioners, in connection with the Builders' Benevolent Institution, was held on Thursday at Willis's Rooms, St. James's, the President, Mr. Ex-Sheriff Burt, J.P., in the chair. There were six candidates, five men and one woman. It was originally intended to elect only two men and one woman; but in consequence of the large amount subscribed in connection with the recent anniversary festival of the Institution, it was determined by the Committee to elect three men.

The candidates were John Willis, aged 65 (second application), who received 2,307 votes; Charles Henry Wood, aged 63 (second application), 1,819 votes; John Loat, aged 84, 1,412 votes; Jonathan Parsons, aged 67, 432 votes; John Cooper, aged 78, 625 votes; and Amelia Stone, aged 60, widow of William Stone (second application), 2,897 votes. Shortly after the close of the poll, at three o'clock, the scrutineers (Messrs. Thos. Stirling and T. F. Rider) reported the result of the voting, as given above, and accordingly the Chairman declared the successful candidates to be John Willis, Charles Henry Wood, John Loat, and Mrs. Stone. Votes of thanks to the Chairman and scrutineers brought the proceedings to a close.

CHIPS.

At the first meeting of the re-elected local board of Oxford, held on Wednesday week, the chairman mentioned that during the year 1,840 yards of new roads had been made up and opened, besides many now in progress; they had also executed 4,670 lineal yards of kerbing and channelling; 1,940 of black bricking and concrete paving; 1,320 of asphalt; and 3,620 yards of sewers and surface drainage. Among the improvements completed during the year were those at New Inn, Hall-street, in St. John's-road, and in Walton-street. Plans for the widening of Magdalen Bridge were in progress, and would soon be laid before the board.

The improvement commissioners of Lowestoft last week instructed their surveyor to prepare plans for main drainage of the southern district, which, including a siphon under the harbour and duplicate drains for sewage and surface water, is estimated to cost £15,000.

In the description last week of the Accrington Conservative Club, the cost was incorrectly stated as £200. This should have been £2,000.

A meeting of the creditors of Daniel Moore, builder, Stafford-street and Bradford-street, Walsall, was held last week. The liabilities were £2,827 6s. 3d., and the assets were estimated at £937 12s. A composition of 5s. in the pound, payable within a week of the registration of the resolution, was offered, and this was afterwards increased to 6s. 8d., the added 1s. 8d. to be secured and paid in three months. The amended offer was carried by a large majority; an amendment in favour of a composition of 7s. 6d. in three equal instalments, at two, four, and six months, receiving only three votes.

Last week a new chapel, which has been erected at Primrose-hill, Huddersfield, for the Baptist denomination, was opened for divine service. The new chapel, which has cost over £1,000, has been erected from designs supplied by Mr. B. Stocks, architect, New-street, Huddersfield, and will accommodate 700 persons. The style is Classic, plainly treated, and most of the stone is from Elland Edge and Crosland Hill.

The largest printing establishment in the North of England has lately been erected at Leeds by Mr. A. Cooke. It is three stories high, and consists of a large open ground-floor, with two stories of galleries running all round, and a large open well. It is mostly lighted from the roof, and the roof glazing is done by Mr. Helliwell, of Brighouse, Yorkshire, on his patent Imperishable Perfection system of glazing without putty.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—Society of Arts. Cantor Lecture No. II.
TUESDAY.—St. Paul's Ecclesiological Society. "A Discourse on the Building of the Chief Monastic Orders in England." By J. T. Micklethwaite, F.S.A. 7.30 p.m.
Institution of Civil Engineers. "Forces and Strains of Steel in the Elastic Field (Gun Carriage)." By H. J. Butter, M.I.C.E. 8 p.m.
WEDNESDAY.—Society of Arts. S.p.m.
Edinburgh Architectural Association. "Architectural Notes in Normandy." By Jas. Gordon. 8.30 p.m.
FRIDAY.—Society of Arts. Special meeting for discussion on the Society of Arts Bill. S.p.m.

Throat Irritation.—Soreness and dryness, tickling and irritation, inducing cough and affecting the voice. For these symptoms use Epps's Glycerine Jubilee. Glycerine, in these agreeable confections, being in proximity to the glands at the moment they are excited by the act of sucking, becomes actively healing. Sold only in boxes, 7½d. and 1s. 1½d., labelled "JOHN EPPS AND CO., HOMOPATHIC CHEMISTS, LONDON." A letter received:—"Gentlemen,—it may perhaps interest you to know that, after an extended trial, I have found your Glycerine Jubilee of considerable benefit (with or without medical treatment) in almost all forms of throat disease. They soften and clear the voice.—Yours faithfully, GEORGE HARRIS, L.R.C.P.E., Senior Physician to the Municipal Throat and Ear Infirmary."

Lamplough's Pyretic Saline is refreshing, most agreeable, and the preventive and curative of FEVERS, RHEUMATISM, SMALLPOX, SCARLET-FEVER, and many other ailments. Sold by chemists throughout the world, and the Maker, 113, Holborn Hill. Use no substitute. See Medical Testimony.

Holloway's Ointment and Pills.—Skin diseases scrofula, scurvy. This class of complaints not only affects the individual, but is too frequently transmitted to the offspring. How important, then, under such serious consequences, it becomes, thoroughly to eradicate strumous taints from the blood. Holloway's Ointment and Pills uproot all such latent corruptions.

Doubling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to **CHARLES TRASK,** Norton-sub-Hamdon, Ilminster, Somerset. —[Advrt.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates. General Repairs and Alterations Executed: Experienced Workmen always in readiness, and sent to any part of the country. —[Advrt.]

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE.
CORSHAM DOWN
CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.
(See trade advt. on p. XXIII.) Advrt.

TENDERS.

* Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ABERDEEN.—For additions to Woodbank House, Cults, near Aberdeen. Messrs. Ellis and Wilson, architects. Quantities supplied by the architects:—

Accepted tenders:—	
Masons' work:—	
Thorn, G., Aberdeen ...	£710 0 0
Grant, W., Aberdeen ...	550 0 0
Davidson, G., Aberdeen ...	51 10 0
Matthews, J., Aberdeen ...	100 0 0
Stephen and Campbell, Aberdeen ...	160 10 0
Donald, G., ...	81 10 0
	£1,653 10 0

ABERDEEN.—For the erection of public school in King-street, for the School Board, to accommodate 840 pupils in three departments—seniors, juniors, and infants, with caretaker's house attached. Messrs. Ellis and Wilson, architects. Quantities supplied by the architects:—

Accepted tenders:—	
Masons' work:—	
Mitchell and Co., A. ...	£2,750 0 0
Johnston and Fullerton ...	1,764 0 0
Wilson, J. ...	186 4 0
Willis and Conden ...	343 0 0
Masson and Findlay ...	335 5 0
Garvie and Sons, J. ...	160 0 0
	£5,538 9 0

AMERSHAM.—For building a shed for tramps to work in, for the Amersham Board of Guardians:—

Keen, Amersham (accepted) ... £62 10 0

ANGLESEY.—For new mansion, for Capt. G. Pritchard Rayner, at Trecawen, Anglesey. Mr. R. G. Thomas, Menai Bridge, architect:—

Bromwich, Foster and Co., Rugby (accepted) £13,790 0 0

(All casting and stone provided by proprietor.)

ANGLESEY.—New stables for Captain G. Pritchard Rayner, at Trecawen, Anglesey. Mr. R. G. Thomas, architect, Menai Bridge:—

Mr. D. Owen, Llangefni (accepted) £1,500 0 0

(All casting and stone provided by proprietor.)

BAGSHOT.—For new stables, Pennyhill Park, Bagshot. Mr. H. Pettit, architect:—

Norris ...	£3,287 0 0
Boyer ...	3,273 0 0
Holland and Hannen ...	3,267 0 0
Nightingale ...	3,195 0 0
Lawrence ...	3,150 0 0
Knight and Sons ...	3,080 0 0
Stimpson and Co. ...	3,045 0 0
Watson ...	2,930 0 0

BATTERSEA, S.W.—For new roads and sewers, for Mr. F. Snelling, on the estate of the late Mr. T. Taylor, at Lavender Sweep, Battersea Rise. Mr. C. J. Bentley, surveyor:—

Williams, W. R. ...	£1,060 0 0
Ball, J. ...	1,030 0 0
Harris ...	900 0 0
Nowell and Robson ...	820 0 0
Neal, R. and G. ...	790 0 0
Blackmore ...	790 0 0
Neal, J. ...	780 0 0

BERMONDSEY.—For two new houses adjoining No. 140A, Abbey-street, for Mr. W. Wilkins. Mr. E. Crosse, 6, Bermondsey-square, S.E., architect. Reduced estimate:—

Winer, W. (accepted) ... £650 0 0

BERMONDSEY.—For furniture and fittings, Bermondsey Town Hall. Messrs. John Elkington and Son, architects:—

Seix and Son ...	£1,220 0 0
Lucraft & Son ...	1,150 0 0
Schoolbred & Co. ...	1,102 12 0
Mr. F. C. Turpin ...	945 0 0
Tarn and Co. ...	910 0 0
Bartholomew and Co. ...	895 0 0
Atkinson and Co. ...	873 0 0
Finch, J. and Co. (accepted) ...	801 12 6

BETHNAL GREEN, E.—For alterations at No. 61, Green-street, Bethnal Green, for Mr. Mardoy. Mr. C. A. Legg, architect:—

Wood, F. and F. J. ...	£432 0 0
Judd ...	341 0 0
Elves ...	340 0 0
Lusk ...	332 0 0
Farrish (accepted) ...	320 0 0

BLACKBURN.—For supply of 500 ash-tubs and 500 excreta-tubs to the Corporation. Mr. W. B. Bryan, borough engineer:—

Accepted tenders.

Franklin, J., Blackburn, and Purvis, W., Padiham.

BLACKBURN.—For supply of a cast-iron Coff-y's still and heating boiler, to be erected at the Fensington Ammonia Works, for the Corporation:—

Heald, J., Chorley (accepted).

BRIGHTON.—For temporary buildings and annexes to the Pavilion, for the Health Congress:—

Humphreys, J. Charlton, Brighton (accepted).

BROMPTON.—For the Oratory New Church. Mr. H. A. K. Gribbles, architect. Mr. H. Smith, and Messrs. Lee and Soa, surveyors:—

For the first section of the cupola:—

Shaw, G., Westminster (accepted) £4,500 0 0

For St. Wilfrid's Chapel (exclusive of the breccia columns):—

Shaw, G. (accepted) ... 3,000 0 0

For the Magdalen Altar (exclusive of floor and marble rails):—

Goad and Co., Plymouth (accepted) 1,040 0 0

BURNISLAND, N.B.—For construction of 400ft. of sea-wall on the shore to the west of the tidal harbour. Mr. R. Henderson, harbour engineer:—

Wilson, J. and Son, Glasgow ...	£7,100 4 0
Lawson and Best, Edinburgh ...	5,580 16 3
Jackson, J. and P., Burntisland ...	4,764 0 2
Morrison, J. W., Edinburgh ...	3,692 5 2
Penny, P., Burntisland ...	3,769 19 8
Henderson, Matthew, and Co., Edinburgh ...	3,742 3 3
Coghill, A. and Co., Glasgow ...	3,523 0 0
Chalmers, W., Aberdeen ...	3,097 0 0
Mason, D. and Sons, Dysart ...	2,910 18 7
Waddell, G., Edinburgh ...	2,885 6 9
Chalmers, T., Dunfermline (accepted) ...	2,800 0 0

BURNISLAND, N.B.—For (Contract 3) repairs and alterations to quay walls at entrance of wet dock, Burntisland Harbour. Mr. R. Henderson, Burntisland, harbour engineer:—

Brand, C. and Son, Glasgow ...	£2,000 18 6
Oliver and Arrol, Edinburgh ...	1,788 14 6
Wilson, J. and Son, Glasgow ...	1,724 17 6
Lawson and Best, Edinburgh ...	1,707 2 8
Coghill, A. and Co., Glasgow ...	1,690 2 6
Morrison, J. W., Edinburgh ...	1,610 4 8
Baine, J., Bo'ness ...	1,601 8 3
Penny, P., Burntisland ...	1,327 12 3
Henderson, Matthew, and Co., Edinburgh ...	1,319 8 3
Chalmers, W., Aberdeen ...	1,269 12 0
Chalmers, T., Dunfermline (accepted) ...	1,231 13 9

BURY, LANC.—For foundations and cellaring of the proposed Turf Hotel, Wash-lane and Deal-street, Bury, for Mr. J. Wagstaff, Messrs. Sellers and Hamilton, Union Chambers, Bury, architects:—

Woodhead, B., Bury (accepted) ... £335 0 0

(Lowest tender received.)

CANBESWELL.—For repairs to eleven houses, Alhany-road, for Mr. H. W. Wilson. Mr. E. Crosse, 6, Bermondsey-square, S.E., surveyor:—

Warren, G. ...	£238 0 0
Kipps, S. ...	220 10 0
Baldwin, H. (accepted) ...	225 19 0

CESNE ABBAS.—For repairs and alterations to the work-house of Cerne Union. Mr. A. Chapman, Dorchester, surveyor:—

Northover, J., sen., Cerne Abbas (accepted) £94 10 0

CHATHAM.—For improvement works at Chatham Railway Station:—

Naylor and Son (accepted).

(The cost will amount to about £20,000.)

CRESSHAM.—For the construction of waterworks, * for the Amersham Rural Sanitary Authority. Mr. J. Mansergh, C.E., engineer:—

The following contractors have written to the authority stating that they have discovered that they had made errors in calculation:—

Fawkes Bros. ...	£3,062 instead of £3,013 19 7
Curral and Lewis ...	7,569 " 7,575 8 0
Trim, R. C. ...	7,672 " 7,478 4 10
Rowles, W. ...	7,245 " 7,235 2 2
Wilkes and Co. ...	7,698 " 7,226 0 0
Hill Bros. ...	7,439 " 7,139 12 9

* For list of original tenders see p. 645 in our issue of Nov. 11.

CLAPHAM, S.W.—For the erection of house in Nightingale-lane, Clapham Common. Mr. Sancton Wood, architect:—

Halt and Beddall ...	£4,260 0 0
Patrick ...	4,098 0 0
Ryden, T. ...	3,768 0 0
Chappell ...	3,750 0 0
Brass ...	3,698 0 0
Colls and Sons ...	3,570 0 0
Dove ...	3,545 0 0
Stimpson and Co. ...	3,467 0 0

CLAPHAM, S.W.—For new roads and sewers, for Mr. H. Bragg, at St. John's Hill, Clapham Junction. Mr. C. J. Bentley, surveyor:—

	Plan A.	Plan B.
Ball, J. ...	£1,018 3 0	£1,046 15 0
Blackmore ...	825 0 0	960 0 0
Neal, J. ...	740 0 0	870 0 0
Neal, R. and G. ...	730 0 0	995 0 0

* Accepted for plan B.

CHRISTCHURCH, HANTS.—For putting a new roof of English oak on the north transept of the Priory Church, Christchurch, Hants. Mr. B. E. Ferrey, F.R.I.B.A., 15, Spring-gardens, S.W., architect:—

	Amount.	Alternative for extended time.
White and Sons, London ...	£790 3 0	—
Both, G. W. & Sons, London ...	745 0 0	745 0 0
Higgs and Hill, London ...	741 0 0	720 0 0
Hoare Bros and Walden, Bournemouth ...	740 19 0	730 10 0
Griffin, Wimbourne ...	732 7 0	—
Stowe, Chr stehurch ...	722 10 0	610 10 0
Seale Bros., Richmond ...	507 0 0	595 0 0
Minty, Bournemouth ...	—	575 10 0
Hyde, Christchurch ...	400 0 0	433 0 0
Jenkins & Son, Bournemouth ...	483 0 0	479 0 0
Howe, Christchurch ...	419 14 0	—

COLERAINE.—For erection of station buildings at Coleraine, for the Belfast and Northern Counties Railway Company. Mr. Robert Collins, Belfast, engineer:—

Christie, D., Coleraine ...	3,857 0 0
Stewart, Thomas, Belfast ...	3,817 0 0
McClelland & Co., M., Londonderry ...	3,735 0 0
Corry, Robert, Belfast ...	3,637 0 0
Rodgers and Craig, Whiteabbey ...	3,592 0 0
Kirkpatrick, I. and R., Coleraine ...	3,500 0 0
Lowry and Son, John, Belfast ...	3,495 0 0
Silo and Mathews, Belfast ...	3,475 0 0
Lavery, Henry, Carrickfe gus ...	3,420 0 0
Fagan, John, Belfast ...	3,275 0 0
McMaster, W. B., Belfast ...	3,245 0 0

CROUCH END, N.—For the erection of a new house and offices at Crouch End, for Mr. John Smith. Mr. T. E. Colcutt, architect:—

	*	†	‡
Wheeler ...	£2,376	£167	£20
Hallday ...	2,375	149	40
Williams and Son ...	2,345	140	30
Stimpson and Co. ...	2,133	155	33
Julian and Co. ...	2,060	120	12
Nightingale ...	2,019	136	15
Taylor and Parfitt ...	1,995	112	10

* House, including fence. † Boundary fence. ‡ Amount allowed if burnt ballast is used.

CROWBOROUGH, SUSSEX.—For additions to the Hermitage, for Mrs. J. H. Barclay. Mr. Edwin T. Hall, A.R.I.B.A., architect:—

Punnett and Sons, Tonbridge (accepted) £350.

DOVERCOURT.—For repairs to the church property at Dovercourt. Mr. H. M. Epton, Ipswich, architect:—

Moran, Harwich ...	£350 0 0
Seely, Harwich ...	297 0 0
Smith, Beaumont, & Dawson, Harwich ...	240 0 0

* Accepted.

DUBLIN.—For erection of new buildings, Cabra-road, farms, for the North Dublin Union. Mr. W. H. Byrne, 52, Dame-street, Dublin, architect:—

Donnelly ...	£10,647 0 0
Millar ...	10,200 0 0
Colles Bros. ...	9,500 0 0

[Fourteen tenders for the work were received, ranging downwards from £13,224, the above being the three lowest.]

DUNDEE.—For the construction of the new Tay Bridge. Messrs. Barlow, Westminster, engineers:—

Arrol and Son, Glasgow, (accepted).

EGHAM.—For shop at Egham. Mr. J. D. Wood, architect:—

Smith, J. and Sons ...	£1,427 0 0
Simpson ...	1,421 0 0
Messon ...	1,375 0 0
Wadey ...	1,333 0 0
Loe, N. ...	1,295 0 0
Reavell, G. ...	1,275 0 0
Oades, J. L. and Sons ...	1,263 0 0
Seal Bros. ...	1,259 0 0
Evans, R. and E. ...	1,235 0 0
Higgs, J. ...	1,197 0 0
Parker, G. ...	1,179 0 0
Warr, F. ...	1,157 0 0
Higgs, F. ...	1,152 0 0

FISCHLEY.—For sanitary work, Elm Park Estate, Finchley. Messrs. E. E. Croucher and Co., 76, Chancery-lane, W.C., surveyors:—

McKenzie, Williams, and Co. (accepted) £200.

GIPSY HILL, S.E.—For residence, for Mr. W. H. Vaughan. Mr. Edwin T. Hall, A.R.I.B.A., architect.

Quantities by Messrs. Evans and Deacon:—

Marriott Bros., High Barnet ...	£2,951 0 0
Holloway, J., Lavender Hill ...	2,741 0 0
Garnham, J., Norwood ...	2,734 0 0
Fox, C. W., Anerley ...	2,710 0 0
Fisher, G. and S., Camberwell ...	2,576 0 0
Nightingale, B. E., Lambeth ...	2,430 0 0

* Accepted.

HAMMERSMITH, W.—For proposed alterations and additions at the Grange, Brook-Green, Hammersmith. Mr. F. Pinches, architect:—

	Extra for Keene's Cement.
Macey ...	£5,130
Colls ...	4,570
Adamson ...	4,490
Thorne ...	4,400
Wall, C. ...	4,314
Stimpson and Co. ...	4,230
Knight ...	4,209

HOLYWELL.—For repairs, alterations, and additions to farmhouses and buildings at Holywell, Carby, and Carby, on the Estate of Mr. C. F. S. Birch-Reynardson. Mr. J. B. Corby, Stamford, architect:—				
	Holywell.	Carby.	Carby.	Total.
Story and Son, Swinstead ...	446 5 9	582 1 3	£195 18 0	£1,450 5 0
Hilliam, Stamford ...	481 10 0	755 15 0	115 10 0	1,352 15 0
Perkins, W. and J., Euston ...	451 0 0	769 0 0	116 0 0	1,336 0 0
Holmes and Sharp, Carby ...	469 17 6	754 13 0	125 10 0	1,354 0 6
Scholes, R., Stamford ...	133 0 0	739 0 0	152 0 0	1,024 0 0
Roberts, J., Hyhall ...	396 12 0	727 4 6	137 2 0	1,260 18 6
Gray Bros., Peterboro' ...	401 15 10	627 0 8	115 0 8	1,143 17 2
Ludlow and Emerson, Stamford ...	410 0 0	670 0 0	133 0 0	1,213 0 0
Woolston, J., Stamford ...	585 0 0	653 0 0	119 0 0	1,357 0 0
Clark and Rouse, Stamford ...	403 4 1	611 13 0	130 9 0	1,145 6 1
HORNSEY, N.—For lowering, widening, sewerage, and metallog a portion (about 800 ft.) of Shepherds Hill-road, Archway-road, for the Hornsey Local Board. Mr. T. De Courcy Meade, surveyor:—				
Pizzey, J., Hornsey ...	£1,296 0 0			
McKenzie, Williams & Co., Moorgate ...	1,188 0 0			
Bowley, T., Tottenham ...	1,170 0 0			
Strachan and Co., Wood Green ...	1,099 17 0			
Jackson, F. A. & Sons, Finsbury Pk. ...	1,095 0 0			
Walker, A., Upper Holloway ...	1,089 0 0			
Dunmore, W. T., Crouch End ...	1,073 0 0			
Randall & McDowell, Shacklewell ...	1,060 0 0			
Ford and Everett, Westminster ...	866 0 0			
*Accepted.				
HENDERSFIELD.—For the construction of a new road at Golear, near Huddersfield. Messrs. Mallinson and Collins, Huddersfield, engineering surveyors:—				
Graham, B., and Nephew ...	£1,734 0 0			
Bainforth, J. ...	1,699 6 6			
Graham, B. ...	1,544 0 0			
Mallinson, W. and Sons ...	1,298 0 0			
Helliwell, J. ...	1,149 0 0			
IPSWICH.—For alterations to laundry at St. John's Boys' Home, for the Ipswich board of guardians:—				
Girling, R., Ipswich (accepted) ...	£149 5 0			
KENTISH TOWNS, N.W.—For repairs to thirty-two houses at Kentish Town, for the Rev. Mr. Blew. Mr. Walter Barnett, architect:—				
Pusey and Lumley ...	£716 0 0			
Parsons ...	700 0 0			
Hewlett ...	635 0 0			
Spencer and Co. ...	670 0 0			
Stevens Bros. ...	482 0 0			
Gentry ...	398 11 0			
KETTERING.—For the erection of two shops and houses, Rockingham-road, Kettering. Mr. T. Whitney, jun., Kettering, architect:—				
Accepted tenders:—				
Coltman ...	£534 0 0			
Carpenters, &c.:—				
Tayne and Son ...	557 0 0			
Stonework:—				
Millins ...	259 0 0			
LEYTON.—For proposed new roads, sewers, &c., on the Great House Estate, Leyton, for Messrs. Melkide and Passmore:—				
Crockett, Battersa ...	£2,887 0 0			
McKenzie, London ...	1,445 0 0			
Dunmore, Hornsey ...	1,375 0 0			
Harris, Camberwell ...	1,081 0 0			
Keeble, Regent's Park ...	1,070 0 0			
Wilson, Walthamstow ...	1,063 0 0			
Pell, Bromley, Kent ...	1,055 0 0			
Acock, London ...	1,048 0 0			
Bloomfield, Tottenham ...	1,029 0 0			
Pizzey, Hornsey ...	975 0 0			
Jackson, Leyton (accepted) ...	966 0 6			
LAMBETH, S.E.—For painting the exterior of the infirmary, for the Lambeth board of guardians:—				
Majors, H. ...	£1,275 10 0			
Ellis W., Edgware-road ...	928 15 3			
Gladding, W., Mile end ...	775 0 0			
Tosser, F. R., Notting hill ...	692 13 2			
Hancock, W., Battersea ...	619 15 0			
Smith, W., Kennington ...	483 0 0			
Main, J., Battersea Rise ...	456 4 8			
Flaming, M. & M., Pall Mall ...	450 0 0			
Scarborough, R. B., Peckham ...	437 0 0			
Derby, W., Lambhouse ...	434 0 0			
Stevens, F. ...	322 0 0			
McCarthy, M., Chelsea ...	389 0 0			
Lapthorne, T., Lambeth ...	379 0 0			
Billard, J., Ball's Pond ...	368 0 0			
Cross, C., Shepherd's Bush ...	367 0 0			
Brown, W., Surrey Gardens Estate ...	340 0 0			
Byford and Gault ...	285 0 0			
Stuart, Lorrain resquare ...	284 7 10			
Ford, J., Wilton-Trees-Walk ...	268 15 0			
McCarthy, P., Chelsea ...	250 0 0			
*Accepted.				

LAMBETH, S.E.—For the supply of 100 tons of granite, for the Lambeth board of guardians:—				
Gabriel (accepted):—				
LAMBETH, S.E.—For the enlargement of the school in Walnut-tree walk, Kennington-road, by 400 places, for the London School Board. Mr. E. H. Robson, F.S.A., architect to the board:—				
Lathey Bros. ...	£6,911 0 0			
Higgs and Hill ...	6,492 0 0			
Marsland, J. ...	6,345 0 0			
Jerrard, S. J. ...	6,343 0 0			
Nightingale, B. E. ...	6,178 0 0			
Stimpson and Co. ...	6,148 0 0			
Wall, C., Chelsea (accepted) ...	5,990 0 0			
[(a) Cost of school buildings only, £2,453; (b) cost of improvement and playground, £165; (c) cost of boundary wall and gates, £221; (d) cost of covered playgrounds, £250; (e) cost of teachers' rooms, £200; (f) cost of re-arranging w.c.'s for whole school, £346; (g) cost of additional classrooms and lavatories, staircase, &c., for whole school (no boys' stairs at present), £1,682; (h) cost of works to present school, £566; (i) cost of making good to old walls adjacent, £19; (j) extra depth of excavations, £55; total, £5,990. Cost per head of (a), £6 4s. 3d.; total cost per head, £14 12s. 6d.]				
LEYTONSTONE, ESSEX.—For new house, with shop and offices, &c., in High-road, Leytonstone, corner of Grove Park road, for Mr. Watkins. Mr. E. Cross, 6, Bernand-square, S.E., architect:—				
Winsor, W. (accepted) ...	£632 14 10			
LONDON.—For parochial schools, Old-street, St. Luke's, E.C. Mr. A. Allen, architect:—				
Moulton ...	£2,388 0 0			
Dove Bros. ...	2,675 0 0			
Lawrence ...	2,845 0 0			
Brass ...	2,535 0 0			
Harper ...	2,487 0 0			
Wall Bros. ...	2,414 0 0			
LONDON.—For erection of new buildings, at 14, Austin Friars, E.C., for Mr. Henry Oppenheim, Mr. E. A. Gruning, (architect). Quantities by Messrs. H. Blackwell and R. Griggs:—				
Mowlem, J., and Co. ...	£11,229 0 0			
Colls and Sons ...	10,670 0 0			
Holland and Hannen ...	10,514 0 0			
Lawrence, E. ...	9,975 0 0			
Brass, W. ...	9,893 0 0			
Clarke & Bracey (accepted) ...	9,885 0 0			
LONDON.—For the erection of premises in Carter-lane, Doctor's Commons. Mr. Alexander Peebles, A.R.I.B.A., architect:—				
McCormick and Sons ...	£7,778 0 0			
Colls and Sons ...	7,501 0 0			
Hall, Reddall, and Co. ...	7,357 0 0			
Jerrard ...	7,046 0 0			
Mark, Patrick, and Son ...	6,973 0 0			
Lathey Bros. ...	6,904 0 0			
Macey and Sons ...	6,865 0 0			
Asbby and Horner ...	6,780 0 0			
Asbby Bros. ...	6,576 0 0			
Kirk and Randall ...	6,506 0 0			
Morter ...	6,430 0 0			
Clark and Bracey ...	6,408 0 0			
Lawrance ...	6,185 0 0			
Perry and Co. (accepted) ...	6,175 0 0			
LONDON, E.C.—For mahogany work at Leadenhall House, Leadenhall-street. Mr. J. Lewis Holmes, architect:—				
Kirk, G. ...	£113 10 0			
Hewlett ...	104 9 0			
Somerville and Smith ...	102 13 5			
LONDON, N.W.—For alterations and repairs to Christ Church Schools, Hampstead, for the Committee. Mr. C. A. Legg, architect:—				
Julian, J. E. and Co. (accepted) ...				
LONDON, N.W.—For sundry repairs and reinstatements at 1 and 2, Manchester-terrace, Kensal New Town, for Mr. F. Allum. Mr. J. H. Taylor, architect:—				
Middleweek ...	£165 0 0			
Backholder ...	150 0 0			
Lamble ...	150 0 0			
Cooper ...	145 0 0			
Handover (accepted) ...	129 0 0			
LONDON, W.—For alterations and additions to the Metropolitan Music Hall, Edgware-road, for Mr. H. G. Lake. Mr. J. H. Taylor, architect. Quantities by Messrs. New and Son:—				
Mark ...	£1,288 0 0			
Temple and Forster ...	1,275 0 0			
Cowlands ...	1,175 0 0			
Hook (accepted) ...	1,145 0 0			
LONDON, W.—For alterations and additions to 102, 104, and 106, Norfolk-terrace, Notting-hill, for Mr. W. Mardell. Mr. J. H. Taylor, architect:—				
Mardell, Thomas (accepted) ...	£1,020 0 0			
MAIDSTONE.—For the construction of a railway between Maidstone and Ashford, for the London, Chatham, and Dover Railway. Mr. Hopkins, engineer:—				
Lucas and Aird (accepted):—				
MILTON.—For the construction of pipe-sewers, with lamp-holes, manholes, flushing chambers, &c., for the Improvement Commissioners of Milton-next-Sitting-bourne:—				
Wilkes and Co., Bishopgate (accepted):—				
MITCHEAM, SURREY.—For completing houses at Mitcham. Mr. J. H. Taylor, architect:—				
Backholder ...	£191 0 0			
Preece ...	191 0 0			
Marks ...	190 0 0			
Handover ...	159 0 0			
Mont ...	111 7 11			
Schoolers (accepted) ...	110 0 0			
NEWCASTLE-ON-TYNE.—For supply and fixing a wrought iron railing, 4ft. 6in. high, to enclose vacant ground round the Fish Market Close, for the Corporation:—				
Toward, T. and W., St. Lawrence, Newcastle * Accepted.				
[Eight tenders received.]				

NEWCASTLE-UNDER-LYME.—For widening and sinking a well at the workshop, Newcastle-under-Lyme. Mr. Harold Bonser, Clifton-terrace, Newcastle, engineer:—				
Rawson & Co., O. Stoke-on-Trent	£199 17 0			
Turner, L., West Bromwich	163 5 0			
Berry, J., Newcastle (Staffs)	153 0 0			
Jones, T., Penkhal, Stoke-on-Trent*	145 2 6			
Hugh, L., Newcastle (Staffs)	57 0 0			
* Accepted.				
NEW MALDEN.—For villa residence, Norbiton Park Estate, New Malden, near Waddon, for Mr. R. E. Matthews. Mr. T. L. Heward, architect. Quantities supplied:—				
Turtle and Appleton	£1,135 0 0			
Lane, W.	923 0 0			
Rice, D. S.	879 0 0			
Johnson, W.	782 0 0			
Sounders, J. (accepted)	777 0 0			
NOTTINGHAM.—For pulling down premises in Angel-row and Mount-street, Nottingham, and erecting sale shop and other premises thereon. Mr. R. Clarke, architect:—				
Mr. J. T. Carlton (accepted),				
ORPINGTON.—For the erection of a country residence at Start's-hill, Orpington, for Mr. J. L. Lovibond. Mr. G. St. Pierre Harris, architect:—				
Grubb	£1,385 0 0			
Haisman	1,156 0 0			
Wood	1,130 0 0			
Taylor and Son (accepted)	1,049 0 0			
ORPINGTON.—For stables, coachhouse, &c., at the Maxwell Arms, Orpington, for Messrs. John Fox and Sons. Mr. G. St. Pierre Harris, architect:—				
Treadwell	£829 0 0			
Grubb (too late)	845 0 0			
Wood	476 0 0			
Haisman	459 0 0			
Taylor and Son (accepted)	458 0 0			
ORPINGTON.—For school-room at Start's-hill, Orpington. Mr. G. St. Pierre Harris, architect:—				
Haisman (accepted)	£270 0 0			
OSWESTRY.—For laying about 400 yards of 15in. pipe and 600 yards of 12in. pipe, with manholes, &c., in Pool-road and Weston-lane. Mr. W. J. Hodgson, borough surveyor:—				
Harris, J., Shrewsbury	£440 0 0			
Watkin, Jones, Rhos	439 0 0			
Thomas, W. and G., Oswestry	523 0 0			
OSWESTRY.—For extension of culvert, &c., at sewage works. Mr. W. J. Hodgson, borough surveyor:—				
Owen, B., Wrexham (accepted)	£30 0 0			
PECKHAM, S.E.—For the erection of new Sunday schools in rear of Congregational chapel, Asylum-road, Peckham. Mr. J. Wallis Chapman, architect. Quantities by Messrs. Goodchild and Son:—				
Jerrard	£1,530 0 0			
Woodward	1,519 0 0			
Taylor	1,437 0 0			
Tarrant	1,394 0 0			
Rickett	1,260 0 0			
Pack Brothers, Brixton (accepted)	1,198 0 0			
RATCLIFF.—For alterations to the Crown and Anchor public house, Brook-street, Ratcliff, for Mr. T. D. Hill. Mr. T. W. Barry, 9, Hart-street, Bloomsbury, architect:—				
Messrs. King and Son	£520 0 0			
Shuff, T.	430 0 0			
Bodwin (accepted)	350 0 0			
ROMFORD, ESSEX.—For planting 560 trees along the borders of the Eastern, Western, and Junction-roads:—				
Meadmore (accepted), 4s. per tree (lowest tender). (Tenders also received from Messrs. Nicholls, Rawlings, and James Smith.)				
SHEFFIELD.—For erection of a house at Carsick Hill. Sheffield (second design), for Mrs. Birks. Mr. E. R. Robson, architect:—				
Ridal and Armitson	£5,405 6 10			
Bromwich, Foster, and Co.	5,411 0 0			
Chadwick and Co.	4,750 0 0			
Bissett, W. and Son	4,600 0 0			
Stone, J.	4,574 0 0			
Tomlinson and Son (accepted)	4,490 0 0			
SKEGNESS.—For new Wesleyan Chapel at Skegness. Mr. C. Bell, F.R.I.B.A., architect:—				
Kidd	£2,575 0 0			
Dunkley	2,150 0 0			
Topham	2,031 0 0			
Riggall	1,980 0 0			
Holmes (accepted)	1,847 0 0			
SOUTH TOTTENHAM.—For mission chapel at South Tottenham. Mr. C. Bell, F.R.I.B.A., architect:—				
Humphreys and Son	£1,257 0 0			
Thornton	1,162 0 0			
SOUTHBURY, LANC.—For supply of 60 cast iron gully grids, to weigh 2 cwt. each. Mr. W. Crabtree, borough surveyor:—				
Horrocks and Owen, Tyldesley, Manchester (accepted), 3s. 11d. per cwt.; Howard and Ball, Ormskirk, 4s.; Smith, Patterson, and Co., Blaydon-on-Tyne, 4s. 6d.; J. and S. Roberts, West Bromwich, 5s. 4d.; Jukes, Coulson, Stokes and Co., 13, Clement's-lane London, 5s. 4d.; The Brymbo Co., Wrexham, 5s. 6d.; Joseph Clayton, Preston, 5s. 6d.; J. Hollinrake, Rochdale, 5s. 6d.; S. Rowland, Wigan, 5s. 6d.; J. Brown, Bolton, 5s. 7½d.; M. and Co., Leicester, 5s. 8d.; J. Fletcher and Sons, Salford, 5s. 9d.; Wear Valley Foundry Company, Darlington, 5s. 10d.; W. Miller and Sons, Wolverhampton, 5s. 11½d.; J. S. Smethurst, Warrington, 5s. 11½d.; Clay Cross Company, Clay Cross, near Chesterfield, 6s.; Goddard and Messy, Nottingham, 6s. 3d.; Hill and Smith, 6d.; Hargill Hill, 6s. 3½d.; C. H. Taylor, Leeds, 6s. 6d.; Haigh Foundry Company, Wigan, 6s. 8d.; W. C. Holmes and Co., Huddersfield, 6s. 8½d.; Walker, Pendleton, and Co., Liverpool 1, 6s. 9d.; Wm. Jones and Sons, Warrington, 6s. 11d.; Sharpe and Co., Lancaster, 7s.; J. and A. Law, Glasgow, 7s. 2d.; Abbot's Foundry Company, Falkirk, 7s. 6d.; Langley Mill Engineering Company, Langley Mill, Notts, 7s. 7½d.; Ludlow and Sons, Glasgow, 8s. 8d.; S. M. Mitton, Birmingham, 8s. 1d.; R. and J. Rankin and Co., Liverpool, 9s.				

THE BUILDING NEWS.

LONDON, FRIDAY, DECEMBER 2, 1881.

INTERNATIONAL EXHIBITION OF SMOKE-PREVENTING APPLIANCES.

AFTER some delay and disappointment to many of the exhibitors, the Smoke Abatement Committee of the National Health and Kyrle Societies have opened their exhibition of smoke-preventing appliances in the arcades and quadrants inclosing the gardens of the Royal Horticultural Society. The arrangements made by the committee were of the most complete kind, and the exhibition, as may have been anticipated, includes apparatus of all kinds from improved firegrates and cooking appliances to varieties of bituminous and anthracite coal and special kinds of fuel. But the principal value of the exhibition lies in the fact that it is intended to be a competitive trial of the merits of the several appliances known for preventing or lessening smoke and economising fuel, and with this object the promoters have not confined it to the production of British manufacturers, but have invited the exhibition of appliances of manufacturers and inventors from all nations. The exhibition comprises two classes of appliances, one having reference to domestic purposes, and the other to industrial uses. Glancing at the different inventions for the purpose of preventing or abating the smoke, we notice a variety of plans for effecting the purpose, though the majority of these can claim no originality. Many of them have been introduced by different inventors during the last hundred years in one form or another, and others are modifications of plans well known to the architect and engineer. There are several means, for instance, seen for regulating the quantity of fuel consumed: some of these depend on movable bottoms for raising the fire, and of introducing fresh fuel below; others are constructed on the Arnott principle, of preventing smoke by igniting the fuel on the top, and allowing the coal to burn downwards, for which purpose a movable blind is made to move down as the fire burns; such is the principle admirably shown in Messrs. Edwards and Sons' modification; while another ingenious appliance shows a movable back, by which the fuel is pushed forward as it is burned, and the fresh coal is introduced behind. There is also an invention for covering the fire by a flap, and for diverting the smoke into side flues, and for introducing fuel at the bottom of the grate.

Commencing at the east arcade adjoining the Exhibition-road, we notice several exhibits. Kite and Company still retain the excellence of their ventilating or exhaust contrivances, specimens of ventilators for extracting sewer-gas from soil pipes, inlets for letting down fresh air into drains, ships, &c., and a capital exhaust ventilator for farm buildings, warehouses, &c., which can be fixed upon the ridge—may be seen in action. We have already spoken of the siphon system of ventilation for drains, recommended by Messrs. Kite; and we may now refer particularly to a capital chimney-top to prevent smoke, and a hay-drier, constructed on the same principles. Passing by a stove for cooking, with a jack for turning the meat, shown by W. Sugg and Co., we reach some interesting sanitary exhibits by the Wilson Engineering Co., particularly the "smoke-consuming range and stove," by which the cold air is made to travel through flanged chambers, so that the heated air mingles with the smoke, &c., producing perfect combustion. We next come to

several appliances of a very useful kind. George Haller and Co., of Lime-street, E.C., are the manufacturers of a patent "hot-air gas-stove" (Kohlhofer's). By this principle the products of combustion are immediately divided and carried through flues or pipes which join and unite into a common flue. A model of a chimney breast is shown with the flue-pipes descending on each side, and then rising where they join a centre flue. Cold air is warmed and discharged by openings above. The advantage of this system is that it can be made to retain the open firegrate, and little or no smoke is evolved. A capital radiating stove for apartments is shown by Michel Perret, Paris, called the "Calorifere." The water-cased firegrate for boilers is also an economical plan. The "Griffin" firegrate, which burns coal or coke, is an attempt to produce a perfect combustion of both fuel and smoke. The smoke is prevented by a super-heated air-chamber behind and above the fire, which heats the gases or smoke to the temperature necessary for its conversion into flame. Another economic open fireplace, the "Shrewsbury," invented by Wm. White, F.S.A., architect, and made by T. Gregory, of Clapham Junction, is self-feeding, smoke-consuming, and wasteless, according to its author. The "Warming Apparatus," under the same name, is a furnace of fireclay placed in an air-chamber, with gills, self-feeding, and of slow combustion. The feed is at the top and is a fireclay funnel over centre of the fire. As fire burns the fuel descends, and no cold air can come in contact with the fresh-kindled fuel. The smoke is therefore made to pass through hottest part of fire, and the combustion is thus more perfect. No iron is in contact with the fire, and the smoke-draught carried on either side, and then at the back is brought down by two flues uniting in one central flue at the bottom, from whence it is carried off by the chimney. The gilled iron outer case is fitted together by sand-groove joints. It is said the apparatus will burn for 15 hours without attention. Thomas Potter and Sons, of Oxford-street, W.C., exhibit Mr. H. Saxon Snell's patent smoke-consuming revolving firegrate, by which means the fire or fuel can be reversed, so that the new fuel, when placed on the top, can be inverted and the fire made to burn downwards, and the products of combustion consumed.

One of the best appliances for preventing smoke is introduced by A. E. Engert, by which means the ordinary open grates can be fitted with a coking-box at the back, which is filled with the fresh fuel, made movable, and can be pushed forward into the fire by a movable plate moved by a screw, which is turned by the poker in front. As the coals are brought forward and consumed, the plate can be turned back and the box refilled. The object of this simple and scientific arrangement is to prevent the cold air from coming in contact with the gases rising from fresh coals. The gases are condensed, and hence smoke prevented or reduced. The apparatus has the advantage of simplicity and economy, and while the fuel is thoroughly burnt smoke is abated. Mr. Engert's vertical boiler has the coking boxes on each side, and movable plates, actuated by racks, push the coals into the furnace. The principle is the same as in the other of this inventor's apparatus, namely, to admit only ready-heated air, so that as the gases are liberated they are burnt. The "Smoke-burning Gill Register" of the Derwent Foundry Co., to burn common coal, is constructed with flues at back with an air opening below, and a grating above fire to admit warm air into room, and appears to give a cheerful fire. One of the completest exhibitions of grates and chimney-pieces is the collection of Barnard, Bishop and Barnards, of Norwich and Queen Victoria-

street, in block XVIII. The exhibits occupy 4 or 5 bays of the east quadrant, and are furnished in a highly decorative manner. The "Glow" slow-combustion firegrate consumes the products of combustion, and from its construction, which consists of an air-chamber behind the fire, a fire-brick back, and a patent fire-brick baffle over the fire, into which hot air is discharged from the air-chamber, there is a large surface of heat presented to the room, and smoke is obviated. The "slow-combustion stoves" are too well known by our readers to need description; there are several modifications exhibited, besides a large dog-grate in an oak and tile chimney-piece, and we believe the smoke nuisance would be amply abated if these grates were generally used. The "Wonderful" automatic smokeless grate, made by Archibald Smith and Stevens, we have already described in these pages. Three or four modifications of this grate may be seen in operation; it burns any kind of coal or coke. The principle of its construction is that the gases are distilled in the fuel hopper, and are converted into flame instead of smoke; the feeding is automatic. The fire can be regulated by a damper, the gases being compelled to pass through the fire, and the combustion be made quick or slow. The grates burn 24 hours without feeding, and their appearance, the firegrate projecting into the room, is in their favour. Messrs. Rosser and Russell shows a large hot-closet and steaming apparatus in the lobby at the end of quadrant. The fire is regulated by raising or lowering the bottom of the grate by a rack- and-pinion movement, instead of by the usual side-plate action. The reversible firegrate, the "Leopold," is a rather pleasing form of this mode of inverting the fuel. We also notice a circular gill stove fed at the top, and ornamented with brass fittings of attractive appearance.

In the east quadrant Fredk. Edwards and Soa, of Marlborough-street, show several of their very excellent smoke-preventing slow-combustion grates. Messrs. Edwards' is a modification of the Arnott grate: there is fire-basket for coals, which is lighted on the top; as these burn downwards, a shutter or blind is moved down in front of the fuel, balanced by weights on each side. The Arnott sunken ash-pit is dispensed with, and a wire basket in front of grate catches the coal that may fall out, and a trough below receives the cinder. At the top of fire is a register which is adjusted easily at the top. The grate has a neat and artistic appearance, and has been introduced in several buildings with the best results. The kitchen on Count Rumford's system of coking by more than one fire, is well worth inspection, and economises the heat. Anthracite or gas can be used. We hardly need here to dwell on the advantages of Messrs. Edwards' modifications, which are well-known to our readers and all who have studied the subject of smoke prevention. Clark, Bunnett, and Company, are the exhibitors of Ingram's patent "Kaio-Kapnos" stoves which burn coke or coal. The grate is well adapted for preventing smoke, and is made both hygienic and non-hygienic, the former allowing warm air to enter room. A flue passes round the back of fire and below it, so that the air is thoroughly heated, and the gases evolved from the fire consumed. It has the advantage of an open fire easily regulated, and can be used for heating rooms by warm air. The kitchen range is constructed on the same principle.

The special appliances exhibited by T. J. Constantine, of Fleet-street, are worthy of notice for the manner in which the fire-door of the range known as the "Treasure Cooking Range," is made to insure the air being thoroughly heated before it reaches the fire. This is effected by a triple-chambered fire-door, and the consequent prevention of

smoke and saving of fuel. There are gilled flanges at the bottom of oven, and by the fire-basket being inclosed in a number of air-tubes, the heat is fully utilised, and the top of fire is covered with a cloud of hot air. A movable ash-pan, one part of which receives the dust, is an arrangement which allows of the former being re-used. The construction of this range appears to be a perfect adaptation of scientific principles, insuring complete combustion of the fuel, and a freedom from "clinkering." The hot-air radiating slow-combustion stove is also worth attention.

Doulton and Co., of Lambeth, make a large and important display of their well-known radiating tile stoves and open fireplaces. One of these is a portable stove, with ventilating tile shaft for introducing warm, fresh air. An open fireplace, with painted tile sides, having siphon flues for the utilisation of smoke as a means of heating, is particularly worthy of remark; and the decorative completeness of these open firegrates is not the least recommendation in their favour. Another exhibit shows a large tile stove, of a pedestal or pier-like form, 8ft. or 10ft. high, in which an open fire as well as a close one are combined. The Doulton or majolica tiles, in green and brown, of richly-moulded and embossed patterns, with which this "combination" stove is encased, make it a very ornamental object. It is entirely of fire's-ay lining. The slow-combustion slab-stove, and the Doulton ware ventilating-shafts are admirable improvements, and will find their way into public favour.

Yates, Haywood, and Co., of Upper Thames-street, are the exhibitors of a variety of improved stoves, and a patent "smoke curer,"—a grate with a top which falls over fire and prevents smoke. The appliance is simple, and is worth notice as a means of obviating smoke in an inexpensive manner. Any coal may be burnt. In the west quadrant the same firm are exhibitors, M. Feetham and Company have a large display of grates and economic kitchen ranges, constructed to consume smoke. In the Hurst grate the hot smoke passes through the fire by an opening at the back. There is a shutter in front, and a warm-air chamber. The draught is through the fire, and no ash is made. One dust-consuming kitchen range will burn dust or small coal. Another range has the openings at top for ventilation, and the heated air is brought to the top of fire, the latter being raised as burnt. E. R. Hollands is the exhibitor of a grate for smoke prevention. The bottom is of open bars, but circular in section; a handle at the side brings a rake-like instrument into play, which rake can be raised through the bottom bars, lifting the burning fuel. A space is thus left for the reception of fresh fuel below, and smoke is not made. The invention is certainly a very ingenious means of allowing fresh coal to be introduced below the fire. The Coulbrooke & Co. have one of the most remarkable displays. Two handsomely fitted and decorated recesses in the Adams style are the chief features, and represent portions of rooms or fire recesses. One of these recesses is fitted with three fireplaces and grates, the mantel and over-mantel being of the style of the 18th century, painted of a celadon colour in one case, and having an "iron bridge controlled combustion" stove. These grates are intended to burn anthracite or ordinary coal, and are of pleasing design. In the projection between the two recesses is a very unique mantelpiece, in the Adams' style, with a Chippendale oak mantel above, having curved side cabinets for bric-a-brac, and a Venetian mirror in the centre. The grate is a projecting hob-grate, in the style of Chippendale, with brass panels and tile covers, and the whole has a very rich effect. The mantelpiece is painted celadon and

white. A bedroom "mantel-sham," designed by Mr. R. Norman Shaw, R.A., is another example. The "Kyrle Grate" is an invention for burning anthracite coal, gas-coke, and other fuel, and is said to give perfect combustion, and is easily controlled. The "iron-bridge grate" of this company can be adapted to any opening, and may be either straight, recessed, or projecting. Holland's smoke-preventing grate, and John M. Stanley's kitcheners and stoves, by which the gases generated are induced through the fire, are worth notice, and several specimens are noteworthy and are to be seen in operation. In the patent furnace of the latter the air passes through the burning fuel. A very conspicuous position in the west quadrant is occupied by Musgrave and Company, Belfast and New Bond-street. Their patent slow-combustion stoves and air-warmers for coke or anthracite are well known. The smoke and gases are consumed, and a chamber inside is provided for ventilating purposes. The "Ulster" smokeless stove-grate is like an ordinary grate; there is a false back and feed for fuel, which latter drops out in front as required, and the smoke is arrested and burnt. There is also a folding curtain in front, perforated, which acts as a blower, the fire being seen through the perforations. The hand-painted tile stoves are exhibited in a variety of designs, and the smoke passing down and then up, a large heating surface is insured.

Near the entrance in the eastern arcade we notice several interesting specimens of open fire-grates, stoves, kitchen-ranges, &c. The visitor will first find a two-horse power, silent gas-engine, intended to work with ordinary coal-gas, exhibited by Crossley Brothers, of the Poultry, the economy and advantages of which are already favourably known. In block XXV., Billing and Company, new Oxford-street, show stoves, for gas, cooking-stoves with double-jacketed oven, and a variety of ornamental brass-work. The "Sundial" gas-stoves appear very economical heaters. G. Wright and Company, Burton-weir, Rotherham, exhibit a patent "bivalve" open grate, fitted with Dr. Siemens' gas and coke apparatus, an economic cooker. J. C. Stark and Company, Torquay, are the manufacturers of gas-cooking, heating and ventilating stoves, which are worth notice for the manner the gas is under control, thus preventing smoke also, and for the current of air introduced under the oven. In the same class of exhibits, Strole and Company show some reflecting gas-stoves in which the copper reflectors can be removed for cleaning.

Steel and Garland are the exhibitors of a variety of patented grates and stoves, as the "Wharfedale." Redmayne's patent, the "pillar-stove" burns any kind of fuel; the combustion is slow, and the hot gases are compelled to pass through the fire, so that smoke is prevented. The circulation of the heated products downwards and through the base, and then up the circular pillars at the sides, insure a large heating power, and the "pillar-stove" makes an ornamental feature in a hall. Wilcock and Co., Leeds, are exhibitors, and so is the Patent Steam Boiler Co. E. H. Shorland, of Manchester, has also on view a variety of admirable grates and appliances, to which and to other exhibits, too numerous even to mention here, we shall return in our next notice.

WINTER EXHIBITIONS.

THE Winter Exhibition of the Society of British Artists in Suffolk-street, Pall-mall, is strong in works by well-known artists and members. In the large room we meet with pictures by A. Ludovici, H. R. Cluty, J. T. Peele, J. C. Waite, A. F. Grace, W. H. Bartlett, Carl Bauerle, Gustave Bréanski Hayllar, Wyke Bayliss, T. F.

Goodall, A. J. Woolmer, P. Macnab, W. Dendy Sadler, J. S. Noble, Geo. Cole, J. Gow, Edwin Ellis, A. Wardle, T. Hine, Edith Hayllar, E. A. Waterlow, H. Caffieri, amongst others. On the end wall the large picture by A. Ludovici will be noticed as a boldly painted imaginative subject. "Le Feufollet" is a skilfully handled fancy; the nymph-like figure, which is seen hovering over the dark swamp, if it does not entirely satisfy our ideas of proportions, is made to suggest the subtle luminous appearance of the will-o'-the-wisp. Just below it is a long canvas, by Horace H. Canty, a member of the Society, who has done excellent work. The "Play Hour" is a broad and feeling picture, in which a number of light-hearted girls are seen disporting themselves on the verge of an open field. "Spring," by Flora M. Reid, is prettily conceived; and H. E. Grace's "Still Life" (11), and E. G. H. Lucas's "Reminiscences of Schoolboy Life," No. 12, must find admirers, for their unassuming records and careful minute execution. A large picture by Lane Calkin represents the parting of a sailor and his wife. The figures and interior of the cottage are depicted with much power—rather hard in colour if anything, yet the incident is touchingly told. Kate Amphlett's "Early Morning" (37), is a solidly-handled landscape. The morning breaks in the sky, and the water-filled ruts tell of a rainy night, and are rendered with much feeling. Mrs. A. Lukis Guerin, in her decorative arrangement of tiles and twigs of appleblossom (40), has displayed a rich treatment in a blue key of colour, and the natural rendering of flowers receives ample recognition by the talent of T. G. H. Miles, in his "Chrysanthemums" (49), and in Mrs. Rose Marshall's "Spring Blossoms" (47). Few painters of incident have done better work than W. H. Bartlett, an old member of this Society. His picture, representing a studio, or "School of Painting under the Direction of MM. Bougereau and T. R. Fleury," is skilful in the accessories of light and shadow. The painter has taken the scene during a rest of the nude model, who is enjoying his pipe near the fire in the brief repose. The students are busily engaged chatting and smoking, and the group is a active one.

Of the few landscapes, we note as one of the best, J. E. Grace's "Sweet Autumn Time" (56), a work in every sense worthy of the artist's ability. There is a natural sweetness of colouring and grouping about this picture which charms. The aerial perspective of the distance, the lake, and the screen of twining beech in the foreground, are admirably painted. H. Garland's "Ferry Boat" is also clever. Near this we pass J. D. Watson's "Hasty Toilet," which is well worthy of the painter of "Corporal Trim," and W. Mouat London's "Study of Head" (62) is boldly drawn and coloured. Three small cabinet pictures call for notice. "Kurd Peasants" is a marvel of transparent colour and delicate handling; "Sport," by G. Jarvis, and "Dorothy," by F. H. Potter. The "Interior of Amiens Cathedral" (91), by Wyke Bayliss, is a finely coloured perspective, though the detail is coarse, and the work cannot compare with former exhibits by this master of luminous architectural interiors, nor with the water-colour drawing by the same hand in another room. An amusing incident of the old-fashioned village Squers is told by J. Barr (92), in his usual faithful style. "Coming from the Corn," by P. Macnab, is also a good specimen of this artist's power in pastoral landscape. There is a pleasant soft chiaroscuro in T. F. Goodall's "Winter's Morning on the Yare"; and "Reedham Ferry" (117), is another choice bit of colour and reflected light, with much sympathetic appreciation for effect. W. Dendy Sadler, a well-known painter of quiet satire directed chiefly

to the more prosperous side of monastic life, has, this year, a well-executed picture of a portly old abbot, in good humour, engaged in scanning a grant (120). The parchments on the floor, and the cabinet filled with similar documents, are cleverly painted, and the whole interior has an air of comfort recalling the richly-endowed convent. "Rehearsing" (138), by E. Pavy, is well finished and delicately coloured; and above, the eye is attracted by a picture by H. Helmick's "Presents for his Reverence" (144), a highly finished interior representing a poor woman with her shoeless daughter offering a gift to a venerable ecclesiastic seated in his study. A depth of tone and shadow and colour are characteristic of this work. J. White, in 179, has produced a large picture, in which with characteristic feeling and power he has portrayed an incident of humble rural life, and near this we find a large landscape "On the Heath, Hampstead," by F. Hines, painted with power and fidelity to nature. W. Holyoake's "Coming Rivals" (187) occupies a central position in the room, and is a large picture, showing a group of country lasses loitering at the side of a roadway, where they have apparently been receiving the attentions of a young gallant. A troop of soldiers with red coats are making their appearance down the road, and have attracted the notice of the damsels. The roadway and foreground are wanting in perspective and detail, and the manner the feet of one of the girls is drawn is rather unnatural. Edwin Ellis, well-known as one of the foremost masters of the French landscape school, exhibits several characteristic pictures. Nos. 145, 196, 244, 294, 440 are intensely vivid renderings of nature. "In Squally Weather" shows a deep green sea, a dashing work, executed with all the verve and technical power of the artist. "An Old-World Corner" (440), "Mending Nets" (477), are both remarkable for vivid colour, luminous seas, and sharp-reflected lights. We must speak in praise of the admirably bright, spring-like studies by H. Caffieri, "Getting Firewood" (193), "Birchwood" (352), "Sunshine" (362), all pictures of birchwood glades, brightened by gleams of sunshine and children. Ernest A. Waterlow's "Timber Clearing" (195), W. H. Gadsby's "Windfall" (201), J. R. Reid's "Old and Young," Claude Hayes' "In the Orchard," and Carl Bauerle's "Returning from the Field," are all delightful studies.

In the south-east room we notice J. M. Burfield's "De Trop," a gorgeously furnished interior; H. H. Canty's "Home of the Wildfowl," solid in handling; J. Haylar's "Chatty Letter"; a pretty study by P. Macnab (259); S. C. Henley's "Special Pleading," among a crowd of other works. Clear and grey-toned, full of misty light, is J. White's view of "The Dart"; J. E. Grace's "In the Gloaming," and F. W. Hayes' "Llyn Du, Carnarvonshire" (389), are both charming pictures. A. Ludovici's "Reminiscence of Drawing-room Manners" is a rich study in the artist's polished style of the costumes and decorations of the 18th century. J. White sends a sympathetically-painted picture in "Crums," in which the treatment of light and shade is exceedingly well managed. "Homewards," by E. A. Waterlow (431), "Winter," by L. C. Henley, are both clever; also, the former has the high lights put in over the darker objects—a method very tellingly practised by the "impressionists"; and we also admire Nos. 438, 440, 445, A. Glendenning's broadly-handled sketch on "The Thames" (447), Edith Haylar's cabinet-picture (458), and No. 445. Recording our impressions in the north-west room, C. W. West's "A Student of Anthropology," a lady in a study, is cleverly painted. Edwin Ellis has a fresh, breezy

piece in 477; and J. Morgan in "Their Last Resource," two urchins trying to extract the contents of a money-box, has drawn an incident with a moral. There is much freshness and soft-handling in Jas. Haylar's "Archery Grounds" (486), and J. White's study, "The Well"—a girl seated near a natural spring on the verge of a common—the last is graceful in composition and pleasing in colour. A low key of colour, grey in tone, pervades H. T. Schafer's masterly picture "The Old Captain," thoroughly French in manner, and our notes would hardly be complete were we to leave unmentioned the "Silver Birch" in the autumnal scene, by H. C. Fox (537), handled with much skill and in an impasto style; the reflected light and luminous atmosphere in E. Ellis's No. 547; Stuart Lloyd's freely painted "Cottage Garden" (548) with its peep of blue sea; No. 549, the study of Friscilla, by W. H. Weatherhead; and the vivid fresh picture in the corner of room by G. F. Munn, "Low Tide" (527).

The water-colours comprise a few works by well-known hands. Of the architectural drawings, we must speak highly of Wyke Bayliss's fine "Interior of Trèves Cathedral" (634), in which all the mass and shadow of Romanesque piers and walls, illumined by a glow of light from painted glass, is contrasted with rich carving of the screen and walled choir of a later style. For light and shadow this drawing sustains the ability of the artist. J. J. Hodson, in "Rue Molé, Troyes" (571), gives a pleasantly grouped bit of old houses; after which must be mentioned R. Phené Spiers's "Mont St. Michel, Normandy," a masterly drawing of the old impregnable rock-built fortress.

B. W. Spiers has another of those marvellous specimens of his transcriptive power for minute finish in "Curiosities of Literature" (574), a heap of old books, odds and ends; we remark, also, W. Paget's study of "Oats" (580), W. Langley's broadly-handled sketch of a "Cornish Fishing Village" (588), J. B. Coughtrie's "Gleaners," Bernard Evans' "Valley of the Dee" (612), despite a want of atmosphere; A. Powell's charming sketch of Cookham (616); also a careful drawing, by Harry P. Gill, of Battersea Bridge; Edwin C. Gardner's sketch of Poreh, St. Mary's, Oxford; S. J. Hodson's "Fruit Market, Nuremberg"; view of Dean Stanley's Resting-place in Westminster Abbey (691). Among classically-conceived subjects, E. T. Hayne's "Love's Oracle" is worth notice for its quiet refined drawing and colour, and in scenery, L. Watts' "Broadstairs," and J. Finnie's "Mill Scene, North Wales," (751), will find appreciative admirers.

The Dudley Gallery, opened last Saturday, is full of choice cabinet pictures. Rosa Koberwein's study of "Childhood" (3), is sweet and delicately painted, but the face of the girl is pale, and hardly embodies the lines of the poet, the "healthy cheek, red ripening lips." Several pictures near claim mention. "A Welsh River, Dolgelly" by C. J. Lewis; "A Tiff," by Alfred Taylor; "Peel Castle," with the fresh waves breaking on the shore, by G. de Bréanski; "Evening in the Fields," by A. Verey; "Narcissus," by Fanny Stable, are all skillfully-painted subjects. Mr. Howard Helmick's "The Weather Prophet," an old man, with pipe in hand, looking out of his cottage-door, is solidly painted, and exhibits careful execution. Ernest Waterlow's "Burning Weeds" is a bold rendering in the naturalistic vein. Hilda Montalba rivals her sister in the little gem "Waiting for Beppo," which is as thoroughly poetical in its conception as it is highly finished. Near it we remark "Steining Market," by Jules Lessore, a clever bit of village life. The cattle and red brick houses are very truthfully painted. A study of fresh moorland, with a pathway, is shown by Joseph Knight,

in his exquisitely-finished manner. The tufts of fine grass are faithfully rendered. "Grey Day," by G. F. Munn, is a freshly-painted study; and the same artist has a broadly-treated picture, "The Walls of La Hougue" (69), a powerful study in a low key of colour. T. F. Goodall's "At the Boatyard" is a clever piece of deep shading, effective in composition. We remark also, "Street in Verona," by John O'Connor; "A Lock-Keeper's Garden, Thames and Severn Canal," a brightly painted picture by Alfred Parsons. "A Cornfield," by Joseph Knight, is a careful study of foliage and sheaves, and a "Venetian Water Carrier," by W. F. Yeames, R.A., will be admired for the pleasing face. W. Dendy Sadler, whose graphic pencil has recorded many incidents from monastic life, has in "A Feast Day" (101), shown a monk descending a staircase with a sirloin of beef; the drawing and accessories are well finished. John Collin shows a humorous picture, "The Reluctant Model," an artist endeavouring to adjust a life-size lay-figure. J. Aumonier is, as usual, very felicitous in his river scenery, "The Thames at Pangbourne," a brightly painted piece; "Winter" (150), by Claude Hayes. W. Bannerman's "Il Penseroso," and "Manor House, Great Chalfield," by Cyrus Johnson, are clever. At the end of the gallery P. R. Morris, A.R.A., has an ideal study, "Voice of the Deep," two girls, one with a bundle of wood trudging along the sea-shore against a strong wind, which has broken the sea into great waves. "Going Home," by John White, is a very a boldly-painted incident in a French manner; the sea and illumined evening sky are effectively rendered. David Carr, in "Hauled Up," "The Village Inn," by Arthur G. Bell, and "Rochester," by C. W. Wyllie, are skilful works. Inlandscapes we must name Arthur Severn's "Early Morning, Amiens," a street in the old city, with its mid-stream; and Alice Havers, "Footsteps," a couple of gaily-dressed young ladies in a field attentively listening. G. Koberwein Terrell in "Long Time Ago," represents the pensive face of a young woman, evidently pondering over the past. J. W. Nicol has a clever study of "A Boy-cotter," a little bully laying wait. "Clarrissa" is a pleasing face, by R. J. Gordon. Poetical themes are few. "Wind," by E. Matthew Hall, representing three female figures, with flowing drapery, is a clever embodiment. "The Gipsies engaged Winnowing" (260), by Fred Morgan, are drawn and coloured with much freedom; and Ada Tucker, in her curious little genre picture, "A Harmony in Black and Gold," a black kitten against some bronze plate, has displayed some taste. "A Peep of Sunshine" (278), by J. W. Buxton Knight, is a clever study of atmosphere in its sullen mood; also F. Barnard, in "An Autumn Manoeuvre" (280), has shown a masterly handling of landscape. J. C. Dollman is again happily represented this year by another of his serio-comic incidents. The scene is a field, with a number of rooks looking very gravely and curiously at one of their number, probably the most daring, suspended by a cord from a wing as a scarecrow, and the title "Don't Care was Hanged," suggests a warning to all of defiant disposition. Edwin Ellis sends one of his bold and lucid studies of coast scenery (333), and we notice another contribution by the same school in J. White's "The Miller's Daughter." Mr. R. W. Allan's "Santa Giorgio Maggiore, Venice," is a bright piece of sunlight and colour, and in opposition, T. J. Watson's "Birch Trees" (364), is sombre and greyish in tone. Some solid painting is given in A. de Bréanski's "Quarry Woods, Marlow"; and we cannot omit to mention F. Hamilton Jackson's "Lorethe Pilgrim," as one of the few essays in ideal composition. There are many other

works of genuine merit to be found on the walls which will make the gallery worth a visit by all admirers of painting.

THE WATER QUESTION.—XXII.

SERVICE RESERVOIRS.

A SERVICE reservoir acts as a pressure regulator. It would be inconvenient to connect the service-pipes of the distribution directly with the main pipe which conveys the water from the storage reservoir: it might be necessary to shut off the water at the reservoir for a day or two for repair of the conduit pipe or other purpose, and another inconvenience would be that the pressure due to the height of the column could not be economically made use of; the pressure would be least when most wanted. It is a common occurrence that during the busy hours of the day twice as much water per hour is used as the average hourly quantity, and at those times the velocity in the main would be doubled and the loss of head increased four times, and the serviceable pressure proportionately reduced. The same thing occurs in the distributing main and service pipes in connection with a service reservoir, but with this difference—that, the velocity in them being less, there is less absolute loss of pressure; doubling the smaller velocity and squaring it for its effect does not produce much absolute loss of head. This excessive loss of pressure at the place where the water is to be used is avoided by interposing a service reservoir in which the flow of water expands over an area, and stands nearly at the same height at all times. This evenness of pressure is a practical advantage, although, no doubt, greater pressure would be obtained without the interposition of the service reservoir if but little water were being drawn from the pipes, and if the main conduit were a pipe laid below the hydraulic gradient. For any purpose for which the water would need to be shut off at the storage reservoir, such as the connection of a branch or the repair of the main, 48 hours would probably be time enough, for emptying the main, doing the work, and refilling the main, and in the following remarks it will be assumed that the service reservoir is to hold two days' supply of water. A system has been in a few cases adopted of making very large service reservoirs, where the ground is sufficiently favourable, and thus increasing the storage capacity of the works materially, the form of the ground in these cases being such as to admit of water being impounded by an embankment on one or two sides of the site, or it may be partly on a third side; but usually there is little choice of situation for a service reservoir, its primary necessity being height, with reference on the one hand to the height of the highest ground to be supplied, and on the other to the height of the storage reservoir, the dimensions of the conduit and conduit pipe being made accordingly. The situation of a service reservoir being thus almost rigidly fixed, it is dug out of the ground for the most part, and the excavated earth embankled round it. The four essential features of a supply of water by gravitation are the storage reservoir, the conduit, the service reservoir, and the distributing main and service pipes. Filtration forms a fifth when it is necessary.

Where the supply of water in bulk may be undertaken in connection with the regulation of flood waters, the question of authority divides itself between the landowner on the one hand, and the local sanitary authority on the other, or it may be several local sanitary authorities in each case. The distribution of the water, and its filtration, if necessary, must be with the sanitary authority, but the service reservoir should be made by the reservoir authority

as distinct from the distribution authority, and the sanitary authority would take the water from the service reservoir at a price per 1,000 gallons or per million gallons. Near populous places, where there is usually excessive dust and smoke in the atmosphere, water for drinking cannot properly be exposed, and each sanitary authority would construct a covered service tank, into which the water would flow from the service reservoir. One service reservoir might suffice for several covered service tanks, which, in some cases, might belong to different local sanitary authorities, whether urban, as local boards, or rural, as boards of guardians. Whether one or several sanitary authorities take water from the service reservoir, each would lay a distributing main between the covered service tank and the service reservoir, and the service pipes in connection with it. Adjoining the service reservoir would be a measuring tank for each sanitary authority, in which would be the gauge, open to inspection, and so arranged as to give the quantity of water agreed upon from time to time up to a certain maximum. The use of the service tank at the end of the distributing main would be to receive the excess of water not used, and to contain a day's supply in case of its being necessary to shut off the water at the service reservoir, of which notice could always be given so as to have the tank full. By the continued record of the state of the service tank it would be seen whether more water were being taken than was used, and it should be a condition of the agreement between the sanitary authority and the reservoir authority that the quantity may be varied from year to year as circumstances require, within a certain maximum. This, no doubt, would throw an onus upon the reservoir authority, but only a proper one, as being the dispenser of the water, and being able to estimate the proper provision to be made for present and prospective needs independently of any estimate made by the sanitary authorities.

Amongst the varying levels at which places to be supplied with water are situated in respect of any storage reservoir, three may be taken for example in which the covered service tanks, A, B, and C, would be at such levels that the highest would be about 100ft. below the lowest level to which the water in the reservoir would be drawn down, and if the population of the three places or districts be 30,000 in all, there would be required for a full supply 750,000 gallons a day. It would be a moderate view of the circumstances to assume that within an average distance of three miles of the three places a service reservoir might be made on ground sufficiently high to command them all, and that the water may be impounded at the height named within a distance of seven miles from the service reservoir. The height of the service reservoir in such a case would be at about the mean height between the covered service tanks and the lowest water level of the storage reservoir. There would then be about 16ft. or 17ft. fall per mile in the distributing main, and 5ft. per mile in the conduit. This would be sufficient if the water were carried along the hill sides, but if any considerable length of low ground intervened, requiring to be crossed by an iron pipe, the total fall of the conduit could be a little increased and the fall of the distributing mains as much reduced.

An open reservoir should be at least 14ft. or 15ft. deep. The rays of the sun act through any shallow and stagnant water upon the bottom, and cause the growth of vegetation and insects. If the service reservoir in question were required to hold 1,500,000 gallons, or 240,000 cubic feet, being two days' supply, and it be made 15ft. deep, the water area at the mean depth would be 16,000 square feet, and if it were

made square it would be, at that depth, 127ft. square. According to the nature of the ground, the slopes may be from $1\frac{1}{2}$ to 1 to 2 to 1. Let it be assumed that they are 2 to 1 throughout, both in the excavation and embankments, and that the top of these is 2ft. above the top water-level. The reservoir would then be at the top 165ft. square. The top of each bank may be 6ft. wide, except on the lower side, where, indeed, the width may be the same and the slope the same, but divided by a level bench of such width that the bulk of earth in the lower bank would, if continued in one slope, make the top width 9ft. Here we have no puddle trench, and to make the reservoir watertight, the puddle—if puddle be used—is continued across the floor and up the slopes of the excavation, and along the surface of the ground to meet and join with the puddle-walls raised in the centre-line of the embankments. The floor-puddle may be 2ft. thick if well made, and the wall-puddle should be at the bottom as thick as will allow the top to be finished 3ft. or 4ft. thick, with a gradual reduction in the thickness of 1ft. in each 6ft. in height. The surface of the floor-puddle, and that upon the slopes, should be covered with broken stone or gravel, not less than 6in. in thickness, which may be continued up the slopes of the embankment to the top of the reservoir. This hardly forms of itself a sufficient protection of the puddle against the action of the water upon it, but if the interstices are filled with sand it does so. There is but little difference between this and concrete for this purpose. But to provide a surface which can be swept, brick-on-edge paving is added, or two courses of bricks laid flat.

If the water is not to be filtered, it is necessary that it should pass through fine wire-gauze strainers in going out of the reservoir. To hold these and the valves through which the water would pass, a structure of masonry is built.

The strainers are of copper wire, 40 to the inch; but as these, being of so fine a mesh, would too soon require removal if not protected, strainers of a mesh less fine, about 20 to the inch, are placed in front of them, and a double set of grooves is provided for these, so that before one set is removed the other may be inserted. The screens are removed and washed as occasion requires, being for that purpose and for strength made in small rectangular frames of wood, inserted in a larger frame which can be lifted out bodily, these being set one upon another to the height required.

The top soil, before the excavation is begun, would be taken off and reserved outside for soiling the slopes of the banks. The tops of the banks would be formed as footpaths, with gravel or any clean material, and formed with a transverse inclination away from the reservoir. The outside of the puddle-wall should be protected from rats by a facing of concrete, or else the earth may be mixed with lime in the proportion of about 10 to 1, and watered for a yard in width outside the puddle-wall, and this should be extended along the surface of the ground for some part, if not the whole, of the seat of the outer part of the embankment. In the case of a high embankment, as of a storage reservoir, this protection is not necessary, because the distance from the outside to the puddle-wall is too great to be burrowed, but in small service reservoirs the puddle should be protected.

In many situations where it would be proper to construct a service reservoir, it would be difficult to procure clay for puddle within any short distance, and it might, at the same time, be easy to procure materials for concrete. In that case the reservoir might be made watertight, without puddle, by the use of concrete made specially with that view, that is, with plenty of filling,

both sand and lime, or sand and cement; but if good blue lias lime can be procured at a less price than cement, it will be preferable to use lime, the quantity being increased in the ratio that the price of cement bears to that of lime; and the thickness of concrete may be less than that required of puddle; and, reckoning the thickness of puddle and its covering together, this is a considerable reduction of the thickness of materials required for the bottom of the reservoir, and saves excavation to the extent of about half the difference of the cubic contents. If, however, there is the slightest reason to fear a movement of the ground, however slight or partial in its extent after the reservoir has been made and filled, puddle will be preferable to concrete as being less rigid. At the same time the longitudinal tenacity of concrete may be a favourable property in the opposite respect. The earth would be wheeled out, or carted out, and put into the banks in thin layers not more than 6 in. in thickness, and consolidated by hard ramming, and, if sand, watered at the same time. A sand bank made in wet weather is very much superior to one made in dry weather. If the banks be wholly of sand the puddle walls should be of greater thickness than is otherwise necessary, unless they be faced with clayey material, or with limed earth to prevent the moisture of the puddle being absorbed by the banks. Service reservoirs, larger and deeper than the one of this example, have been made on ground containing nothing but sand, and with the strength-dimensions here stated, stand firm and watertight; but ground containing sand, clay, and stone shale mixed is preferable, if the clay be not in excess. Instead of the expensive brick-paving of the inside of the reservoir, a facing of Portland cement on concrete would be almost equally good, and considerably less expensive.

A particularly good fence is necessary round the foot of the slopes. Post and rail is good enough for a storage reservoir, but not for this, and the fence should be far enough from the foot of the slope to allow a cart-way all round, and a piece of land should be inclosed near the outlet of the reservoir for stores and other purposes.

ARCHITECTURAL ASSOCIATION.

THE second ordinary meeting of the present session was held on Friday evening—the President, Mr. Aston Webb, in the chair. The following 62 new members were selected:—M. Collins, C. S. Cornish, F. Ward, F. W. Lane, A. E. S. Whitelock, F. A. Dry, F. A. R. Willey, J. Napier Hamilton, Stuart H. Davies, G. H. Oakley, L. Dawson, F. A. Huntley, F. Macey, J. E. Newberry, W. R. Lawrence, W. D. Duffett, C. Turner, R. Kershaw, A. O. Breeds, C. J. Clarke, P. J. Burne, F. E. Masey, J. J. Wood, F. J. Webb, C. S. Meadway, B. Potter, N. J. Stanger, G. G. Wallace, P. H. Watson, C. F. Moxon, E. J. Stow, E. P. Tucker, Levi Lunn, J. Shepherdson, W. J. Roberts, G. E. Holman, C. R. H. Tyndall, G. P. K. Young, H. C. Chevalier, R. W. Paul, W. R. Crewe, A. G. Griffith, H. Whittles, J. M. Hatfield, R. J. Thomson, E. H. Dance, W. C. Rea, V. E. Bigsby, E. D. Hoyland, P. P. Brown, C. J. Knight, H. O. Jackson, F. L. Sweet, T. F. Pryce, H. C. Brushfield, J. M. Keith, W. H. Closson, A. Turner, J. Innes Murray, J. C. Waghorn, W. E. Synnington, and W. A. Alderton.

THE NEW EXAMINATION AND WHAT IT INVOLVES.

A paper on this subject, which we reproduce in full on p. 718, was then read by Professor T. ROGER SMITH.

At the close of the paper, the PRESIDENT heartily congratulated Mr. Roger Smith, a past-president of the Association, in the name of the members, on his recent appointment at University College, adding that at the present moment, the paper was most valuable to all young architects. The subject of the

Institute examinations had been clearly and concisely brought before them, and they had had the great advantage of ascertaining from one who enjoyed exceptional opportunities of knowing the facts, particulars as to the kind of examination and the probable mode of awarding marks. The practical failure, as he might almost call it, of the previous voluntary examinations, made them rather more dubious as to the success of the present scheme; but the Association had endeavoured to assist it by starting preparatory lectures, which thus far he was pleased to state had been very largely attended. It was to be regretted that the first of the new examinations would be held so early as March next, before the courses at the Association and University and King's Colleges were concluded, and it was a question whether it would not be advantageous to omit the examination. The high standard which had been set by the lecturer, would, if adhered to, largely increase the value of the certificate, while it added to the responsibility of the examiners.

Mr. A. L. PITE said the younger men had been whipped up to this examination, but now that the syllabus was published it did not seem very grand. He trusted that the fatherly Institute in its scheme would not simply test them as budding building surveyors, but as future artists, and that in the marking of papers some (say) 500 marks would be awarded to art qualifications and 100 to mere construction, for the two great qualities of great architects had been enthusiasm and imagination. He suggested a preliminary examination for those joining the Association, and proposed a vote of thanks to Prof. Roger Smith, who had always shown himself ready to give a helping hand to young men.

Mr. BLASHILL seconded the motion, and said it was right to explain that the suggestion of a compulsory examination was not due to a committee, but to their Past-President, Mr. Douglass Mathews. He had been gratified that the members had responded to the proposal to form classes so much more numerous than had been expected. In his own class he felt the great responsibility thus laid upon him, and how inadequate the time was to the purpose. For the latter reason, he should aim at making it rather a reference to authorities where information could be gained, than an attempt to compress the information itself into the hour, for it was far more useful to the student to know where he could continue his studies than to gain some one fact. It was also highly important that the student should study and sketch buildings in progress and completed. Mr. Pite's suggestion that an examination should be passed by those joining the Association, was too much like telling a man he must learn to swim before entering the water; the very purpose of the Association was mutual help and instruction. Nor could he see why construction should be considered of less importance than art; many men could draw pretty pictures of buildings which careful inspection would show to be impracticable, as they transgressed the rules of construction. The lecturer had mentioned that the subject of the examination was to show that men were fit to act as architects. Let them not forget that it would also show if they were qualified to be assistants, for such excellent work and many important, responsible duties were performed by confidential assistants, and the filling of such a position was a useful training to the future architect.

Mr. SIDNEY VACHER expressed a hope that the certificate of examination would be regarded by practising architects as of some weight in engaging architects; as otherwise, it would be very discouraging to those entering for it. His own experience, when seeking a situation as assistant, was that employers paid little or no attention to prize-work, for when he tried to get a fresh situation he took with him a roll of diploma drawings, which had gained first prizes in the classes of construction and design, the silver medal of the Academy, and a certificate of having passed the first portion of the voluntary examination. No architect would take the trouble to look at his work, or paid any attention to it, till he got to the last name but one on his list, that of Mr. Street, who examined his work and engaged him. He should like to know if the examiners would deal hardly or easily with the ambitious young men who aimed at a "new style," and inserted into their works funny little "bits," picked up apparently in

the gutter. He trusted more attention would be given to construction than to such attempts at "art."

Mr. S. STEWARD SMITH, of Reading, observed that provincial students, who could not attend the classes and college courses in London, would be thankful to know what books they ought to study to prepare for the examinations. He also asked whether the examiners would prefer the rough sketches as drawn, or to have them worked up and finished.

Mr. HARDCASTLE suggested that any student who took an interest in his work would be certain to have devoted more attention to one branch of study than to others. It would be desirable to know if the Institute examiners would require marks to be pretty equally allotted all round in a certain proportion, or if they would pass a candidate who made a total of 600 marks, even if he failed in some one or two sub-sections. The new examinations would be beneficial in drawing their studies into a focus and in giving a stimulus to work. They offered an absolute prize, which all could gain, in lieu of the competitive prize, which only one could carry off, and so afforded a more general encouragement to students.

A MEMBER asked how a pupil who was closely employed all day in an office could gain practical experience in constructional matters? At the Saturday afternoon visits the workmen had all left off, and they saw nothing of the actual operations.

Mr. DOUGLASS MATHEWS held that the Association was not, strictly speaking, an educational body, but one of mutual self-help, and that, therefore, the class lecturers were right in proposing to give skeleton rather than exhaustive addresses. It was not, in his judgment, desirable that men should enter both courses of classes, or that they should aim at doing too much at once. Indeed, students who had just taken up the subject, would do well not to enter for the examination for a year or two, so as to get thoroughly grounded and prepared. The aim of the promoters was not, he thought, to show that Mr. So-and-so had passed the examination, and was, therefore, entitled to practise as a thoroughly able man. Still, at some future day, if shown to be necessary, the issue of a diploma might follow. He could not agree with the President that the voluntary examinations had been a failure, although he admitted that they had not been largely availed of, because there was a want of incentive to undergo them. Since this inducement was now held out in the Associateship of the Institute, there was no reason why the compulsory scheme should not be a success.

Professor ROGER SMITH, in responding to the vote of thanks, said it could hardly be expected that the examinations should be suspended on the ground that students were not prepared. Notice had been given of the compulsory scheme for two years past, and there had been ample time for preparation. Still, he agreed with the last speaker, that it would be wiser for those who had but just taken the matter up, not to enter till the second or third examination. The question had been asked as to whether the certificate would imply a fitness to practise; that was, whether the standard to be set would be so high as to act as a diploma. In itself, no doubt, the examination simply professed to ascertain the qualification of a man for admission into the central society of the profession, but the public would soon jump at the conclusion that a man's ability to act as an architect was testified to by his having passed. That feeling was held in committee, and would probably influence, to some extent, the action of the examiners. At one time, some doubt might have existed as to whether any body of men could examine works in many styles; but in these latitudinarian days there would be less difficulty in getting an impartial judgment from examiners as to designs in any style, Greek, Gothic, Italian, or Queen Anne, than would have been possible twenty, or even fifteen years, since. Mr. Vacher had raised a question as to the chances of eccentric work. He did not think an unusual design would necessarily be rejected, but it would, probably, make the examining board more strict in their requirements as to the constructional and other sections. As to the difficulties experienced by the same gentleman in seeking work, he hoped it was because he tried at a slack time, and not because architects

were, as a rule, indifferent to the value of prize work. With most men of good position, the passing of an examination should be a valuable recommendation in an applicant's favour. As to the probationary work to be submitted, the best possible would be a complete set of drawings, executed by the candidate, of a work carried out under his supervision. Sketches should be sent in in the rough, and not re-worked. He would recommend classes of books, rather than any special volume, to those who studied at home, and these would be works on the history of the art and those dealing with construction. It was more desirable they should get up some one subject thoroughly, than try to learn up the whole of Gwilt's "Encyclopædia," for example, for as the student pursued any special subject, such as one of those treated of in Scott's Academy Lectures, he would find that it had ramifications, which, if followed out, would lead to a connection with what he knew on every branch of architectural study. The marks at the examination would be given as a whole, and not equally proportioned, and thus the man thoroughly qualified in one subject would obtain credit for that special knowledge. He had been asked how the hard-worked pupil could see a building in course of construction. He would remind the questioner, that, even if his luncheon time was too short for the purpose, few architects' offices opened before 9 a.m., whereas most building operations commenced by 6 or 6.30 a.m., and, therefore, to the earnest worker, there were two valuable hours' instruction to be gained. There were easy means of making friends with a foreman or artisan, and they might depend upon it that every man liked to talk about that which he thoroughly understood. In conclusion, Mr. Smith expressed his belief that the examination would succeed.

THE NEW COMPULSORY ARCHITECTURAL EXAMINATION, AND WHAT IT INVOLVES.*

THERE are, I think, few architectural matters which cannot be better understood by reference to their history, than if you regard them simply as they appear at the present day. Though an examination which has never yet taken place cannot exactly boast of a history, still a little retrospect of the causes which led up to it may help us in understanding its scope. As far back as the oldest member present can remember, that is to say, in the days of Lyons' Inn Hall, the desirability of a diploma for architects, or at any rate of an examination, such as the members of several other licensed and scientific professions have to pass, has been dwelt upon in this Association—and the need of it has always been felt by a certain number of the members of the Institute. Eventually Professor Hayter Lewis, when he was Secretary of the Institute, procured the appointment of a committee to consider this question and draw up a scheme for an entirely Voluntary Examination. The work of that committee was, a good deal of it, done by Mr. Arthur Ashpitel, Mr. John Papworth, Professor Lewis and myself, and during part of our deliberations we had the co-operation of Professor Kerr. The Institute, as a body, I must confess, looked upon the scheme with coldness, perhaps with some jealousy, and to disarm this jealousy we were compelled to accept limitations which hampered it not a little. No kind of distinction or reward, not even a certificate, was to be gained by passing, no privilege or grade, or title was to be accorded to those who passed. The first examination took place in the year 1863, and it is melancholy to think that of those who conducted it, I am the only survivor. The examiners were Sir Gilbert Scott, Sir Digby Wyatt, and Mr. Arthur Ashpitel, the Moderators, Mr. John W. Papworth and myself. The result was that eight candidates passed in the class of Proficiency, and in the following year seven, with the addition of two in the class of Distinction, for we had two classes to begin with, and altogether the honour of Distinction was gained by three candidates, all of them well known members of this Association, Mr. R. Philip Speers, Mr. R. K. Bayne, and Mr. T. H. Watson. As years went on this examination languished

mainly, I believe, because it led to nothing; and modifications were introduced with the idea of making it more attractive to students; the most important changes being the abolition of the class of Distinction—the introduction of a Preliminary Examination, the division of the Proficiency Examination into two portions, which a candidate might take in different places—some modifications of the subjects of Examinations, and last, but not least, the grant of a certificate, and, under some limitations, of the title of Graduate of the Institute. These changes seemed to work well, and the results of the Voluntary Examinations, before and after this introduction may be summarised as follows:—Ten Examinations have been held during 18 years. Three students have passed in Distinction, 43 in Proficiency, and 52 in the Preliminary Examination, making a total of 93 successful candidates, whose names you will find in the Brown Book, and many of whom you will recognise as having been in other ways successful since. I must now take a glance into the past, and remind you that some years ago a Committee was appointed, at the suggestion of Mr. Horace Jones, to consider what steps could be taken to advance the welfare of the Institute. That Committee's report was not agreed to by the general body mainly, on the ground that it advocated the grant of a new charter, and a second Committee, which was thereupon appointed, considered the matter afresh. Among the recommendations which it made, this Committee reported that after a certain date all Associates of the Institute ought to pass an Examination. The various recommendations of this report were agreed to substantially as they stood, and the changes recommended were adopted. The Examination about to take place is one of these changes, many of which appear to have been of essential service to the Institute, and through it to the Profession. I propose now to give you some idea of what we may suppose to be intended by the establishment of this Examination, and of what the Examination itself will embrace. We may safely put the intention of the Institute as being to render the Associateship of their body, a guarantee that the Associate has proved his fitness to be entrusted with work, so far as that fitness can be ascertained by an Examination. At present a man is admitted an Associate because nothing is known against him, and something has been said in his favour; but it is not incumbent on him, and indeed would not be very possible for him to prove to the satisfaction of the Council who receive his nomination or of the general body who elect him, that he is properly qualified; and accordingly, though Associateship of the Institute has a very considerable value, it is not at all so serviceable to those who have obtained it in the way of giving them standing in the eyes of the public as it might be, and as we may hope that in a few years it will be. This being so, the course of examination must be taken as embodying a kind of standard of the qualifications of an architect, and, as such, is a document of no small interest. The draft of it was prepared with great pains and care by a committee on which several members of the Association had seats, it was finally brought to its present shape by the Council of the Institute, and it was passed by the general body, so that among the matters which are involved in the Examination, we may fairly take this authoritative publication of an architectural standard of qualifications as the fairest. A competent architect, then, must be able to design and draw out a building complete, including perspective, details and ornament, and he must be able to plan and work out a scheme for appropriating a given set to a special purpose. He must be able to write a specification and prepare an estimate. He must also know something of the conditions usually appended to contracts. As far as construction goes, he must be familiar with building materials and how to use them, and calculate the strains upon them. He must know how to drain his buildings, and should have some knowledge of what to do in case of failure and accident. Lastly, as regards art, he should have a general knowledge of the history of our art, and be tolerably familiar with one small portion of that history, and he should possess sufficient acquaintance with the mouldings, features and ornaments of some one style, to be able to use them with correctness in his designs, and to draw them from memory. I do not think that less than this can reasonably

be expected of architects who begin practice, in the interests of the public and the profession alike; and should the examination be so conducted as to bring these qualifications to a fair test, the architectural profession cannot fail to reap great benefit. I have recently, before a different audience, given some account of the actual course of examination as proposed in the Institute's programme, and as that must be done here also, you will, I dare say, pardon me if here and there I quote a phrase from the opening lecture of the courses at the University College, the lecture* just referred to; though I may as well say at once that I propose to examine the course of examination here at much greater length than was requisite in that lecture. The obligatory preliminary work consists of a set of plans with a perspective drawing, a sheet of details, and an ornament. This requirement is, of course, intended to elicit practical skill in architecture generally, and in handling drawing materials and making drawings. Work done as a student, such, for example, as sketches from ancient buildings, notes or essays, may be also submitted at the option of a candidate. This affords an excellent opportunity for a student who has really made studies to show them; and though it does not appear that marks are directly allotted to the preliminary work, there can hardly be a doubt that good preliminary work will tell in a student's favour, for example, it will be likely to induce the examiner to turn the *vis-à-vis* examination into a direction towards which his preliminary studies have pointed. The first subject for examination is the History of Architecture, taking a general view of a wide field and an examination in some detail of a single division of the subject. It is a matter for congratulation that History is thus required, for its value is, I believe, very much underrated. To a certain extent a knowledge of the History of Architecture is part of the education of an architect, as distinguished from his mere instruction; and it is a characteristic of the present day, that few students, especially young ones, will tolerate any subject of tuition which is to be pursued solely for the purpose of training, expanding, and informing their minds. They want something that will pay. Now that the history of architecture will pay to the extent of 100 marks out of the 600 obtainable, I hope many will give some attention to it, and will, to that extent, get educated in spite of themselves. The answers to this paper are to be illustrated by sketches, and, no doubt, the judges will be much influenced by really good sketches.

The second subject of examination is one intended to show that the student has mastered some one Style sufficiently to give him a command over its forms and features, knows it, in fact, so that he could use it on a building without committing gross errors. This subject is largely a test of practice and drawing, and private study, but there is nothing in which the junior class of design could be more serviceable than in giving the members some idea of what is meant by an accurate use of some one style: though, of course, in preparing for examination careful private study will be required in addition to attendance at that class. The best preparation by far, is measuring, sketching and drawing out some existing example or examples of the style selected. Even a modern example from the hand of a good architect would be a more instructive study than a book or an engraving. To this subject 75 marks are allotted. The third division is Materials and Construction with Sanitary Science, and I need hardly add, I hope, that practical as well as theoretical acquaintance with these subjects will be necessary, in order to satisfy practical examiners, and must be sought on the works to which the student has access. This group of practical subjects to which two papers will be devoted—engrosses one third of the marks and occupies one third of the time which is allotted to paper work. It is therefore manifestly the most important of the whole, and one in which I venture to think the examiners will be disposed to be more strict than in other cases when marking other papers. The principal building materials can be understood best by those who have experience of their use, and have ripened and extended that experience by reading books, attending classes, making inquiries for themselves.

* A paper read before the Architectural Association by Professor F. Russell Smith, on Nov. 29, 1881. (See p. 717.)

* See verbatim reports of the lecture in the BUILDING NEWS for Oct. 11 and 21, 1881, pp. 488 and 522 of current vol.

examining, and when possible collecting specimens; and witnessing experiments when testing is going forward. "The principles of construction as applied," are words in the Programme which seem to cover the theory and practice of building, and the student will have to pursue both. Drainage and sanitary requirements are also named. In this we are all in the position of new brooms, and probably a manifest want of familiarity with the modern ways of executing what is called sanitary plumbing and drainage, would induce the examiners to make a clean sweep of the candidate's chances. The application of formulae will, in all probability not be pushed far, but it is very desirable that what is done should be right. As there is no preliminary examination, and no subject that is not a strictly professional subject is taken up, the examiners may possibly afford an opportunity for those candidates who are good mathematicians to show their skill by including two or three difficult questions. No doubt the moderately trained man will be wise enough to let these questions alone if such are set; and the mathematicians will be heartily glad of them. Considering the heavy risks that attend the failure or fall of buildings, it is a very good thing that this curriculum includes what I may call their Pathology. This the aspirant to associateship cannot learn from any books that I know of; but only from seeing buildings that are dangerous and watching how they are dealt with. It is very desirable to get some notion of how foundations fail, how brickwork fails, how timber leaks or shrinks, or rots, and how masonry yields; and perhaps there is no place which affords more opportunities for the study of these things in old buildings and new than poor leasehold London, founded on clay, run up in haste, with indifferent materials, and too often no professional supervision beyond that of the district surveyor, and no specification save the Building Act.

The fourth subject is Planning for a special purpose; it is one more calculated than some of the others to show that the candidate is fitted by nature and training to practise as an architect. No preparation for this paper will be better than making designs in one or two classes of design; but the various opportunities offered by public competitions, by the prizes given in some of the Professional journals, and by competing for the Institute prizes, and those of this Association, each and all offer good occasions for drawing out and stimulating powers of design. No man is a born planner, and practice is as necessary in this as in any part of the curriculum, perhaps more so. To this subject 75 marks out of 600 are allotted. The fifth subject is writing Specifications and Estimating, and here a candidate can make 125 marks, though, as the time allowed is rather disproportionately short, he will probably be unable to do as much as he would like in the way of answering questions. My own impression is, that specifications will be more thought of than estimating, and, indeed, the questions are described so as to lead one to expect that only a general acquaintance with how to Estimate will be required, while an actual bit of Specifying has to be done—and should be well done. The last subject is so much of Professional Practice as is involved in the general conditions usually appended to a contract. Of course, this must be interpreted as meaning not merely familiarity with the usual clauses, but with the purposes which each is meant to serve, and the dangers and disappointments which each is intended to avert. It does not seem that great stress will be laid on this subject, important though it be, as only 25 marks are allotted to it. The work thus far is done by means of written or drawn answers to printed questions; i.e., is paper-work only, and it takes up three days—Tuesday, Wednesday, and Thursday—the candidates having six and a half hours' work on each day. The examiners, meantime, will give such consideration as they can in the time to the work of each student taken as a whole, with the addition of his preliminary work, and will so prepare themselves for the *viva voce* examination. This, though no doubt actually very formidable to some young men, should really be regarded as a most valuable feature of the scheme. The candidate who has really done something wrong—as, for example, one who had attempted to send as preliminary work something drawn by another hand (if any one ever was mean enough to try that)—might

expect to have a bad time of it, as the inconsistency between his preliminary work and his answers would probably have appeared, and he would be pushed hard, and deservedly; but to no student who has honestly prepared himself, and tried to do his best, can the oral examination be other than an advantage. It must not be forgotten that, at any rate in the early examinations, the desire of the examining board will be likely to be much more to let men in than to keep them out; and in scanning the work of a doubtful candidate, there will be sure to be a disposition to try to find out the points where he is strong, and give him opportunities of answering some questions about them than to push him too hard where he has shown signs of weakness. I beg strongly to commend this view to intending candidates who are fairly prepared, and to advise them to look upon the oral examination as their best friend, and not as diminishing their chances of success. The examiners sitting round the table will certainly not desire to admit the unworthy, but I am very sure they will do their best to discover and bring out the worth of the worthy. Finally, the examiners will have to adjudge marks to the work done. The system they will pursue is of course for themselves to determine, but it will no doubt be a uniform one. They will, in all probability, give no marks at all to paragraphs full of irrelevant information, which the student had in his head or had committed to memory, but which are not answers to the questions. On the other hand, correct, exact replies, just to the point, even if brief, will be sure to be marked high. Illustrative sketches, if well done, ought to command good marks; and any answer, be it drawing or be it writing, that is thoroughly right and thoroughly complete, no doubt will earn all the marks it will deserve. On most systems of marking it would be possible for thoroughly correct answers to all the questions to obtain more than the maximum number. On the least favourable plan, the full maximum must be possible. The limit which a candidate must obtain in order to pass is one half this number, gained not necessarily in each subject, but as the candidate best can; and any moderately good set of answers ought to reach this. If the half is very nearly approached, though not reached, it is to be presumed that the examiners will recur to any memorandum they may have kept of the oral examination, and will re-examine the preliminary work in order to see if they can fairly increase the number of marks in any subject; and if, after this reconsideration, which I know will be done with a disposition to look into the candidate's merits fairly, and perhaps favourably rather than harshly, the examiners feel bound to reject a candidate, he may be pretty sure that he has not yet properly prepared himself for practice, and that by continuing his studies he will be doing nothing more than that which it is necessary should be done in order that he may, with safety both to himself and to those who may employ him, practise as an architect. Perhaps it is right that I should add that, owing to my position at University College, I am, fortunately for myself, not eligible to serve as an examiner, and that in what I have just said I must not be understood as pledging any of the examiners to any special course; but only as speaking from some experience in the voluntary and other examinations, and from an intimate knowledge of the circumstances.

(To be continued.)

LECTURES ON HORTICULTURAL BUILDINGS AT THE CRYSTAL PALACE.—III.

(Concluded from page 687.)

THE last of the course of illustrated lectures to the students of the Crystal Palace School of Gardening and the public was delivered by Mr. F. A. Pawkes (author of "Horticultural Buildings") on Wednesday, Nov. 30th.

Directing the first portion of his remarks to the subject of "Show-houses," the lecturer said that several points regarding these must be kept in view: 1st, a conservatory or show-house must be regarded as one of the reception-rooms in the dwelling; 2nd, we must endeavour to make it approximate architecturally, both within and outside, to the other portion of the dwelling; 3rd, this being so, we must regard the functions of growing and

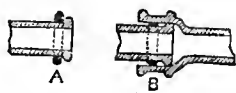
showing as quite separate. In a growing-house the glass roof must be brought as near the plants as possible; in a show-house high eaves are usually necessary. In a growing-house 5ft. is a very general height; in a showing-house they may frequently be with advantage 10ft. high. The site for a show-house is generally determined by the situation of access from drawing-room, and may be where no sunlight can reach it. It must have scantling of larger dimensions and more obtrusive than that for a growing-house. If gardeners recognised this distinction of purpose, they would not so unhesitatingly condemn many designs for conservatories as perfectly unfit, because the designers showed too high a roof or obstructed the light by sash-bars, a little cathedral glass, or a gable. In designing such buildings considerable regard must be paid to artistic qualities, without forgetting its purpose, and some general principles can be laid down. Where possible, the floor-level of conservatory should be on higher level than that of garden by a step or two. This, however, is practically determined by the next and important point that a conservatory floor should be practically on the same level as the floor of dwelling-house communicating with it, the fall not being greater than 2in. Avoid valley gutters next the wall of dwelling-house; if you cannot, let the gutter be a wide one, on which a man can easily walk. Let the roof of conservatory meet the brickwork of dwelling, either upward or at right angles. Have a short corridor between dwelling and conservatory, so that two sets of doors may efficiently prevent any moist air entering the house. Avoid circular work and complicated roofs—a simple gable may be treated effectively. Sufficient interest should be created by broad lines without having recourse to fussy details or meretricious ornament. If you have a lean-to roof and wish to introduce a gable, let the latter project, if only for a few inches; better still, let the gable be emphasised by rising above the eaves. Sometimes a semi-octagonal roof may be thrown out from another roof; but it should be a true semi-octagon, or a flat, weak appearance will be the result. Should a lantern-roof be used, if the end of roof be octagonal, the corresponding end of lantern must be of the same form. A roof of 30° pitch forms part of a hexagon, and may be advantageously employed in producing a pleasing perspective. In a conservatory, the distance apart of the principals depends upon the size and proportion of the structure, but 5ft. is a very convenient width for bays between mullions. These spaces may often be filled up by a transome with transome light over, and beneath two framed lights, opening casement fashion. The light over transome may be filled up with tinted cathedral glass, lead glazed, or perhaps small panes. If the height to the eaves be 10ft., composed of 2ft. wall, 6ft. casement, and 2ft. transome light, and one width of the casement lights about 2ft. 6in., then whenever doors occur their upper part may be treated like the casements and occupy the same space, the tops of the doors coming up to the transome. If, on the other hand, the height to the eaves be only about 8ft., made up of 2ft. wall, 4ft. 6in. casement, 1ft. 6in. transome light, then when doors occur they may rise above the transome and reach the eaves.

So far as the interior treatment of conservatories is concerned, the intimation given that a conservatory should be regarded as one of the reception-rooms of the dwelling-house, will have prepared the way for my advice to avoid fitting up the interior with staging of any kind. Let there be beds and borders, but do not let any supports for the plants be seen if possible. Let there be an ample paved space—not a mere path, but a space so that a table and chair or two may be placed in it. Let the conservatory be regarded more as a lounge than as a mere place to walk round. This space may be paved with marble mosaic, or encaustic tiles. If the size and nature of the conservatory will admit, then rockwork, a fountain, or even a little sculpture, may find a place in it. Baskets of hanging foliage look pretty; bare walls may have creepers upon them, and if staging round the sides or over hot-water pipes be employed, then the space under staging may be hidden by wood diagonal trellis. If one side of a large conservatory be the wall of the dwelling-house, and there be means for easily effecting it, an open fireplace against such a wall would not be unsightly. A grass mat or two thrown down here and there, and a

parrot on a stand, might form pleasing features. Sometimes there may happen to be an awkward recess in the brickwork; of this an aviary might be formed. If shading be required in a conservatory, the vertical sashes may very well have South African grass curtains, hung in front of them. This material is not affected by sun or damp, and looks artistic and suitable. There are various ways of heating horticultural buildings; by fermenting mat-ricks, flues, hot air, stoves, gas-stoves, lamps, high-pressure, hot-water, steam and low-pressure hot water. Fermenting materials by themselves are perfectly insufficient and inefficient. Flues are liable to promote excessive heat as well as concentration of heat; they sometimes admit the products of combustion to the plants, and cannot be manipulated with sufficient ease. Hot-air stoves are liable to much the same objections as flues. Gas-stoves, in addition to other fatal objections, are very costly to keep in work. Lamps are out of the question, except in the very smallest and rudest of green-houses. High-pressure hot water and steam are both dangerous, and both concentrate the heat. This leaves us for consideration low-pressure hot water, which provides the most suitable and efficient means yet known for raising the temperature in horticultural buildings. The maximum temperature required in a glass house depends on the amount of piping used; the calculations as to the amount of pipes to secure given temperatures are almost too complicated for mention in a lecture; a few statistics, based on experiment as well as theory, must suffice. The radiating pipes in horticultural buildings are generally 4in. in diameter of cast iron. In conservatories and greenhouses, in which the aim is to keep the frost out, for sheltered lean-to's from 30ft. to 35ft. of 4in. pipe should be used for every 1,000 cubic feet of area in the house; for exposed span-roofed houses, from 35ft. to 40ft. must be employed. In vineries, &c., where the temperature must be from 55° to 65° F., use from 40ft. to 50ft. per 1,000 cubic feet of area in lean-to's, and from 45ft. to 55ft. in spans. In plant-stoves, with temperatures of from 60° to 70° F., use from 50ft. to 60ft. per 1,000 cubic feet of area for lean-to's, and from 55ft. to 65ft. for spans. For forcing-houses, with temperatures of from 65° to 80° F., use from 55ft. to 65ft. per 1,000 cubic feet of area for lean-to's, and from 60ft. to 70ft. for spans. Much must, however, depend upon the aspect and position of house, and the amount of shelter it possesses. It is a good fault to specify rather more pipe than is absolutely necessary, for with low-pressure pipes the radiating surfaces can never attain a high temperature, and the water should never be allowed to reach the boiling-point, or great waste in fuel will take place. The figures just given are for pipes freely exposed in the open air; if it be in trenches covered by gratings 30 per cent. more piping may be allowed. For pipes through beds at bottom heat for cucumbers, allow for a bed 1ft. 6in. wide, two rows of 2in. pipe; 2ft., two rows of 3in. pipe; 3ft. wide, two rows of 4in. pipe; 4ft. wide, three rows of 4in. pipe; 5ft. wide, four rows of 4in. pipe. The air requires to be heated immediately upon its entrance into a house, in order that the cold air may not strike the plants; consequently pipes should be placed near the outer walls, and, if possible, immediately under or in front of the inlet ventilators. At the same time, the heating surfaces must be distributed as much as possible to avoid concentration of heat. Pipes should, therefore, be continued throughout the length of a house, and if it be wide in proportion to length continue across the ends. You may find it necessary to have three, four, six, or even more rows of pipes coupled together at the ends. Where several sets of radiating pipes are required, they can all be fed from one boiler, and worked independently of each other, if a supply-main flow and return are properly used. No dips must be made in the pipes to go under doors, for dips mean arrest of circulation. The more the heating-pipes are exposed to the atmosphere they are required to heat, the more efficiently will they work. As the mains, however, are simply used to convey heat from the boiler to the radiating pipes, they must be so protected as to radiate the maximum amount of heat. Where the mains pass through an open space they may be lagged with felt, silicate cotton, or other non-conductor. When they pass through the ground, lay them in a hollow brick trench, covered in at the top, so that they are sur-

rounded by a quiescent jacket of air. It is thus possible to place the boiler at a considerable distance from its work, although a certain amount of heat is lost in transit, however well the mains are protected. Supply mains must never be less than 2in. diameter, and when the distance is great the diameter may be increased to 3in. or even 4in. All pipes should have a rise of 1in. in every 9ft., to promote circulation and all bends and contractions must be avoided when possible, as they occasion friction. The boiler must be well below its work; the greater the rise in the pipes the more manageable will be the two columns of water which you have to deal, and the easier and quicker the circulation. The valves used are throttles, and these should be provided to the return as well as the flow-pipes, but high-pressure stop-valves are preferable, as being more efficient. If used, however, they must have a full straight unimpeded passage when open, or they will seriously impede the circulation. Provision must be made for the expansion of the water (which in being raised from 40° to 212° F. increases 1-23rd in bulk) by a little cistern; but in practice the expansion never exceeds one-thirtieth, as a boiling temperature is never attained in the pipes. The cistern should be connected with the bottom of the boiler, so as to serve as a source of supply. Soft water should always be used so as to reduce the amount of incrustation. An air outlet must be made at the highest point of each series, and should be at the summit of every rise. It may take the form of a small tube rising 8ft. or 9ft. above the apparatus, where it will be self-acting, or a small tap, which will require attention twice a day. Of joints, the spigot and socket are generally used, indiarubber rings being the best cementing

FIG. 24.



material. Fig. 24 shows a section of indiarubber ring joint A being ring before, and B after insertion between socket and spigot.

In choosing a boiler, recollect that its power primarily depends on the area of heating surface and the description and position of that heating surface. This surface is fully effective only when it is flat and horizontal, and the fire is beneath it. Vertical surfaces are calculated at 50 per cent., if the efficiency and horizontal surfaces beneath the flames are not calculated at all. When instead of the actual flame, merely hot air impinges upon the heating-surface, as in the case of saddle-box boilers, only about one-third of the heating surface is efficient. Each square foot of effective area will heat from 40ft. to 50ft. of 4in. pipe, from 55ft. to 66ft. of 3in. pipe, or from 80ft. to 100ft. of 2in. pipe. For efficient economic heating, you must never put on to a boiler more than about 60 per cent. of the maximum length of pipe which the makers of a boiler guarantee it will heat. Cast-iron boilers are better than those of wrought iron, tubular better than saddle forms, horizontal tubes better than vertical ones. Boilers should also be adapted for extracting the maximum amount of heat from the fuel, should be easily stoked and cleaned, should burn easily the fuel most readily obtained in the neighbourhood, and should present the minimum obstruction to the upward passage of the water in circulation. The flow pipes should be at the highest part of the boiler, the return pipes at the lowest.

You will have seen from these lectures that in order to construct horticultural buildings, it is necessary to have a knowledge of the details of a great many trades—those of the excavator, the bricklayer, the mason, the joiner, the smith, the engineer, the painter, and the glazier. It is for you to follow up the subject, and bring to bear upon it your horticultural experience. As Lord Brougham once said: "It is very necessary for your success in life that you should know something of everything; but it is quite as necessary that you should know everything of something."

SIR RUPERT KETTLE ON ART.

LAST week the annual distribution of prizes to the successful students of the Dudley School of Art took place. Sir Rupert Kettle, who

presided, said he noticed among the works of art very little effort to realise art in connection with the useful trades of the district. At every school of art he went to be had to say, "Why don't you attempt something to show art in connection with your manufactures? Why don't I see in Kidderminster more of carpets, in Stourbridge of glass, and in Dudley of the staple trades of so great a district?" He found and believed that one of the reasons for so small a Government grant was that the teaching of art was not devoted to the improvement of local industries. He appreciated fine art as well as anyone; but he felt, on public grounds, that the pupils must not look upon that building as merely a drawing school; they ought to look upon it as a school of applied art. In a district like that nothing would be so useful as to pay special attention to mechanical drawing. Hundreds and hundreds of pounds were yearly spent in Lord Dudley's offices in making models for the erection of machinery and for repairs, and yet most of that ought to be done in the office by means of drawings—drawings so well done and so easily understood that draughtsman and workman could fit up the machinery as easily as from models. He did not deprecate freehand drawing; in fact, he loved it, and looked upon it as a second gift of speech, for by a sketch a man might teach another in a few lines what he never could explain. But whilst fine arts and freehand drawing were good, utility ought in manufacturing districts never to be neglected, but encouraged. Sir Rupert Kettle then instanced Doulton's sanitary pipes and Doulton's beautiful and expensive ware as an instance of the value of art when applied to the commonest of materials. Dudley was a large ironmaking district, and they might, by well and judiciously applying art to their manufacture, create a large and a profitable market. Sir Rupert instanced wrought-iron work as an example of what he meant. He had a wretched-looking gas-pendant in front of him—and he would suggest, as a beginning, that any rich man in the room should give a prize for a good chandelier for that room. In conclusion, he asked his audience to take his remarks in a thoroughly practical spirit, and then he believed good results would follow.

TERRA-COTTA AND FAIENCE AS MATERIALS FOR ARCHITECTURAL AND DECORATIVE APPLICATION.*

(WITH PHOTO-LITHOGRAPHIC ILLUSTRATIONS.)

THE Italian term "terra-cotta," by which a certain class of burnt clay or earth is technically known, at once points to the source from whence it derives its present characteristic features as an architectural material. In such relationship its general use dates from the period of the Italian Renaissance; but historically it was known and used in much earlier times.

In fact it may be said to be prehistoric in its origin, for in many forms it is one of the few links, and in some cases almost our only link, with nations of the most remote antiquity. Both in the form of bricks and more elaborate constructive and decorative forms, it was evidently largely used by the earliest builders known to us who can lay claim to architectural skill.

The remains, fragmentary and otherwise, of both Nineveh and Babylon as revealed by the researches of Layard, Rawlinson, and Porter, clearly reveal its application, and afford not a few specimens of historical, antiquarian, and also of architectural significance. Whether in fact the remains of the very earliest builders of whom we have record can or cannot be absolutely identified, we are nevertheless, in the use of terra-cotta, merely following in their wake, for we read of the men of the East, when migrating westward, that, "coming to the land of Shinar they dwell there, and said one to another, let us make bricks and burn them thoroughly, and they had brick for stone." It is not my purpose, however, this evening to touch upon the historical aspect of the subject, although it might well deserve, and would certainly repay attentive consideration.

In incidentally alluding to the early authentic use of terra-cotta, I merely wish to remark that as an architectural material we have at least some ancient historical and not a few fragmentary

* Paper read before the Leeds Architectural Association on Nov. 24th, by Mr. JAMES HOLROYD.

testimonies to its value, and in considering its modern developments and uses it is not without significance to remember that we are not concerned with something new, but rather with the oldest composite and manufactured architectural material to which we have either historical or fragmentary reference.

That the burnt brick of the ancients is identical in material with the terra-cotta of to-day may seem at first a somewhat bold assertion, yet it is probable that it had a very close similarity to many varieties of so-called terra-cotta.

Burnt brick and terra-cotta are, as regards the nature of the material, synonymous terms. The former may be, and sometimes is, the coarser and rougher form, but not necessarily so nor always by any means. Technically we apply the term brick to forms of certain, or rather uncertain, dimensions and shape within recognised limits as to size—the maximum limit of size being generally that capable of being handled by one hand in the process of building; whilst the term terra-cotta is technically understood to refer to blocks exceeding this maximum, in form more resembling blocks of masonry, moulded in its plastic condition into the required shape and size, and applied architecturally on more or less the same principles of construction as are recognised for the use of stone blocks. This definition may be said to be of general application, but it may be remarked that since the introduction of machinery in making bricks a decided difference of process in the preparation of the raw material tends considerably to widen the distinction between terra-cotta and many classes of bricks. The manufacture of terra-cotta is essentially a plastic process. The manufacture of bricks is not now essentially or necessarily so, for in many districts the raw material is now treated in what is called the semi-plastic or the dry form, and worked into the required shape by mere force of compression, without any of the preparatory plastic treatment, which gives to terra-cotta one of its principal qualifications as an architectural and artistic material. Although it is unquestionable that with certain shales and clays the dry or semi-plastic process of brick-making is capable of producing, and with suitable treatment does produce, bricks of excellent quality and hardness for building purposes at a very low rate of cost, yet, I think, it will not be seriously contested, even by those interested in their production, that, apart from the question of cost, they are entitled to rank with a suitable clay skilfully treated as a plastic material and made into brick or terra-cotta, with due regard to the necessary qualities of a first-class building material. In our consideration of terra-cotta as a material for architectural and decorative use within the limits at our disposal, I think I shall best serve your purpose by describing the nature and quality of the raw material.

The terra-cotta, the burnt brick of the ancients, was probably made of the rich clayey earth, or surface-clay of the alluvial plains, which, being plastic in its natural condition, was most easily susceptible of treatment with the simple appliances at their command. Varieties of the same alluvial formation are preferred in some districts and countries, not only for the ease with which they are worked in the plastic form, but from their abundance and great accessibilities at a minimum cost.

These surface clays were, however, in many respects, the least desirable of the aluminous deposit available for terra-cotta. They preserve, often, indeed, a high degree of plasticity which is most desirable; but this valuable quality is often neutralised by an absence of strength, which renders them unsuitable for any purposes requiring exactness of form and shape, after exposure to even a low heat in process of burning. As a rule, these surface-clays being rich in alumina, and deficient in silica, are reinforced in process of manufacture by the addition of sand and other silicious materials, and in some districts it would be impossible to treat the clay in any practical way without this or similar combination.

In not a few instances the material thus prepared is, however, only available for bricks burnt at a low heat, either in clamps or ovens, and cannot take higher rank than a country-made common brick or a London stock brick. In other cases, by the addition of large proportions of sand, the tendency to twist and warp in burning is checked, but the product is often rendered very porous, and is deficient in the ring and

hardness characteristic of a well-burnt brick material of a superior quality. The shales of the coal measures are in some instances used as a raw material for the manufacture of terra-cotta, but these also are often deficient in silica, and are also more or less in combination with other carbonaceous and deleterious substances. They require very skilful treatment to produce a terra-cotta of even moderate quality, and are, as a rule, deficient in the clearness of colour characteristic of purer deposits of clay.

The natural clays most favourable to the production of the best terra-cotta are those in which silica and alumina bear a proportion of not less than 60 parts of silica to from 30 to 40 of alumina, with but little more than one or two parts of foreign material, chiefly ferruginous oxide. Such deposits are probably more plentiful than they are known to be, but the most important at present available are confined to limited areas, and are not numerous. They are of two or three varieties—viz., the banks or pockets of red marls characteristic of some of the Midlands, Staffordshire, some parts of Cheshire, some parts of North Wales, some parts of Devonshire, with here and there banks of marl similar in formation but with the colouring oxides more or less absent. These banks or beds are sometimes of considerable thickness, and present several varieties of clay. The thickest I know is in North Wales, and probably some hundreds of feet in total depth; it is a remarkably fine bed of red marl. 2nd. Certain anhydrous strata of the coal measures, commonly known as fire-clays, a material composed of silica in varying proportions, from 60 up to 70 parts in the 100, and the rest of alumina, with but small admixture of foreign organic matter. These strata exist more or less throughout the entire area of the coal measures. But I think I shall not be guilty of undue partiality in stating what I believe is generally admitted by those best qualified to judge, that one of the purest strata of this clay hitherto worked in this country, is in the Leeds district, and underlies the large area of what is known as the Low Moor or better bed-coal. It lies at an average depth of (say) 60 yards below the surface, and is of an average thickness of about 3ft. Having a considerable depth of cover, it is very hard and close in texture, and is got only by mining operations by the same methods as coal. An analysis of it indicates great refractile power, with almost perfect freedom from foreign matter or organic impurity. It is unquestionably a most excellent base, in connection with other material, for the production of terra-cotta in any form, from the simplest to the most elaborate, inasmuch as it secures—1, hardness and exactness of form when burnt; 2, solidity under pressure; 3, clearness of colour. The clays of Dorsetshire have also been largely used for terra-cotta, and they are for the most part an excellent clean and plastic material, but they are too deficient in silica to be used without considerable admixture. Although when in suitable combination they make excellent stoneware, and are invaluable to the potter, they are less desirable for architectural work. It will be inferred from what I have already stated that the question of suitable raw material for the production of first-class terra-cotta is by no means simple, and in order to solve the matter satisfactorily, some manufacturers make from the clays of various districts what they consider to be the most suitable body. The London manufacturers, for instance, as well as some others, are compelled to rely entirely on clays from localities at a more or less considerable distance from the place of manufacture. Although by judicious mixing it is no doubt possible to produce a thoroughly good and sound body, yet when the finer and more important proportions of the raw material are imported from considerable distances, often at a considerable expense, there is some danger (in these days of excessive competition) of the product suffering by a too sparing use of the most desirable constituents. I have incidentally alluded to the question of colour; this is, however, a most important point in determining the value of a terra-cotta material for architectural purposes. The principal colouring matter is oxide of iron, present in one form or another in all genuine clays; but these oxides are very various in their quality and condition, and produce remarkably varying results under the action of fire. Some clay will develop

by heat a rich deep red colour, others a warm buff, and these again vary considerably according to the mode in which the heat is applied, or according to the amount of atmospheric oxygen admitted during the process of burning. The colour qualification of each bed of clay can practically be determined only by experience, for although chemical analysis may indicate the actual quantity of iron oxide present, its effect is a matter of direct experiment. In some cases it is necessary to support the colouring properties of the clay by additional oxide; in other cases the oxide is present in too abundant degree, and has to be neutralised. The degree or tone of colour most desirable for architectural purposes ranges from a warm buff to a deep red, and by the aid of recent improvements in manufacture, aided by improved chemical knowledge of a technical character, it is now possible with a good material to produce almost any required tone and any required colour. In the production of these results with any accuracy, the quality of the fuel used is an important element. A variation in the sort of fuel used often produces very perplexing results, and unless its nature is understood, may defeat the greatest care in other processes. A sulphureous coal is one of the greatest drawbacks to purity of colour, and often furnishes one of the constituents for chemical combination with some of the salts evaporated by the clay, and with them forms several varieties of sulphates, often known as "scum," which more or less disfigure the surface of the bricks or terra-cotta. Possibly I may have said enough on the question of raw material to make clear some of the salient points connected with it, and without further enlarging I will pass on to the process of manufacture.

It will at once be understood that the processes of manufacture are only next in importance to the nature and character of the raw material. In some cases, the very simple and elementary processes of preparation are all that are necessary to secure such results as are possible with the material, whilst in other cases a strong and costly plant is necessary to reduce the raw material under control, and produce from it satisfactory results. With the plastic and slender clays to which I have alluded but little more is necessary, if they are clean and free from grit, than thorough working in a pug-mill—a machine composed of knives revolving in a cylinder—the effect of which is to work up the material into a homogeneous mass of the requisite degree of plasticity. In some cases, however, the clay or loam is full of stones, hard grit, which must either be crushed between heavy rollers or washed out, and both these processes are more or less in use. The hard and strong marls and fireclays, however, require more thorough treatment; in many cases it is desirable to reduce them to the condition of a fine powder as a preliminary process. In all clays thorough weathering or exposure to the oxidising influences of the atmosphere is most desirable, and complete plasticity of the homogeneous quality of the clay depends largely on the thoroughness with which this is applied. Unweathered clay is much more likely to twist and warp in drying and burning, than is the case with clay imperfectly and hastily prepared.

Of late years very powerful machinery has been adapted to all the preliminary processes of preparation, by which both time and labour are saved, and certainty of result secured; after being reduced to a plastic condition by these means, the clay is all the better for remaining in a mass for a lengthened period, if suitably protected from incrustation. There are several methods of moulding terra-cotta, and some manufacturers have adopted machinery to some portion of this work; but the only really satisfactory method, although not the cheapest in all cases, is to press it into plaster moulds accurately made from plaster models.

The making of the model is one of the niceties of the terra-cotta manufacture. Unless made to shrinkage rule in the first instance, the design or working drawing of the architect has first to be enlarged, the requisite size to provide for the ascertained shrinkage of the clay in drying and burning. In all the first-class terra-cotta works, this shrinkage can be determined to a very great nicety, and it is most important that it should be so if the various blocks are to work together with accuracy. The most thorough method is to prepare a plaster model exactly representing the

required block, plus the shrinkage allowance; and if this is skilfully done, and a mould taken from it in the way best adapted to moulding the clay, and afterwards withdrawing the mould, accuracy of result is reduced almost to a certainty. It cannot be denied, however, that there is in this operation much room for bungling and equal scope for the exercise of true architectural skill and practical knowledge and experience. Inaccurate or badly-made models and moulds are apt to twist the clay, and are by no means unknown, and hence often follow bad joints, irregular lines, twisted blocks, and general anathemas, only to be avoided by great care and practical skill in the department in which good, careful, and experienced workmen are not too plentiful. When decorative or enriched modelling is required, there is further scope for intelligent and trained skill; many enrichments have been murdered in the modelling, and the most graceful designs converted into hard and lifeless monstrosities from a lack of artistic perception on the part of the modellers. Having personally devoted considerable attention to this subject, I may, perhaps, be permitted in passing to express the opinion that, although the English sculptor in stone can possibly hold his own with the world, yet I have not yet found an English modeler in clay who can hold his own with the Continental modellers of similar calibre trained in the Italian and French methods of manipulation, either in respect to the speed, quality, or spirit of his work. Possibly now that terra-cotta is assuming greater architectural importance in this country, this position may not be of long continuance; but the great requisite is that trained artistic perception should more intelligently guide manipulative skill. After the clay is moulded or modelled, it has to then dry very gradually, for hurry, haste, and push are fatal to true work in terra-cotta. Ample floor or still-room is necessary, of a suitable temperature—and considerable attention is often necessary to regulate judiciously the process of drying. When sufficiently dry—and clays differ as to this condition—the final and possibly most critical process of burning follows. This process is variously performed, according to the quality and nature of the clay, and according to the standard of excellence in colour, exsiccation, and durability sought to be obtained. Some terra-cotta will not bear more than a good red heat, whilst some require a degree of heat sufficient to melt iron, or even steel.

(To be continued.)

TERRA-COTTA LUMBER.

A RECENT American invention is that of the manufacture of lumber from fireclay, patented by Mr. C. C. Gilman, of Eldore, Iowa.

The composition consists of kaolin clay, free from grit, one part; resinous sawdust, from one to three parts, as porosity may be required; water sufficient to thoroughly incorporate the above, by the aid of machinery, into a plastic mass.

Removed from the grinding tubs, where it has been ground, the spongy product is forced by plungers driven by steam through iron or steel cylinders to express the superfluous moisture therefrom, and issues forth in the shape of long blocks or logs, of length, form, and size best fitted for handling, usually eight to twelve inches in thickness and four to six feet in length. When sufficiently dry to render handling safe, these logs are moved into kilns or clamps calculated for the purpose. After the steam and vapours are driven out by a slow, steadily increasing fire, the temperature is rapidly raised to nearly a white heat, which not only consumes the sawdust, but brings the clay itself into the first stages of vitrification. On cooling, the logs are removed to the mill and sawed into planks, boards, and dimension-stuff, as lumber from wood is manufactured, and subsequently fashioned in the workshop into such forms and articles as demanded by purchasers. This material, being free from grit and tough in texture, can be cut, sawed, bored, planed, and carved with edged tools, and before or after such treatment can, after slipping and glazing, be submitted to a second firing, with fine results in ornamentation obtained.

Kaolin is the upper stratum of fire or feldspathic clay beds, and owing to the absence of

sand or free silica is unsuited to common pottery uses, as its warpings in drying and firing unfits it for moulding purposes. Mr. Gilman's invention, so he claims, overcomes this trouble, inasmuch as the material is reduced to form with edged tools subsequent to firing.

Terra-cotta lumber, it is claimed, is indestructible by fire, gases, or acids; is a poor conductor of heat, sound, and electricity; and possesses molecular attraction to an extent which allows of plastering without first lathing. Its weight is one-half less than common building brick, and is erected with nails instead of cement or mortar, virtually rendering fire-proofing a work of carpentry instead of masonry as heretofore.

THE BUILDINGS OF THE CHIEF MONASTIC ORDERS IN ENGLAND.*

A DISCOURSE on this subject was given on Tuesday evening, by Mr. J. T. Micklethwaite, F.S.A., before the members of St. Paul's Ecclesiological Society, at the Chapter-house. Mr. J. P. Seddon, F.R.I.B.A., occupied the chair. The address, which was extemporaneous, was illustrated by large ground-plans of the monastic buildings at Westminster, Durham, Christ Church Canterbury, Fountains, and Mount Grace, near Thirsk, all drawn to uniform scale. The author said he proposed to restrict himself to English examples of monastery buildings, and to render this intelligible it would be necessary to sketch the development of the monastic orders. Of the very earliest, or pre-Anglo-Saxon houses in Britain, we had no remains nor any definite descriptions, but sufficient particulars had come down to us to show that they resembled the Oriental monasteries in including no large buildings, but that men lived in little huts, a mode of life which prevailed in Ireland till a much later period. This Celtic plan of semi-isolated life was in existence when Augustine came from Rome and brought with him, and endeavoured to enforce, the Benedictine rule, by which a system of living in common was substituted for the hermit-like life. A long struggle ensued between the two modes of life, but ultimately the Benedictine method prevailed. These houses had a general ground-plan, which was altered to fit the circumstances of site and requirements, but adhered to an arrangement the origin whereof was so remote that it could not be traced, but which the lecturer believed to be derived from the Roman villa of the better class. A drawing made in 820 A.D. of an ideal monastery intended to be built at St. Galle (and possibly carried out, although no traces remain there of such early work), still existed, and the facsimile exhibited by Mr. Micklethwaite showed a general correspondence in plan and arrangement to the typical Benedictine house in its division into cloister, church, and buildings for housing the monks. The earliest actual remains sufficient to indicate the general grouping were those at Westminster Abbey, usually considered to be of Edward the Confessor's time, though as a matter of fact they were a little later, being of the end of the 11th century. We know from records that at that period the abbey buildings were entirely reconstructed, so that there was nothing to show what the earlier Saxon arrangement was, although the probability was that it corresponded with the existing work, but was planned to a smaller scale. By the time of the Norman Conquest the struggle of conventual plans and modes of life was determined, all the older monasteries having conformed to the Benedictine rule. Some time before that there had been at Clugny a reformation of the Benedictine rule, which was gradually relaxing. For about half a century, from 1080 till 1130, there was in this country a fashion to establish Clugniae houses, the first of these being that at Wenlock. The new order followed generally the Benedictine model, but carried the accessories of worship to the utmost point of splendid elaboration—they were indeed the Ritualists of that day. The next reformation of the Benedictine order went to the opposite extreme, and was a Puritan reaction.

* Ground-plans of Westminster, Durham, Christ Church Canterbury, Chester, Worcester, and St. Stephen's, Caen, drawn by the late Rev. Mackenzie E. C. Wileott, B.D., together with a report of his lecture on this subject before the Architectural Association, to which they formed illustrations, were published in the BUILDING NEWS for March 3, 1876.

It was that known as the Cistercian order, and, beginning in a Burgundian convent, became in about 30 years the most popular order in Europe. Its members affected the greatest simplicity in their services, prohibited the use of stained-glass, carving, and pictures; but, like the modern Society of Friends, determined that while no ornaments could be tolerated, every portion of the building and every detail of the services should be of the very best. The consequence of this was that in the Cistercian buildings we found the most careful designing, planning, and construction, the purest details, and excellent workmanship. The first English house was that of Waverley, in Surrey, founded in 1128; this was followed two years afterwards by Rievaulx, and that in 1131 by Fountains, and before long a very large number of houses erected in the purest style of architecture, and rigidly divested of ornament, were rising in many parts of the land, chiefly in the northern counties. The rise of the order was coincident with the introduction of the pointed arch, and it was probably to the general meetings in chapter of the heads of this order that we owed the simultaneous adoption of this feature throughout Europe. Singularly enough, the Cistercians proved very conservative in their tendencies, and adhered to their style of building and modes of life long after the fashions had changed with others. They were not only the great innovators in architecture, but were also the pioneers in manufactures and commerce, especially introducing the iron-smelting into Yorkshire, as well as the woollen trades. The next reforming movement in the Benedictine rule resulted in the founding of the Carthusian order. The new system was begun at La Grande Chartreuse early in the 11th century, but was not known in England till the foundation of a house at Witham, Somerset, in 1176. The movement developed very slowly, and at long intervals some 15 or 17 houses were formed in this country. One of them was the well-known house near Newgate-street, London, of which traces exist in the school, and another, that of Sheen, near Richmond, Surrey. There was never in our history a rush after any order after the establishment of the Cistercians, because the Preaching Friars came in. The former orders, especially the Benedictine and Cingniae, had appealed to the rich and great for support, the friars were of, and worked amongst, the people, and the modern strife between Church and Dissent was paralleled in the more intense jealousies and disputes between monks and friars. The houses of the new orders were very interesting, but showed so many diversities that a whole evening would be needed for their description, and he must now turn back to examine in detail the houses of the several monastic orders, and their points of difference and resemblance. The familiar example of Westminster Abbey was almost a normal Benedictine house, and from its plan he could show all the buildings which made up such a monastery. To this rule the large cruciform church, and the cloister court surrounded by four covered alleys, one side of which flanked the nave (here, at Westminster on the south) were essential features. The cloister was neither a graveyard nor a mere passage, but was the place where the monks actually lived when not on duty in the church, or at meals, or asleep. Over one walk, here, at Westminster, over and beyond the eastern one, on the first floor, was the long narrow building, the dormitory, and beneath it a room provided with a fireplace, the common hall or parlour. From this dormitory a passage on the first-floor level ran westwards, communicating with the triforium of choir or transept, and so affording a covered and high-level access to the church for the performance of matins. At right angles to the dormitory, and parallel with the church, behind the south walk, was another long building, the refectory or frater. This frater, fratre, or fraytray, was often supposed to be a separate building, but the name was simply an Anglicised form of the refectory or dining-room. A serving-door at the south-west end led into the kitchen, which always adjoined the refectory. When in the cloisters the monks sat on the wall next the church, here on the north side, and in later times, as luxury increased, were provided for in little wooden erections; traces of which might yet be distinguished at Westminster. The novices occupied the west walk of the cloister, and Mr. Micklethwaite mentioned that at nearly

every Benedictine house you might find, by a little examination, the nine holes in the stonework where these youths played tit-tat-toe with round stones; he had discovered them at Westminster, Canterbury, and Norwich, and had no doubt it was usual. The chapter-house was always behind the east walk; it should be as at Durham, Canterbury, &c., an oblong building with circular east end, having seats for the monks on the sides, and for the superiors in the rounded portion. At Westminster this feature was abnormal, Henry II. having determined to erect a Chapter-house that should surpass all others, and accordingly built the present well-known octagonal structure communicating by a passage with the east walk. Close by were, at Westminster and in most houses, the stairs which led from the cloister to the dormitory, and by which the monks descended to the undercroft, common room, or calefactorium, beneath their general bedroom, where more relaxation was permitted than in the cloister. Close by was the treasury, which was in reality a muniment room. At Westminster this formed the undercroft of the Chapter-house, and was now known as the Chapel of the Pyx, having taken the functions of the Royal Wardrobe room, now destroyed. The washing of feet was a great institution in a monastery, the monks having to perform that office for each other weekly, and on Maundy Thursday to wash the feet of some poor man; on this occasion the abbot did the same for 13 poor outsiders, as a proof of humility. The place for the general footwashing was the south walk, that for the abbot being in the east walk. At the south-east angle was a little room, the barbary, for shaving the head and beard. In later times, when the monks got fewer (for at the time of the Dissolution, the system, it would seem not to be generally understood, was falling so much into disuse that the monasteries were almost uninhabited), the monks felt that the great frater was too large and uncomfortable for dining in, and so screened off a small portion. The Benedictines adopted various refinements, but always adhered to the letter of the rule. Thus, they would on no account eat meat or indulge in luxuries in the general frater, but they considered it permissible to enjoy these in a smaller room, known as the misericord, and by the monks as the "disport" or other slang names. In this little room they took by turns, a week at a time, to dine on meat. At Westminster is the only identified one existing in England, in Ashburnham House, which, if handed over to the King's School, as now unfortunately proposed, would be simply destroyed; it lay to the south of the refectory. In a line with the west front of the abbey church, and extending far to the south and west, was the cellarium or cellarer's department. The cellarer was a most important officer, having the management of all the secular affairs of the convent, and in particular of the showing of hospitality—a marked feature of the monastic institution. There were three classes of guests to be provided for. First were the actual tramps, the paupers, the arrangements for receiving whom by the cellarer, till then very complete, were only recently destroyed in the course of "improvements" at Canterbury. Then there were the middle-class guests, who were received at the expense of the house, in a range of divided buildings, generally, as at Westminster, in a line with the west front of church. The third-class were very eminent personages, who were entertained by the Abbot from his own funds and in his own apartments. At Westminster the site of the Abbot's house was now occupied by the Deanery, and his retiring-room or parlour was the Jerusalem chamber abutting on the west end of the abbey church. On the most private side of the monastery at Westminster, to the east, were the infirmary buildings. These were intended to be an asylum and place of retirement for the aged brethren—their use being reserved for those who had been professed 50 years, and must, therefore, be considerably over 70 years of age; but a few sick folk were admitted, and it was frequently alleged that monks were eager to qualify for admission. The infirmary, as at Canterbury and other houses, was a very long hall divided into aisles by an arcade, with a chapel at one end; in later times, when privacy of life was more valued, the hall and aisles were partitioned off into little cells. The infirmary at Westminster was, contrary to the rule, quite secluded from the general buildings, and had a

little cloister of its own. Beyond the domestic buildings on the cloister side of the church were the garden, which was walled around, and could still be traced at Westminster, and the farm buildings. The mode of drainage was simple and effective. The monastery was usually placed near a stream, from which a portion was diverted to turn the mill-wheel; this running water was carried through the buildings as an open channel, and into its sewage and drainage, and all objectionable matters, passed into the general body of the river. The course of this drain-stream could easily be traced to the south of Westminster Abbey. Turning now to the plan of Durham, Mr. Micklethwaite showed how the peculiar site, with the west front of the cathedral church overhanging a bold river-side cliff involved a recasting of the normal plan. Close examination of the buildings would show that the Durham monks attempted to carry out the usual scheme; but it was found too inconvenient, and so the buildings were rearranged so to suit an approach from the west instead of the east. The cloister and chapter-house occupied their right relative positions to each other and the great church; but the infirmary was removed to the west side of cloisters as the most retired position. The prior's house (there being no abbot, as the bishop was the head) was at the east end, but the guest-house and its appurtenances were to the west and south. The position of the house at Worcester, where the west front overlooked the Severn, similarly accounted for the rearrangement to be seen there, where the dormitory and common room were to the west of the cloister, which again was on south side of church; the refectory parallel with south walk, as usual; and the guest hall, &c., to the east of chapter-house and cloister. Except in giving more domesticity and privacy to the infirmary, the changes introduced into Benedictine houses were few and slight during the four centuries they were in use. The buildings of the Cistercian order were marked by extreme plainness. Their common houses were larger than those of the Benedictines, because they did much of their work in them. A peculiarity by which the Cistercian house might always be distinguished was that the frater was placed at right angles, instead of parallel, to the church, and, as a consequence, the kitchen was placed near the cloister, and the scullery at its rear and facing the drainage stream. At Fountains and other monasteries, at a considerable distance from the church and cloister, was a long range of buildings, about which, a few years since, a fierce controversy raged. The late Rev. Mackenzie Walcott contended that it was the *domus conversorum*; but the lecturer and others pointed out that it was too long, and by analogy with Benedictine houses, showed that it was the counterpart of the continuous but divided buildings used as the cellarium or cellarer's offices. By reference to plans of Fountains and Canterbury, Mr. Micklethwaite showed the resemblance, and added that another peculiarity of the Cistercian house was its church. This was nearly always square at the east end, whereas, the Benedictine was sometimes apsidal. Unlike the latter, although cruciform on plan, it was cut up into many different cells by substantial walls, so that the modern idea of a vista could not have been very precious to Gothic men. At Fountains, not only were the aisles thus screened off, but solid stone walls, 10ft. or 11ft. high, and 2ft. to 3ft. thick, were carried across the nave and choir, and other wooden screens were constructed to inclose bays and portions. In many naves also, indeed, of other orders, a pulpitum, now erroneously called the rood-screen, was often to be found near the crossing. It consisted of parallel walls of masonry, on which was erected the organ, and to the east of it was the true rood-screen. The infirmary was like a Benedictine one, but the chapel was smaller, as the sick brothers were expected to come into a private or retro-choir of the ordinary church. The choirmen sat on the south side at Fountains, and the conversi on the north, the latter overlooked by the Abbot's pew on south side of nave. At Fountains, the whole river was taken under the buildings to act as a drain, and streams were carried in stone flues wherever wanted. The last order he should describe were the Carthusians. They lived an isolated and solitary life, each shut up in his little cell, inclosed in a common monastery, and only met at church, at the refectory, and very rarely at the chapter-house.

Most of these houses had disappeared, or had been rebuilt on other lines; but at Mount Grace, so much remained unaltered that the Yorkshire Archaeological Association had been able to prepare and publish a ground-plan. The scheme showed a very small church, to which was attached an irregular four-sided court, 250ft. square. The outside of this quad was surrounded by walled-in inclosures, 20 in number. Each consisted of a garden and a dwelling, consisting of three apartments—living-room, bedroom, and store-cupboard, corresponding to modern pantry—on the ground-floor, and in the roof a little attic. In the garden-wall was a little loop, or narrow passage, turning sharply at right angles, so that the monk who brought round the daily allowance of food should not see or be seen by the inmate of the cell. The latter was supplied with sufficient materials to render him self-dependent except for his dinner, each man having issued to him, according to an inventory which the author recently discovered, two complete suits of clothes, a better and a worse, a razor, whetstone and bone, needles, thread, and comb, writing-desk and writing materials, including pens, chalk, two pieces of pumice stone, and two penknives, lead weight, ruler, prick, two horns of ink, and a style, two pots, two tubs, bread-bag, spoons, knife, basin, water-cup, torch, flint and steel, axe, and firing wood. The use of the attic was unknown even to the modern Carthusians, although they reproduced it in new monasteries. The church consisted of a truncated nave and transepts, a tower to east of these, and a large choir. At Mount Grace this arrangement of 20 cells was found too small, and as it was impossible to enlarge the scheme, a second nest of cells, five in number, were built round the church. In conclusion, the author graphically retold, with the aid of a ground-plan, the story of the murder of Thomas Beckett at Canterbury.

The Chairman expressed his concurrence in the lecturer's views as to the real use of Mr. Edmund Sharpe's "*Domus conversorum*," which he held, at the time of the controversy, was much too large for such a purpose, whereas its utility as a place of reception for the cellarer's guests was obvious. A vote of thanks was accorded to the lecturer.

BOOKS RECEIVED.

Simple Hydraulic Formulae, by T. W. STONE (London: E. and F. N. Spon), is a useful collection of hydraulic formulae applicable to nearly all cases to be met with in the actual practice of the hydraulic engineer. Some of the computations are quite original, and those which are selected have been chosen with care and discretion. — *Economy*, by JAMES PLATT (London: Simpkin, Marshall and Co.), is another interesting book by the author of "*Business*," "*Morality*," "*Money*," and "*Life*." We have read the introductory chapter with great interest. We hope Mr. Platt is wrong in the conclusions he has arrived at in the first part—we are sure he is right in all the rest; and, right or wrong, he invariably writes with a fairness and force that compel thought and eschew disarming prejudice. — *Toys and Toymaking*, by JAMES LUKIN, B.A. (London: Bazaar Office) is the second part of a capital boys' book. It deals especially with clockwork, steam, and electrical toys. — *The Whole Art of Marbling*, by C. W. WOOLNOUTH (London: Geo. Bell and Sons) is a new edition of a work addressed especially to bookbinders, but which will be found useful by decorators as well. Numerous coloured examples are given, and the directions are comprehensive, and easy to follow. — *The British Almanac for 1882* (London: The Stationers' Company) is as good as its predecessors. — *The City Diary for 1882* (London: W. H. and L. Collingridge) has reached its nineteenth annual issue. — *Cities of the World* (London: Cassell, Petter, and Galpin) is the first part of a well produced interesting new publication. — *The Steadfast Aim* (same publishers) is the Christmas number of the *Quiver*, and, as usual, shares all the characteristics of that popular magazine.

Casual wards are about to be built at Market Rasen, for the Caistor board of guardians. The architect is Mr. P. Bellamy, of Lincoln.

CONTENTS.

International Exhibition of Smoke-Preventing Appliances	713
Winter Exhibitions	714
The Water Question.—XXII.	716
Architectural Association	717
The New Compulsory Architectural Examination, and What it Involves	718
Lectures on Horticultural Buildings at the Crystal Palace.—III.	719
Sir Rupert Kettle on Art	720
Terra-cotta and Faience as Materials for Architectural and Decorative Application	720
Terra-Cotta Lumber	722
The Buildings of the Chief Monastic Orders in England	722
Books Received	723
Our Lithographic Illustrations	724
The New Patent "Electric" Paint Remover	724
Mr. Val Prinsep on Art	737
The Elements of Art	737
St. Dunstan's Church	737
Ruford Abbey	737
Building Intelligence	738
Competitions	738
Schools of Art	738
Chips	738
To Correspondents	739
Correspondence	739
Intercommunication	743
Legal Intelligence	744
Our Office Table	745
Meetings for the Ensuing Week	746
Tenders	746

ILLUSTRATIONS.

DETAILS OF NEW CHURCH OF THE ORATORY, SOUTH KENSINGTON.—MUNICIPAL BUILDINGS AND NEW MARKET EXTENSION, CHESTER.—BITS FROM CANTERBURY CATHEDRAL.—HOUSES AT LEICESTER.—DOMESTIC WINDOWS IN TERRA-COTTA.

OUR LITHOGRAPHIC ILLUSTRATIONS.

THE ORATORY, BROMPTON.

AMONG our illustrations this week, we give a detail drawing of the cupola for this new church, which is being rapidly pushed forward, so much so that the pendentives of the dome are well advanced, and the centring of the large arches are engaging the attention of the carpenters. This cupola is particularly conspicuous by the absence of the drum (with which such structures are usually accompanied for the purpose of giving additional elevation and greater dignity to the exterior), and although this building suffers in this respect, yet seen from the inside of the church, its medium height may prove an advantage. Its line of springing is about 100ft. above the floor, and it is 51ft. in inside diameter, which is similar to that of the Gesu, S. Andrea della Valle, and the Oratory, at Rome. It may here be not without interest to mention that the cupola of the Roman Oratory is also without a drum, the vault springing from within a few feet of the circular cornice. The four pendentives are carried up in brick in level oversailing courses up to the height of 14ft., and from that to where it meets the circular architrave with radiating joints, the upper angle or feather-edge being formed in Portland stone well doweled together; the vertical portion of the wall from this point will have a slight batter towards the inside until it reaches the thickness of 3ft. 9in., upon which there will be a ring in brick and Portland cement to the height of 12ft., constructed in small portions at a time in well-slaked cement; the upper surface of this ring will represent a thickness of over 7ft., the inner portion forming the skewback for the concrete vault. The ring of the eye at the top will be executed in large blocks of Portland stone, upon which the lantern will be erected. The whole of the concrete vault will be protected with an outer shell of woodwork, covered, at least, for the present, with 16oz. Vieille Montagne zinc; this intermediate space will inclose a staircase, giving access to the lantern. The vertical portion, or dado, will have at the back a series of recesses for the purpose of easing the weight on the pendentives, and the eight angles which fall on the haunches of the main arches will be considerably strengthened with additional brickwork and buttresses. The estimated cost of this portion of the church is about £10,000, but only a part is being carried out at present, and is being done by Mr. Geo. Shaw, of Westminster, under the direction of Mr. Herbert A. Gribble.

THE CHESTER TOWN-HALL AND MARKET EXTENSION.

The Town Hall, as erected, was designed by Mr. W. H. Lynn, and was carried out under his superintendence. The design was adopted by

the Corporation of Chester on the advice of the late Sir M. Digby Wyatt, who had been called in to advise on the merits of the designs submitted in competition for the work in 1864. The new buildings were inaugurated by the Prince of Wales, in 1869. The space between the covered market and the site of the Town Hall was occupied by tavern premises, which, owing to rights of light which they enjoyed, prevented the completion of the return of the new building towards the market. This had to be sloped inwards from about two-thirds of its depth as a temporary expedient. The Corporation having acquired this property, are now extending the market accommodation up to the Town Hall boundary, with a front towards Northgate-street, in keeping with the style of the Town Hall. This, which is shown in our view of the buildings, is being carried out from Mr. Lynn's designs also. The return of the south end of the Town Hall is drawn complete—a condition which, it is to be hoped, it will be left in before the opportunity for accomplishing it simultaneously with the market work is allowed to pass. The extension of the market is being carried out by Mr. W. Edge Samuels, of Wrexham, contractor, under the superintendence of Mr. J. Matthew Jones, the City surveyor of Chester, who has prepared the drawings of all the work now being done, with the exception of the new front designed by Mr. Lynn.

BITS FROM CANTERBURY CATHEDRAL.

CANTERBURY CATHEDRAL and its precincts afford a vast field for study to the architectural student, being one of the best examples of the gradual growth and development of an English Cathedral, without destroying the harmony of the whole. The diminution in width of the choir at its eastern end is full of suggestions for interior effect, without destroying the grandeur of the exterior, if artistically treated. Another peculiarity is the approach of the choir by two flights of steps from the nave, and the north and south transepts, being the same level as the nave, are descended to from the first flight of steps to choir; the crypt, which is under the choir and its aisles, is entered by steps from the east end of north transept. The view from the north-west of cloisters, with the magnificent central tower, is very striking, its buttressed pinnacles giving play of light and shade, notwithstanding its want of graduation in bulk. It was begun by Archbishop Morton and completed by Prior Goldstone, and is 235ft. in height. The north and south transepts were rebuilt in 1379 by Archbishop Sudbury. The north transept, called the Martyrdom, the scene of the murder of Thomas à Becket in 1171; a stone screen separating that spot was taken down in 1734. There is some of the Norman masonry remaining in the north-west corner of the north transept. The nave, begun by Archbishop Sudbury, and finished by Archbishop Courtney and Arundel in 1410, has little of historical associations. As will be seen in the accompanying sketch, the aisle-windows are the same in design as the west window in transept. The Chapter-house or Sermon-house, approached from the cloisters, was rebuilt by Prior Chillenden, about 1400, assisted by Archbishops Arundel and Courtney. It is 92ft. long, 27ft. broad, and 54ft. high, and is remarkable for its curb or mansard roof, covered with sheet-iron; the effect of the interior is better than that of the exterior, having no ties, and being divided into panels by moulded ribs. The whole was originally decorated with esuteheons, &c., which have partly been restored. The south side of cloisters, leading from palace to north transept, was rebuilt by Archbishop Courtney, and the remaining three sides by Prior Chillenden, and were afterwards glazed. On the north side was the refectory, which, with the library adjoining the Chapter-house, completes the interesting quadrangle.—T. H. CURREY.

HOUSES AT LEICESTER.

THE houses at Leicester of which we give a view this week are placed in the best residential part of the town, near to Victoria Park. They are four in number, and each contains three sitting-rooms, good kitchen premises, abundant bedrooms, and all conveniences. They are built of good red local bricks, and roofed with Broseley tiles. The timber-work is red deal, and portions of the plaster filling are enriched with carving. Messrs. T. and H. Herbert, builders, of Leicester, are carrying out the work

under the superintendence of Messrs. Goddard and Paget, MM.R.I.B.A.

DOMESTIC WINDOWS IN TERRA-COTTA AND FAIENCE.

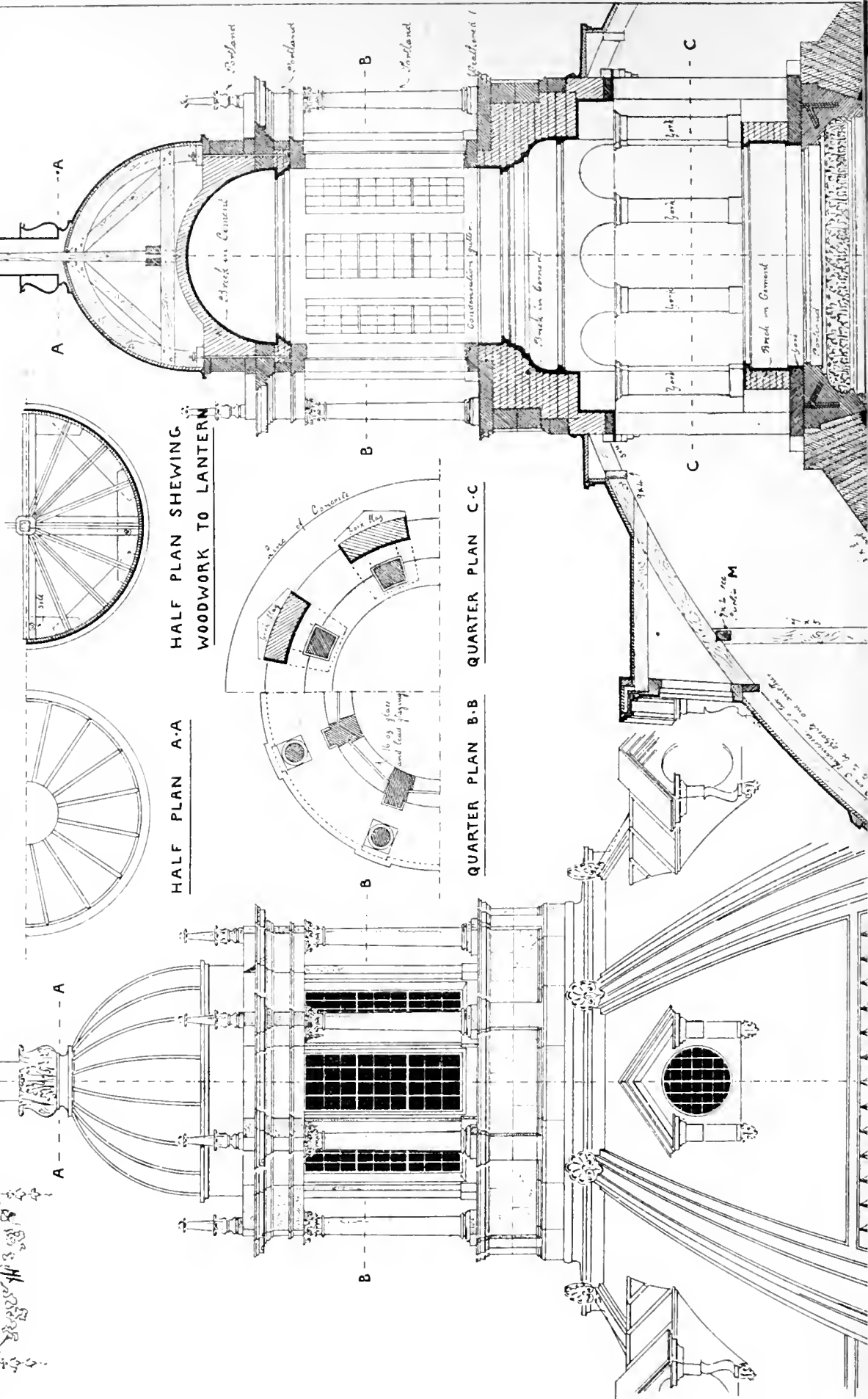
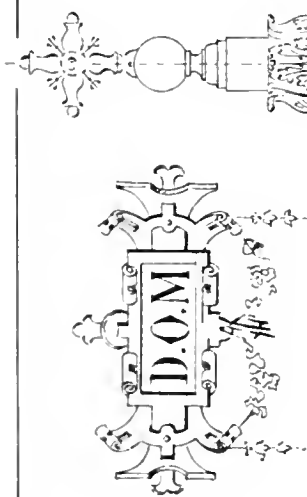
THESE examples illustrate a lecture delivered this week at Leeds, which is reported elsewhere in this number.

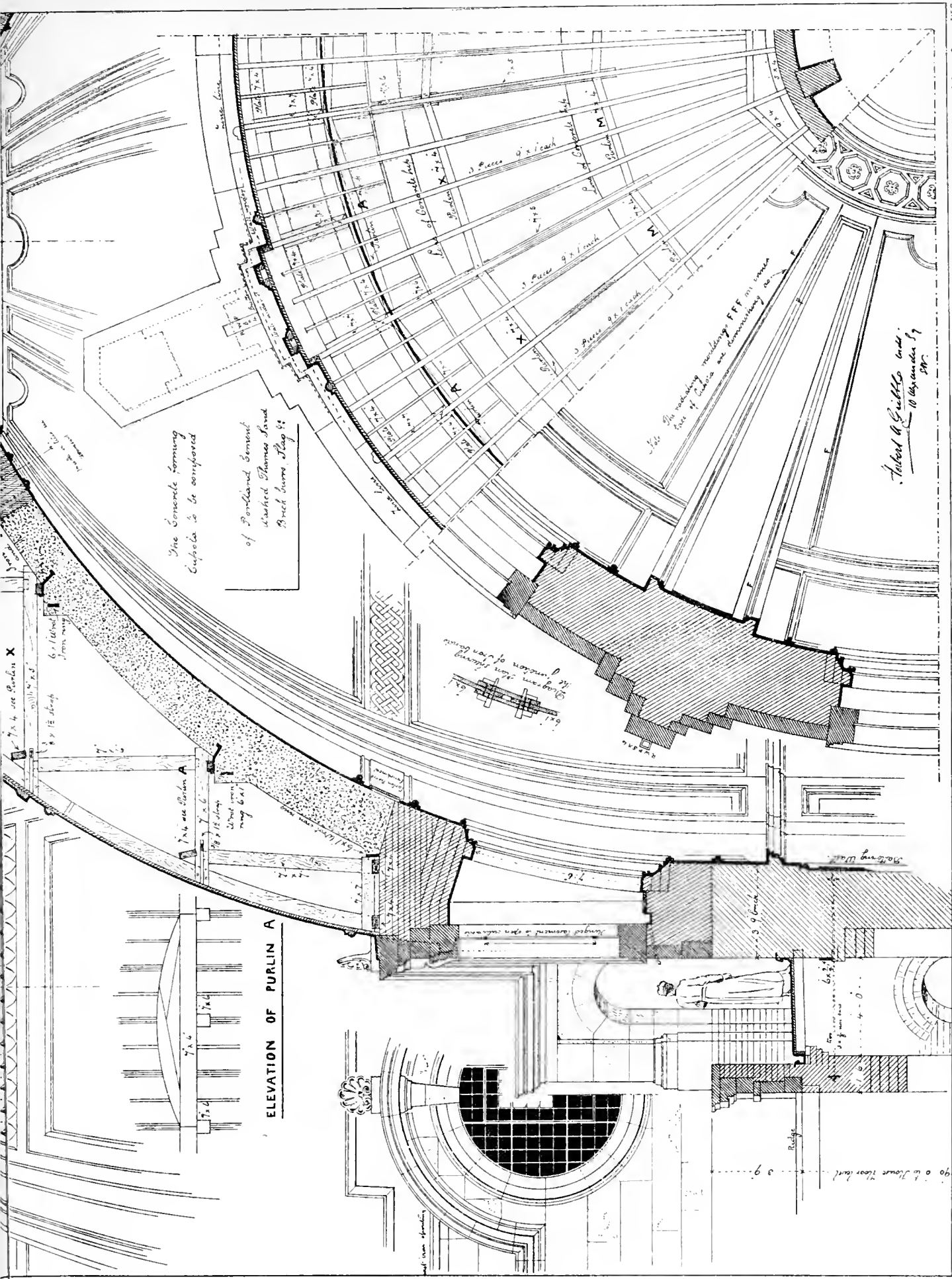
THE NEW PATENT "ELECTRIC" PAINT REMOVER.

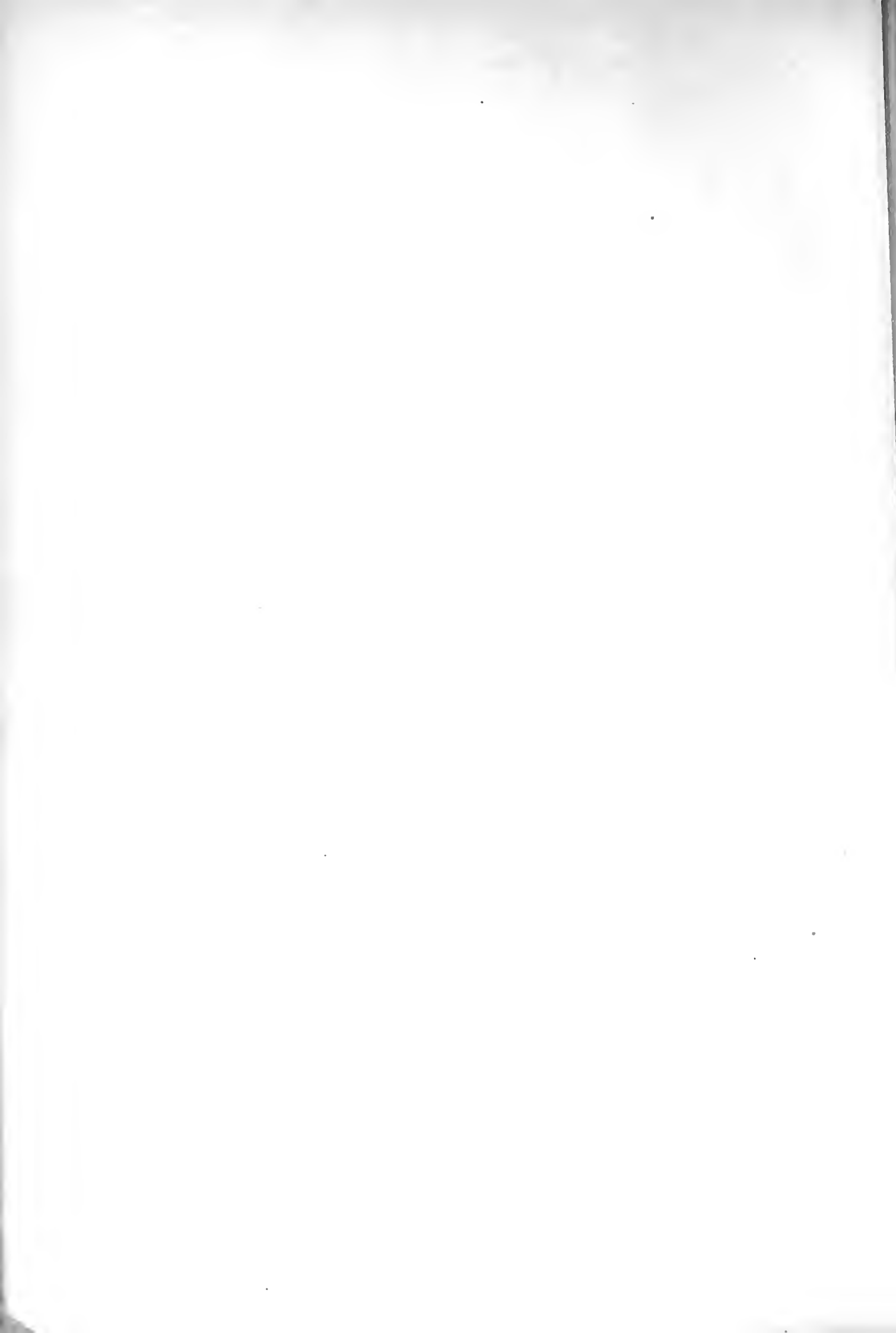
A VALUABLE addition to the resources of the painter's art has been patented by Messrs. Rendle Brothers, of 3, Westminster Chambers. The "Electric Paint Remover" is the name given to a chemically prepared compound for removing old paint, varnish, tar, rust, grease, &c., from wood, metal, stone, and fabrics of all kinds. Last Monday we were invited by Messrs. Rendle to see some experiments made with this preparation upon various specimens of painted wood and metal. These were all old samples, well painted with several coats of good oil colour. The compound, which is of a cream-like consistence, quite white, is spread over the painted surface, and after being left on a few minutes, is wiped off. The inventor made some remarks upon the chemical properties of different sorts of paint "removers" known to the trade. These were generally compounded of alkalies, soda, potash mixed with lime, which latter was known to have a dehydrating action on the fibre of the wood. The result of the use of these preparations was that only the first film of paint was removed, the body of paint being imperfectly acted upon. While some of these preparations remove paint of ordinary work, for paintwork of several coats they are quite inoperative. The new "electric" paint remover is chemically prepared according to a scientific formula, in which potash and soda are the principal ingredients, but in which there is not a trace of lime present. Its action upon the body of the paint is thorough and complete, a saponification is set up which continues, the soda is liberated, and fresh soap formed, and this process goes on; the alkali being liberated as it is wanted, till the whole of the paint is removed. The specimen we saw acted upon only remained about a quarter of an hour subjected to the action of this caustic preparation, and the compound being wiped off, every trace of paint was found cleanly removed, and the wood exposed appeared as if it had been planed. Nothing could be a more satisfactory test of the destructive action set up by this material. Directly the compound touches, saponification is set up. The action of this preparation seems to be twofold; there is first the destructive action of the applied alkali, always caustic, and next a continued sponge-like action going on—in other words, a constant and perfect causticity is maintained. The result of the preparation on metal was equally convincing. A gas-meter which had been thoroughly coated was exposed to the compound for about twenty minutes, after which the japan was removed and the bright metal exposed. The other forms of this preparation we saw were of a weaker character and nearer soap in their composition. They are intended to remove dirt, and their action is just the reverse of the compound already described. The preparations are liquid and are soluble in water, and their cleansing power upon cloth of an unmistakably greasy and dirty character was almost magical. For delicate carvings and fabrics of all kinds these solutions are admirably adapted, and we think their use by restorers, decorators, and others will be highly esteemed. The modification of the solution for cleaning cloth is well adapted for restoring the linings of railway-carriages and stuff seats of all descriptions. No scraping or erasing is necessary. There is nothing injurious, we are told, in the preparation which can attack or injure metals or cloths, they all produce a minimum action on brushes, which is a consideration, and, what is very important, colour is not taken out by the use of these solutions. The price is less than that of other preparations. The "paint remover" can be easily applied by being spread over the painted surface to be removed. It is sold in 5lb. tins at 2s. 6d. each, and the patentees are prepared to give special quotations for large quantities in bulk for railway, gas, and shipping companies, &c.

THE NEW CHURCH OF THE ORATORY. SOUTH - KENSINGTON.

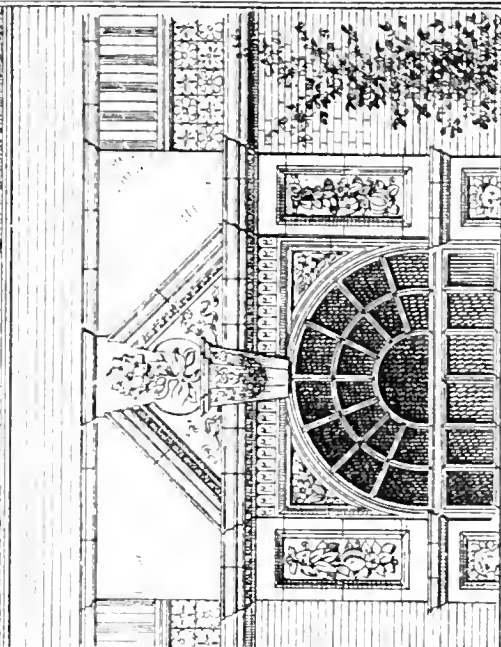
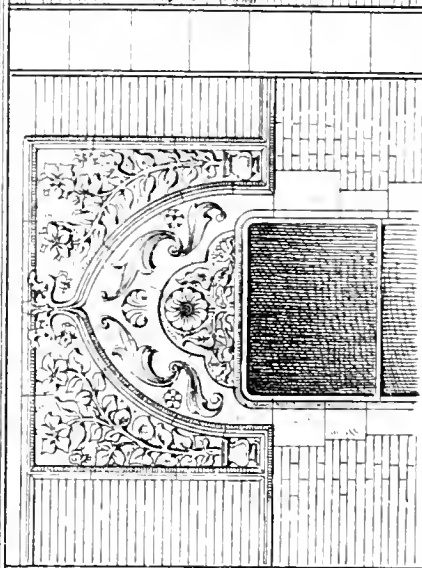
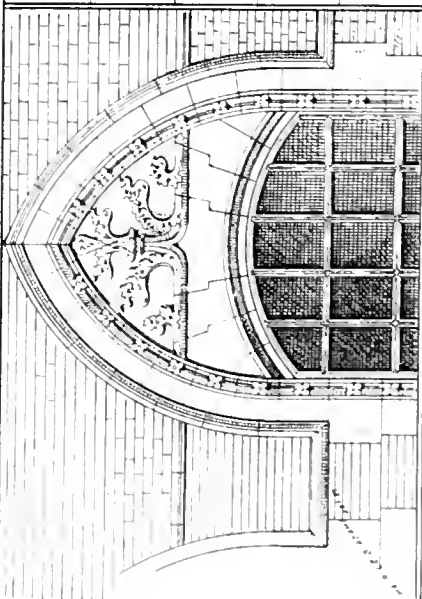
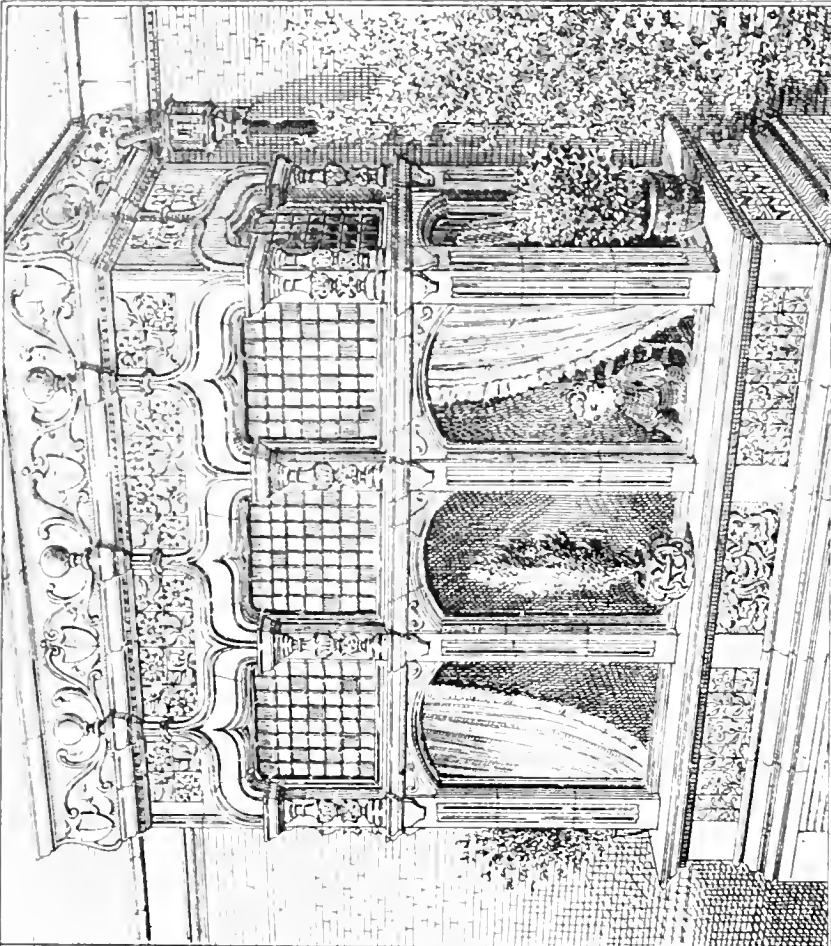
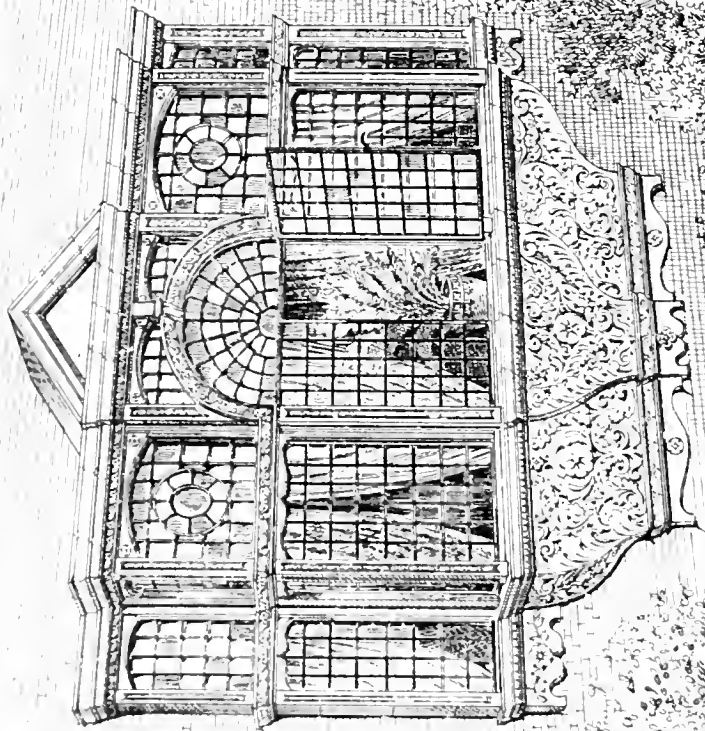
HERBERT A. GRIBBLE, ARCHT.







DESIGNED BY MAURICE B. ADAMS, ARTIST

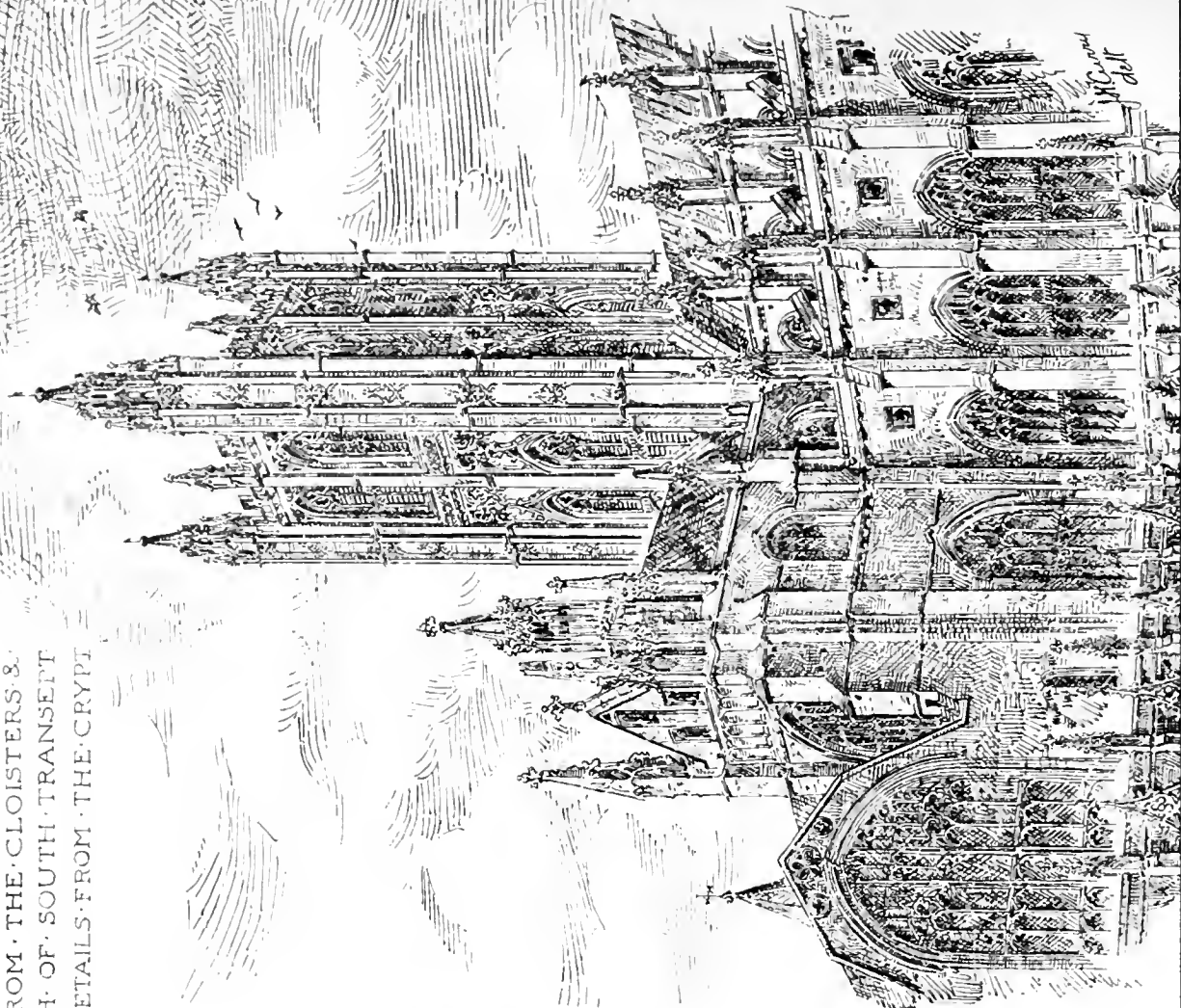
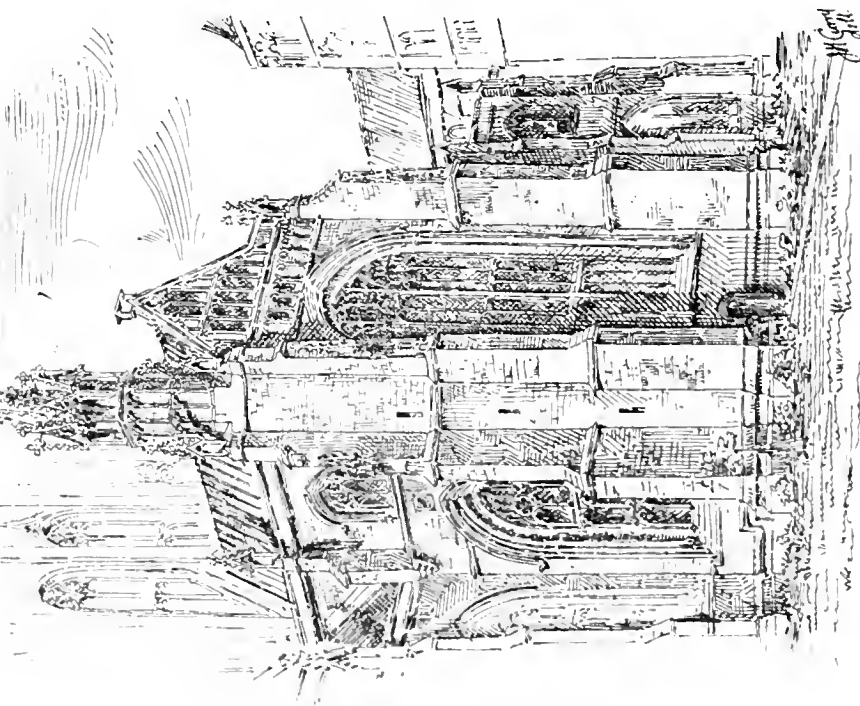
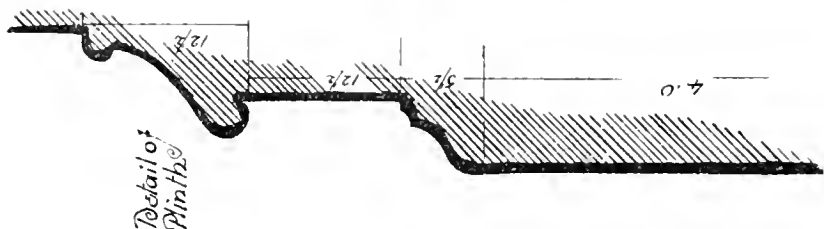
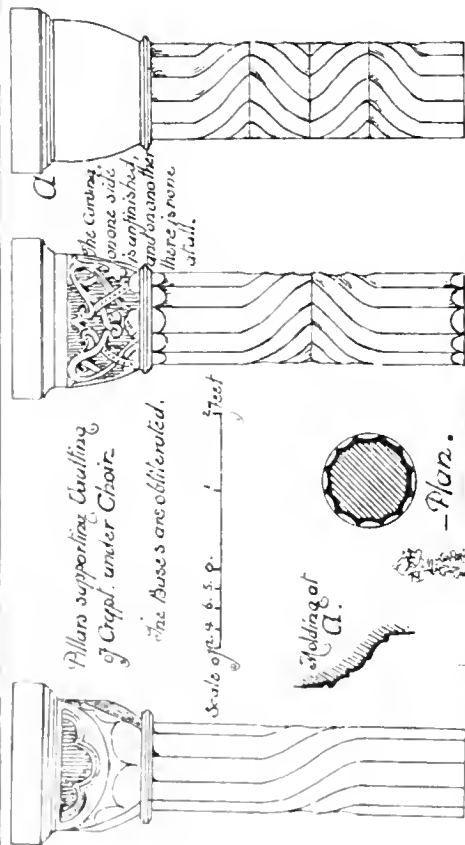


DOMESTIC WINDOWS IN TERRA-COTTA & FAIENCE. MADE BY WILCOCK & CO. BURMANTOFTS, LEEDS.

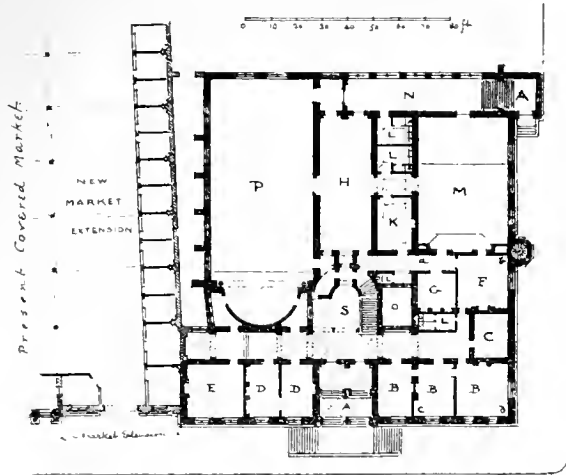


Bits from Canterbury CATHEDRAL

VIEW FROM THE CLOISTERS &
SKETCH OF SOUTH TRANSEPT
WITH DETAILS FROM THE CRYPT

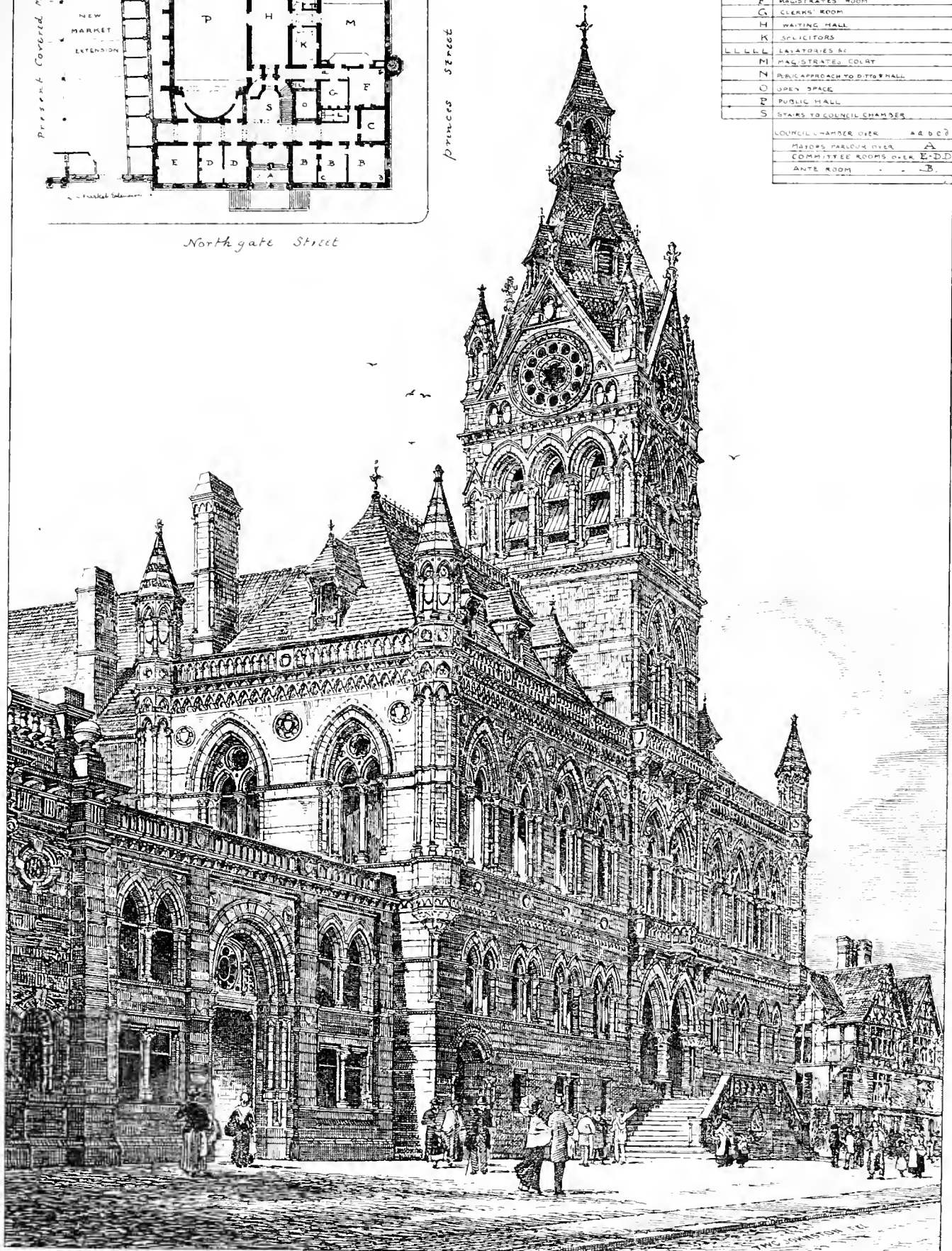


GROUND-PLAN SHOWING MARKET EXTENSION



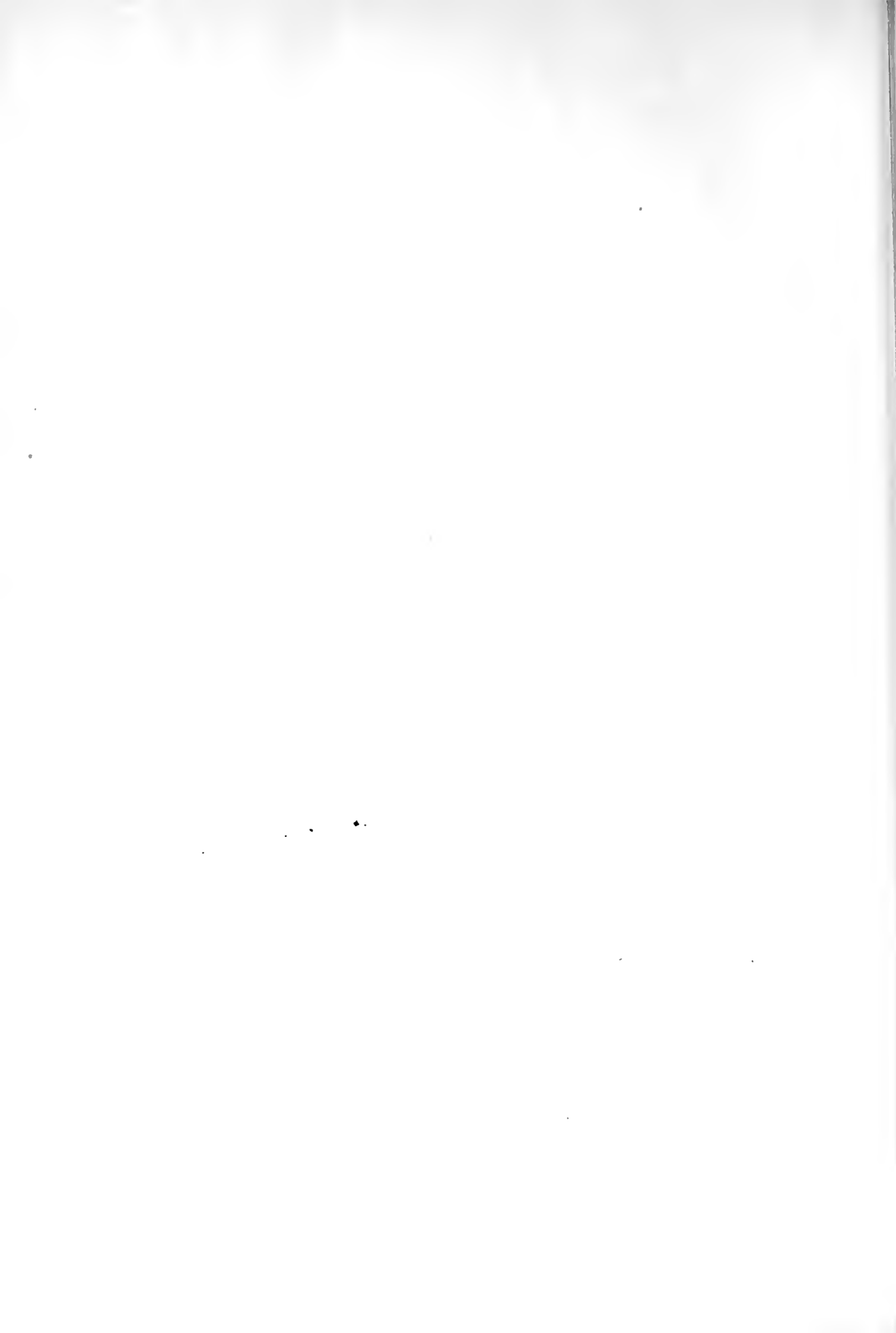
Northgate Street

REFERENCES	
AAA	ENTRANCE PORCHES
BBB	TOWN CLERK
C	MUNICIPAL ROOM
DD	TREASURER
E	SURVEYOR
F	MAGISTRATES ROOM
G	CLERKS ROOM
H	WAITING HALL
K	SPEICATORS
LLL	LAWYERS &c
M	MAGISTRATES COURT
N	PUBLIC APPROACH TO DITTO HALL
O	OPEN SPACE
P	PUBLIC HALL
S	STAIRS TO COUNCIL CHAMBER
COUNCIL CHAMBER OVER A & B C D	
MAYORS PARLOUR OVER A	
COMMITTEE ROOMS OVER E & D	
ANTE ROOM - B	



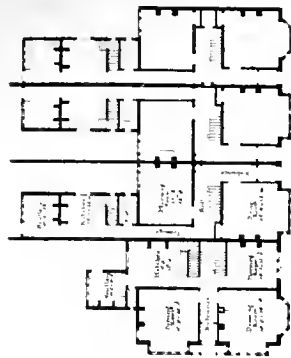
MUNICIPAL BUILDINGS CHESTER & NEW MARKET EXTENSION
W. H. LYNN R. H. A., ARCHITECT.

J. A. Kerman Photo Lith London

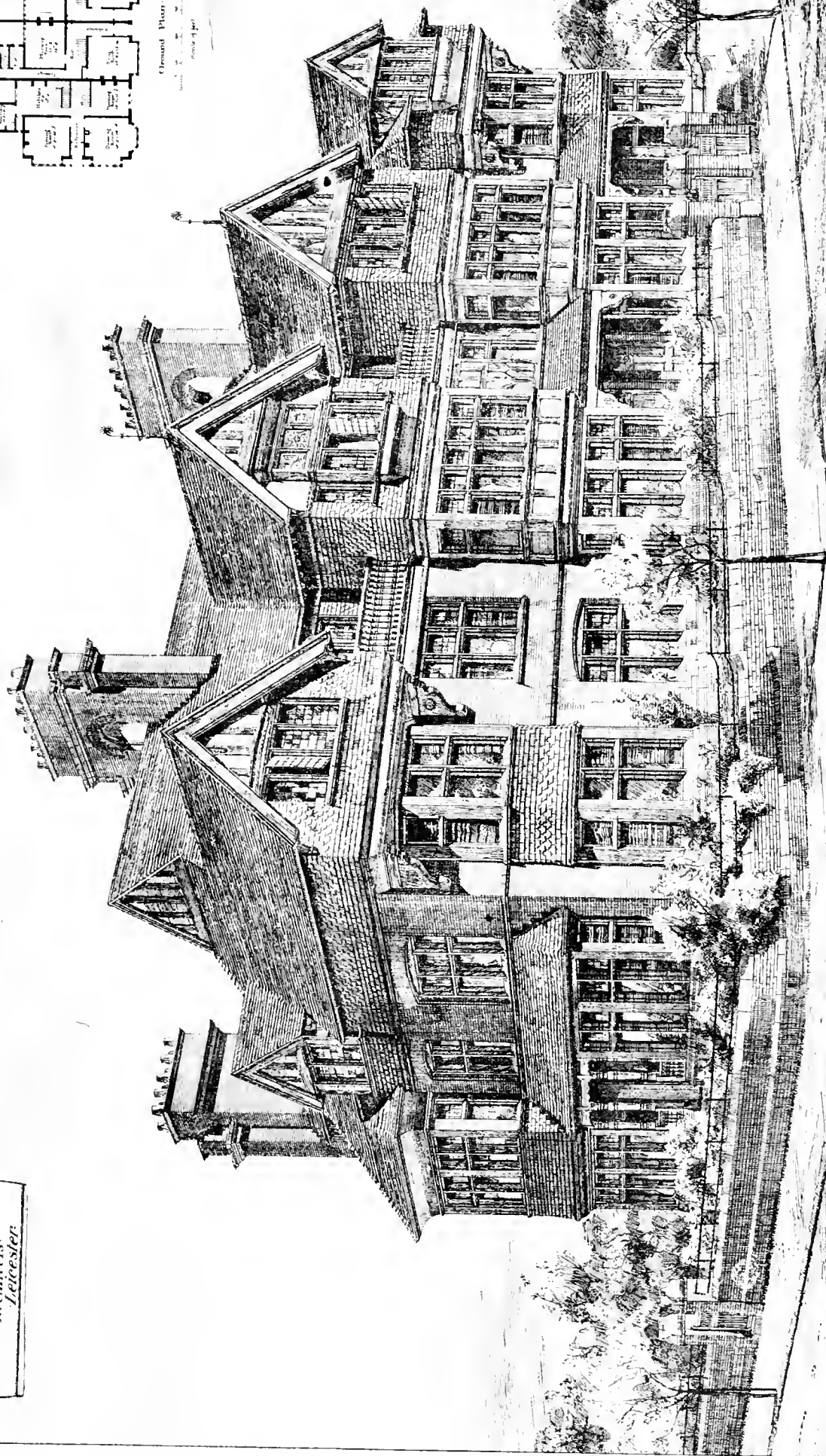


THE BUILDING JEWS, DEC. 2, 1881.

HOUSES in course of
erection at LIVERPOOL.
for John F. Hodges Esq.
GARRARD, PICKETT & CO
Architects.
Liverpool.



Ground Plan.
Scale of Feet
0 10 20





MR. VAL PRINSEP ON ART.

THE prizes gained by the successful students of the St. Martin's School of Art were distributed last Friday evening, in the School-room, Castle-street, Long-acre. Mr. Val C. Prinsep, A.R.A., who presided, distributed the prizes and then, addressing the students, said great credit was due to them for giving, after the close of their day's work, a few hours to the study of drawing. That study would never be thrown away. The knowledge of drawing would help them in the mechanical arts they were pursuing. The voyage made in the pursuit of art was longer and more difficult than that undertaken by any mariner. They must remember, too, that often the smaller the work of art the greater the labour bestowed upon the picture. To those who were studying art with a view of improving themselves, he should like to point out a way by which they could do so with success. Supposing, for instance, a friend of theirs was anxious to learn a strange language, what advice would they give him? Why, they would recommend him, after acquiring the language, to learn the literature that had been written in it. And so it was with art. They were studying a language. He saw from the determination they had shown that they had a mind to know the meaning of art. For that purpose he advised them to visit the different picture-galleries in London, and when there, to ask themselves what the artist meant to express when he painted the picture. And the same thing applied to sculpture. Beauty was, no doubt, everywhere, and it was one of the great functions of art; but as art was not born in man, but was a matter of education, so also was the idea of beauty. Dealing with the progress made in art, Mr. Prinsep urged upon the students the importance of learning the grammar of art. They might leave out what they liked in art, but what they did put in should be absolutely exact and truthful. He then traced the progress of art since the time of the Greeks, in which days the Church was its great patron; and showed its condition in the seventeenth and eighteenth centuries. It seemed likely, he said, that art would rise again with redoubled success. True art was a mixture of art and nature. Art by itself would not do, neither would nature by itself; the two combined were necessary. He warned them against being led away by enthusiasm and over-estimating the value of a work of art executed by themselves. They were apt to admire things that struck them as original, but which were only eccentric. "Eccentricity was not genius" was a precept he would impress upon them; nay, he would have it written in letters of gold, on the walls of every art-school in England, where the students seemed more influenced by peculiarity than the Frenchman or the German. Lately we had heard much of the "aesthetic." Aestheticism was in possession of the stage and in the mouths of all. Aesthetics might be seen in our streets, clad in sad greens and sickly yellows, with long or unkempt hair and shaky legs. The word came from the Greek, and originally meant "sentiment, or the pleasures derived from the senses." The greatest geniuses had been the simplest men, and it was these great men who might be called aesthetes, professors of the science of the beautiful, expounders of the beauties of nature. Let them, then, be true followers of aestheticism. When such a knowledge of art, such a profusion of the beautiful, got thus spread, Art would prosper and find very much more scope on which to exercise its civilising power. Mr. Luke Fildes, A.R.A., also spoke, and said the secret of success in the work in which they were engaged was to be full of earnestness. The student might not at the time think that he was able to reach the goal that he was seeking, but it was very wonderful how, little by little, success would come.

THE ELEMENTS OF ART.

UNDER this title Mr. Joseph A. Stark delivered on Friday evening the first of a series of lectures on Art, before the members of the Balloon Society at the Royal Aquarium, Westminster. In his introductory remarks the author mentioned that he was a follower of Professor Semper, of Vienna, who in his great work on "Style," had set the claims of art before us in quite a new light. He proposed

that evening to deal with art in its philosophical aspect as a process, and as an aim. He defined art as nature filtered through the complex machinery of human thoughts and hopes; as the reflection of permanent nature seen in the mirror of fleeting man. Art is, he said, the spring of our life, at once man's distinctive attribute and his highest effort—man himself at his highest valuation. But one other power sways the heart with equal force, that of Religion, or in a broader sense, Philosophy. Art and philosophy are the primary necessities and products of human nature—one in essence, but distinct in application. All work which aims at representing the ideal personality and hope of man is an art manifestation. Such are music, poetry, sculpture, painting, and the higher prose literature. Other branches of work are not essentially art manifestations, although they can be raised to that level by the manner of their performance; such are pottery, textile manufactures, carpentry, and stone construction. These lead up to and find their climax in architecture, which is an art only by imparted interest, although it can realise for us the highest degree of material expression. In other words, art may be divided into philosophical and material. The bulk of modern art is mere reproduction—a borrowed and copied, and not an original, art. The inferiority of modern art is one of necessity caused by the accumulation of the past, and the exhausted state of our natural resources. It does not follow that if our great inheritance from the past could be obliterated, we should do better than they did; but our work would be carried on with greater vigour, and would give more satisfaction than was now possible. As an instance, the gratification with which the American citizen, ignorant of Classic art, looked upon the copies in his streets of Greek temples and Gothic cathedrals, was referred to. But the past could not be effaced, and the only thing possible, therefore, was to endeavour to understand its character and charms, and to re-compose the several items into intelligent and consistent re-issues. This was the province of the new philosophical school of Semper, which sought to free art from the fetters of corrupt traditional teaching, and to establish her on the true foundation of our common human nature.

ST. DUNSTAN'S CHURCH.

ST. DUNSTAN'S CHURCH, Fleet-street, has undergone of late thorough repair and decorations, and the church was reopened by the Lord Mayor last Thursday week. The church in plan is an octagon, with eight recesses opening by pointed arches from the central area or ball, and is on this account of more than ordinary interest to the architect, as showing the adaptation of this plan for town churches. St. Dunstan's in the West was designed by the late Mr. John Shaw, an architect of some eminence, and was erected in 1838. It is in the Perpendicular Gothic style, and has a western tower and octagon lantern which from its resemblance to the one at Boston, in Lincolnshire, is rather interesting. The period of its erection was too early in the history of the Gothic revival to expect any very thorough acquaintance with Gothic detail, and the restorer had of course this circumstance to take into consideration. The principal alterations that have been made consist of the removal of the two running galleries on the southern apsidal recesses, and the introduction of two windows with Perpendicular tracery. One of these in the baptistery has been filled in by the memorial window, designed in memory of the late rector of the parish, the Rev. Edward Auriol, who had officiated in that capacity for 38 years. The design of the window in question was submitted in competition and was described by us. The subject is "Christ Blessing Little Children," and the design and execution has been entrusted to Messrs. Taylor and Sons, of Berners-street. The other window, we hear, is to be filled in at the expense of the Cordwainers' Company, in memory of John Fysher, and will represent in its chief lights the subject of the "Good Samaritan." These semi octagonal recesses have been also paved with mosaic pavements in effective squares by Messrs. Simpson, of St. Martin's-lane. The other alterations and additions made are raising the choir stalls in one of the apsidal recesses on the west side of chancel, repairs to the tower, and iron ladders to the lantern, and a lighting-conductor.

But the chief feature in the church are the decorations. These have been carried out by Messrs. Campbell and Smith in a satisfactory manner, chiefly in distemper. The walls and roofs were before of a stone colour; these have been cleaned and repa red, and a high dado of a pleasing neutral green, with a border of white flowers on a warm ground, now surrounds the walls and recesses, above which is a lighter shade of neutral green laid in courses or blocks of a conventional kind, and relieved by small powdering or stars in alternate courses. This treatment is carried up to the level of the springing of arches, above which the spaces are relieved by a diaper on a light cream ground. The ceilings of the eight recesses, four of which at the angles are semi-octagonal, are all relieved by colour, at the springings of pendentives also by blue bands of colour, relieved by four-leaved flowers, and by the ribs being picked out in warm salmon colour. The spandrels of the main arches, carrying the octagon clerestory and groined roof, have been decorated with bands of grey green and salmon tints at the springings, and with folial designs in light greyish-green round the quatrefoil piercings. A deep stringcourse surrounds the walls, above which is the clerestory, the wall spaces of which have been diapered, and the octagon-groined ceiling of plaster has been treated in a light and effective manner: the surfaces being lined in courses and the ribs picked out with warm members. The centre pendant from which the gas corona is suspended is also relieved. The chancel has a waggon roof with ribs which has been similarly treated but not emphasised; the old reredos, with the Decalogue and the canopies over, and the panelled wall lining, remaining. The old oak seating has also been left, and the woodwork generally is in excellent condition. The main piers at the angles of octagon, which rise to the main vault, are relieved by the outer shafts being coloured a sage-green, and the side shafts with a salmon tint, the hollows being left cream, relieved by fillets being picked out in the warm salmon colour. The general effect is quiet and unobtrusive, and the scheme of colour appears to have been happily chosen to give surface relief and to keep the architectural lines. The whole of the work has been well carried out by Mr. H. S. Foster, builder, of Whitefriars-street, under the supervision of the architects, Messrs. Fowler and Hill, of Serjeant's-inn.

RUFFORD ABBEY.

THE *World* gives some account of Rufford Abbey, in "the Dukeries"; which is described as alike beautiful in situation, and in the ruddy-grey colour of its decaying sandstone walls. The Abbey was originally the offshoot or colony of Cistercians from Rievaulx, and when dissolved after the seventeenth abbot, the house and land were given by Henry VIII to the Markhams; and on the expiration of their tenancy, to the fourth Earl of Shrewsbury and Waterford, in exchange for some estates in Ireland, and finally went *via* the Talbots, into the Saville family. All that is left of the original Abbey is the enormous crypt. A portion of this, with beautiful pointed arches, is made into a servants' hall, and the remainder serves as a wine and beer-cellar. There seems to be plenty of crypt to spare, and this, it may be added, is very much the effect of the old house. There is plenty of room, not always perhaps where it is wanted, but there is, at least, an old-fashioned amplitude about the house. Rufford is full of relics of historic personages, refectory or hall tables of ancient oak, pikes, guns, jackboots and blackjacks. It is also full of interminable passages, of corridors which seem to have only one end, and of mysterious flights of stairs, leading one into queer nooks and corners, chapel galleries, and haunted chambers. Some of the rooms have been restored during the present century, but the result is not quite so unhappy as might have been expected, and Rufford has not, like many other old houses, been destroyed by successive generations of inhabitants straining to bring it into consonance with their own idea of comfort. Mr. Augustus Saville Lumley, who recently succeeded to the property, on the death of his half-brother, "Mr. Henry Saville," has already seriously considered the necessity of arresting the decay of his beautiful house—a gem when compared with the vulgarity of Clumber,—and

has consulted Mr. Ellis as to a cautious and delicate strengthening of it. Repair is hardly the word, and "restoration" makes one shudder; but there is no fear that Ratford will be roughly handled.

Building Intelligence.

DUNFERMLINE.—The members of Dunfermline Free Abbey Church have resolved to build a new church, and Messrs Douglas, Campbell, and Sellars, Glasgow, have prepared the plans, which show a building in the form of an octagon, with pinnacles at the corners. The style of architecture is Norman. As viewed from a distance, the church will look pyramidal in shape, the total height being about 100ft. The chief elevation will be towards Canmore-street, and the chief entrance is flanked on either side by fluted pilasters with foliated capitals, and surmounted by heavy cornice. Internally the church will measure clear 15ft. across, and round five sides of the octagonal gallery will be erected. The church is expected to accommodate 800 people. A hall is also to be erected with accommodation for over 200. The total cost is expected to be £5,500.

GALASHIELS.—A new church for the parish of Galashiels was opened last week. The estimated cost, including the spire, but exclusive of organ and pulpit, was about £13,000. The style is Early Decorated Gothic. The masonry outside and inside is of finely hewn stone—the outside of red-sandstone, and the inside of coloured grey sandstone, intermixed with red-stone mouldings and other details. There is neither lath nor plaster, the stones being clean chiselled and close set. The spire with the tower is to be 190ft. high, but the tower is only built as yet. A spacious hall is built at the south end, for the use of smaller meetings. Inside, the church is divided into nave, aisle, and transepts. The length of the nave is 83ft.; width across nave and aisle, 58ft.; width across transepts, 82ft.; breadth of transepts, 10ft.; height from floor to wall-plate of nave, 36ft.; height to apex of roof, 62ft. The roofs are of open-timber work, supported on corbelled shafts of red freestone, with capitals and corbels carved against clerestory walls. The architect is Mr. Hay, of Edinburgh.

HULL.—A new Unitarian church at Hull was opened last week. The buildings are designed in Geometric Gothic, freely treated, and are erected externally in white stock bricks, with Ancaster stone tracery, copings, and dressings. There is a spire about 90ft. in height at the north side. In the interior the church is divided into nave and aisles, with clerestory lights above. Sittings are provided for about 300. The accommodation at the rear of the church consists of a large schoolroom on the first floor, with sitting-room for about 300 persons. The designs are by Mr. W. H. Kitching, architect, Coggar Chambers, Hull, while the builders are Messrs G. Jackson and Son, Hull. The total cost of the land and buildings will be about £14,000.

LLANDINABO.—The parish-church of Llandinabo, was reopened by the Bishop of Hereford on Tuesday week, after restoration. It is a very ancient structure, and in the course of the work, on removing the plaster ceiling, an interesting 13th-century truss rafter roof was found in a good state of preservation. The existing registers date back to 1596. The church has been restored from the designs, and under the superintendence of Mr. A. E. Lloyd Osell, A.R.I.B.A., diocesan architect for the archdeaconry of Lullow. A new north aisle and vestry have been erected: the gallery has been done away with. The old external walls have been entirely refaced with new stone, a porch has been added to the south door, and an oak bell-turret, seven feet square, has been erected on the west gable. The old roof-timbers have been exposed to view, and the interesting 16th-century oak chancel screen restored to its original form. The old Jacobean pulpit has been recast and fixed at a lower level, and, instead of the old-fashioned pews, open pitch-pine benches, all free, have been placed in the nave and chancel. The floors are laid with Mr. Godwin's tiles. The whole of the work has been carried out by Mr.

J. Court, builder, of Llanwarne, near Ross, at a cost of £660.

METROPOLITAN BOARD OF WORKS.—At the weekly meeting of this Board, held on Friday last, a report was brought up by the works committee, recommending the enlargement of each of the main sewage outfall reservoirs by 50 per cent., namely, that at Barking, by the addition of five acres, at an estimated cost of £100,000, and Crossness by three acres, at an estimated cost of £60,000. These amounts simply represented the cost of execution, the land being the property of the board, and by the extensions the board would get rid of the necessity for the discharge of sewage, except at ebb-tide. The report was adopted, and the chief engineer, Sir J. W. Bazalgette, was instructed to prepare contract drawings for the work. It was resolved to contribute £21,912, being one half the estimated cost for setting back seven houses on Lugate-hill, and contributions of £2,687, £1,267, £850, and £708, were respectively voted, as moieties of costs for other City improvements in Long-lane, West Hardiog-street, Pudding-lane, and Old Broad-street. Towards the improvements of the bridge over Blackwall Dock entrance, Poplar, £325 was voted. With reference to a memorial from Chelsea, objecting to the carrying of the proposed flood relief sewer down Sloane-street, it was resolved to adhere to the original proposal, the engineer being instructed to carry out the work with as little inconvenience as possible.

PLYMOUTH.—The public school in Cobourg-street has just been extended and enlarged. The head-master, Mr. Jago, prepared the plans and designs, and has acted as architect. A local journal asserts that "the style is nondescript." The school consists of a double bay front, relieved with terra-cotta dressings. Porphyrus stone has been used, with blue nobbing pointed in Portland cement. The ashlar work has been done in Portland stone, and the cornices consist of terra-cotta with Macfarlane's ornamental gutting. The railings have been supplied by Messrs. Smith, of Glasgow; the plumbing has been executed by Messrs. Colling and Hocking, of Plymouth. The cost of the extension is about £2,000, and the contract has been executed by Messrs. A. R. Lethbridge and May. The carving was done by a local man, Mr. David Ross.

RYDE.—During the past two years considerable alterations and improvements have been made in St. Mary's (Roman Catholic) church, Ryde. The church was built in 1844-46. It was designed by Mr. Joseph Hansom. In the year 1863 the church was decorated by Messrs. Hardman, and soon after Bishop Grant consecrated it. In 1879, the whole of the Caen stone, in which the dressings were carved, was found to have perished, portions of it falling occasionally into the street; and it became necessary to replace the Caen stone with Portland stone throughout; advantage was taken of the opportunity thus afforded to alter the character of the window over the high altar and to fill it with a memorial window to the founders. The Bishop of the diocese, and the missionary rector, placed the work in the hands of Mr. Philip M. Westlake. The window represents in a trefoil Our Lady of the Immaculate Heart (to whom the church is dedicated) enthroned, with the Divine Infant, and attended by angels. Mr. Westlake has also designed two other windows, to complete the series in the south aisle, one being the Immaculate Conception, and the other St. Wilfrid, the apostle of the Isle of Wight, both excellent works of art. A member of the congregation has also directed Mr. Westlake to design the Stations of the Cross for the church, and nearly half of these mural paintings carried out under his personal supervision are now in their places. The total cost of these repairs and artistic additions up to this point had been above £2,500, when Father Cahill, in the work of the restoration of the church, determined to perpetuate in the church the memory of the late Bishop by a memorial similar to that of its founders. For this purpose the talents of Mr. Philip Westlake were again called upon, and he has just finished a most successful piece of church decoration. The whole space above the chancel arch has been filled by a painting representing Our Lord in Majesty. Our Lord is seated on a cloud, His right hand raised in blessing, and in His left the orb of the world. Around Him and forming the *resica* of holiness

are the seraphim, below on either side are Our Blessed Lady and St. John Baptist. Underneath are angels censuring, while one leans over the battlements of the walls and holds the shield of Bishop Danell, second Bishop of Southwark. The painting is somewhat in the character of the middle Renaissance period; the principal figures are about eight feet high.

COMPETITIONS.

DUBLIN MUSEUM COMPETITION.—Sixty sets of designs have been sent in for the Dublin Science and Art Museum, and the judges have commenced their work. These are the Lord Mayor, Lord Powerscourt, Mr. Mayers, builder; Mr. J. J. McCurdy, architect; Mr. W. G. Hodson, and two assessors from Kensington. We regret to learn that some uneasiness exists among the competitors with regard to certain points discussed by correspondents on pp. 608 and 611. We trust the result will prove that the Committee of Selection have not overlooked the very necessary qualification for the proper discharge of their duties, pointed out by "Fair Play," on p. 608.

SKEGNESS BATHS COMPETITION.—At a meeting of the directors of The Skegness Swimming, Hot, Cold, and Turkish Baths Company, held on the 22nd November last; it was decided to adopt the design sent in under the motto "Convenience with Economy," the author of which, Mr. James Whitton, of the city of Lincoln, was commissioned to carry out the work. The second premium being awarded to Mr. H. A. Goodall, of Nottingham. Seven designs were sent in. The buildings will be commenced at once. The baths will be supplied with sea-water. The materials to be used are red bricks for all walls, stone being slightly used in the fronts. The swimming baths will have iron roofs covered with galvanised corrugated iron.

WIMBLEDON.—In a limited competition for Congregational Church and Schools, Wimbledon, the design submitted by Mr. W. D. Church, architect, of 12, South-place, Finsbury, was unanimously chosen by the committee.

SCHOOLS OF ART.

BURTON-ON-TRENT.—The annual distribution of prizes and certificates was made by the Mayoress on Friday evening. The report of the Science School showed that 89 per cent. of the students examined passed, earning for the school £55. The financial statement adverted to the fact that the receipts of the schools had been £107 4s., and the expenditure £131 10s. 1d., they were about £10 2s. in debt. The report as to the School of Art referred to the fact that Mr. Simmonds, the late head-master, had obtained the valuable appointment of head-master at the Glasgow School, and had been succeeded by Mr. Whitehead. The results of the year's teaching had been highly satisfactory, two third-grade and ten second-grade prizes had been gained for drawings sent to South Kensington, and ten other second-grade prizes at the examinations, being a total of 20 second-grade prizes, as against 6 in the previous year. The Government grant, £52 1s., was the largest ever obtained by the school.

CHIPS.

The prizes and certificates gained in the science and art schools at Stratford, E., were distributed on Friday evening by Sir Antonio Brady.

Mr. Thomas Hallon, a timber merchant and saw-mill owner at Middlesborough, died on Saturday, aged 75 years. He served his time as a joiner and cabinet-maker in the shop of his father at Shildon, along with the well-known author, William Howitt, and had lived in Middlesborough for 38 years.

A stained-glass window has been placed in St. John's Church, Portmadoc, to the memory of the late Mr. John Breese, F.S.A., a well-known Welsh antiquary and bibliophile.

For some time past, the use of the unusually heavy tower bell at St. Mary's, Keelington, has been discontinued, owing to the threatening condition of the beams, and on Sunday week, while the other bells were being rung for service, the next largest bell fell from its bearings. The firm of Bond and Sons, of the bell foundry at Barford, Oxon, are now rehanging the peal.

"To a practical man with a taste for mechanics, and the humps of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the Joe numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recordable information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Englishman*. Price Two-pence of all newsmen, or post free 2s. 3d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.
Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 5s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in series advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33s. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—F. W. R. and Co.—W. H. S. and Co.—C. P. K. and Co.—J. and Co.—W. H. L.—E. and Co.—S. S. B.—S. U. G. C.

INQUISITIVE. Some of the washes would not show at all; the others would come out a dense black and spoil the drawing.—B. (We do not, if we know it, insert letters which are sent to other journals.)

"BUILDING NEWS" DESIGNING CLUB.

LIST OF SUBJECTS.

1. A small country club, with a billiard-room, reading-room, and drawing room, the latter to be fitted for a stage suitable for private theatricals, one of the other rooms to be used as a green-room. Steward's sitting-room, kitchen, and two bedrooms, with offices, to be provided. Plans, elevation, and section to an eighth of an inch scale, with sketch. The frontage to be 60 ft.
2. Bookcase and arm-chair, suitable for the above; scale, 1 in. to the foot.

DRAWINGS RECEIVED.—Ivy, Dum Spiro Spero, Tom, Ignotus, Truth, Opus, E. V., One for Dot, Skill in Riches, Byculah, Maslwich, Mustapha, Excelsior, H. D., Frat, Rolls, Merit, Sleights, Hamlet, Gable End, Sam Slick, Random Shots, Semper Idem, Pupil J., Francis, H. in circle, Go Bo, Oliver Twist, Peter, Pharaoh, Ambition, Ernest, Yarra Yarra, Ever Onward, N., Spur and Win, Fidelis, Broad Oak, S. D., Deva, A Skull, Juno, G. od Luck t your Fishing, Just my Luck, Circle in Square, E. D. in circle, Trident, Byculah (2), Tom Finch, Fidelis (2), Spes, Othello, Nemo, Peter (2), Veritas Vincet, Try in Shield, Edmund, Ambitious, Pallium, Adventure, Bean Stalk, 1881, C. in circle, Student M., Beta, Ir-hman, Tristram, Zeld, Edward, Rest and be Thankful, Old England, Mary Jane, Nil Desperandum, In Hoc Signo, &c., Fred, Benachie, Semper Idem (2), Eos, To be or Not to be, Justice for Scotland, Cobbler's Wax, Hal in a square, Folle-Farine, Bunthorne, H. d, I Fain would Climb, &c.

RECEIVED.—Dum Spiro Spero (we cannot alter the size of paper), B. E., Ivy, G. F. U., Gubb, J. L., H. D., Chip, W. H. B. A., G. E. H. (Yes).

Correspondence.

WHY PROVINCIAL ARCHITECTS DO NOT JOIN THE R.I.B.A.

To the Editor of the BUILDING NEWS.

SIR,—Whatever shortcomings there may have been in past years, the present council and members of the R.I.B.A. seem so earnestly determined to improve its status and its morals, that the letter signed "A Provincial Architect,"

which appeared in your last week's issue, demands, I think, some attention from that body.

With regard to the subscriptions being the same for both London and provincial members, I do not see that it should act unfairly on the latter. If the Institute succeeds in its endeavours, the question will not so much be access to the library, &c., but the honour of belonging to a corporate body containing the best members of the profession.

I can scarcely agree with "A Provincial Architect" that "it is a mistake to suppose that the public look upon membership of the Institute as a guarantee of professional standing." He will find, I think, that even among the members themselves, who are, of course, able to accurately gauge the value of the initials—that some sort of confidence is placed in members, which would not be otherwise accorded to unknown men; and, I venture to say, that the public are not quite so unmindful of the value of members of a body (which certainly contains the flower of the profession), as to ignore the fact of membership altogether, and to attach no importance whatever to it. It rests quite with the members themselves to make the public regard the initials after an architect's name as a sure pledge of honesty and professional probity.

The proposition of "A Provincial Architect" to give country members "a greater voice in the council" is a fair one; but if he will remember that the present list of members of council contains the names of John Honeyman, E. G. Paley, Alfred Waterhouse, and Thomas Worthington, he will see that the country members are excellently cared for. His other proposition to "have provincial branches and hold congresses in provincial towns, that the provincial public may know more of the R.I.B.A.," is one which the council might I think well consider; but to "seek union with provincial architectural societies," is scarcely the work of the mother Society: it should be the earnest wish of infantile societies to seek union with the representative body, and so obtain lustre from the reflected light of that luminous centre.

That improvement in the status of the Institute will arise during the reign of the present President is not a matter of doubt with any who heard his vigorous address.—I am, &c.,
WM. WOODWARD.

SIR,—With considerable satisfaction I observe this question being reopened, concurring as I do in every line of your correspondent's letter of last week. There is no possibility of avoiding being somewhat personal in dealing with this question. The constitution of the Institute was never as elastic as it should have been to embrace the profession generally in the provinces. It was made infinitely worse by a mistaken policy of "reconstruction," so-called, of the Institute, set on foot and carried through with a high-handed disregard of all argument or remonstrance from without during the presidency of Mr. Charles Barry. May it be the distinguishing feature of Mr. Street's reign to remove the obstacles and stumbling-blocks then set up so unfortunately, and to sweep into the circle and influence of the Institute the great mass of the practising architects of the kingdom.

Extreme cases will best prove the logical working-out of the "reconstruction" policy in raising the subscription of Fellows to a uniform four guineas per annum. Writing from this *Ultima Thule* of provincial practice, I may instance the case of myself and several friends who have retired from the Institute after having exhausted all resources of argument and remonstrance. The distinguishing initials, "F.R.I.B.A.," are of some account and solid value in London; but of what account are they here, where an indifferent, and possibly scoffing public, accustomed to alphabetical decorations to names in abundance, neither known nor care for their significance. Then, of course, there are the *Transactions*. But will any unprejudiced member of the Institute appraise their value as literary stock-in-trade at more than 10s. per annum? After that, there is the inward moral satisfaction of supporting the dignity of the profession in London. What is that worth in money value? There our privileges cease. If we desire to enjoy the communion of our Fellows at the Institute, to exercise our rights of hallot, use its library and rooms, or attend meetings, we can do so at the

cost of £10 expenses for each occasion, and 24 hours of sea and land journey. A movement was set on foot here successfully to bring into the Institute every practising architect of good standing. The "reconstruction" policy came on shortly after, which, *more Ilbernicus*, we did not fail to remonstrate about. The result, that all the local fellows of the Institute, except one or two, resigned, aggrieved, as they felt they had some right to be. It is sheer nonsense to contend that this objectionable inequality of benefit does not apply in degree to all provincial architects more or less. What I venture to suggest as the lines on which a real reform and reconstruction should be are these: Not to seek unduly for the increase of the number of Fellows of the Institute. Let that distinction be a real distinction for architects of proved eminence. We cannot all be eminent and distinguished, but we should be all within the influence and recognition of the Institute for uniformity of respectable practice and many useful ends. What we want is a United Kingdom list of registered members of the Institute. Into this, endeavour should be made to sweep every provincial architect of decent repute, competency, and irreproachable professional conduct, admitted by the recommendation of trusted Fellows of the Institute, by ballot or examination; the annual subscription maintaining such registration to be one guinea, or even a more moderate nominal fee; the privileges to be awarded therefor as generous as the Central Executive could give for the money. This, I believe, would be a practical step towards obtaining legal recognition of such a status. The "dentist's art," to which I have before referred, is nearly exactly analogous and encouraging as a precedent for bringing about the legal recognition of a hitherto irresponsible and legally unrecognised profession as we are now. I believe that the moral influence over the profession and power in the State of the Institute would be enormously increased. Local societies, it should be remembered, too, must be maintained, and these have to be supported by provincial architects, as well as subscription to the central body. I feel sure, if Mr. Street will recognise the fact that there must be a special constitution to embrace widely the architects of the provinces, raising rather than lowering the status of a Fellow of the Institute, he has both the ability to lay it down in detail and the vigour to carry it.—I am, &c.,

THOMAS DREW,
Ex-Fellow and Member of Council R.I.B.A.
6, St. Stephen's-green, Dublin, Nov. 30.

SIR,—I may supplement your correspondent's letter of last week. I was elected a Fellow some time ago, and though I never set foot inside the Institute since I was a pupil in London, and never, that I am aware of, derived any benefit, directly or indirectly, from membership, I continued to pay my subscription till the authorities passed a resolution to double it. I think I paid, as a Fellow, for seven years or so, in addition to a donation of £5 to the library fund. When it came to be a question of "double or quits," I made up my mind to quit—the joke had gone quite far enough for—

EVEN AN F.S.A.

Dublin, Nov. 26.

ANOTHER BEAM FROM ST. MARK'S AT VENICE.

SIR,—We have such distinct evidence of the degree of architectural refinement to which the Greeks had attained, that we were not taken by surprise in the discovery of those curves of optical direction which have been so well illustrated by the labours of Mr. Penrose and Mr. John Pennethorne. The important work of the latter gentleman, which, at the hands of Mr. John Robinson, had received such careful delineation, will be in the recollection of your readers, as will also the singular discoveries of Mr. Street, Mr. Stevenson, Mr. Ewan Christian, and others, with reference to the "wavy lines," and other very remarkable optical refinements in the west front of St. Mark's at Venice, which structure, your readers will bear in mind, was not erected by the Greeks at the zenith of their art-culture.

I had, until the appearance of the article in your last issue, entertained serious misgivings as to whether or not all the subtleties of St. Mark's had been yet discovered, and it was, therefore,

with rapture that I read that studious essay signed "Védécé," which shows that to him who can read between the lines, and has time and energy at his disposal, there yet remains in St. Mark's a fund of undiscovered subtleties.

This time it is the Porta della Carta of St. Mark's—"the studied inclinations of the upper members" thereof—to which our attention is directed; and omitting, for the sake only of brevity in this letter, the mathematical workings which "Védécé" has supplied, we shall find that, if we could stand about 350 yards down the piazza, away from the porta, and looking at the lateral mouldings at the top of the finial, which forms a pedestal for the statue of Justice, those mouldings would be found to be inclined about 1 in 18 towards the beholder. When we have quite recovered from the effects of this stupendous discovery, we may contemplate the subtlety in the medallion over the arch-head, which contains the figure of St. Mark, where the climax of optical refinement is reached in the inclination forwards of that medallion of about 1 in 18, and, as "Védécé" very truly remarks, with regard at least to the Porta della Carta, the "arrangement" indicated takes the matter out of the reach of dispute.

Then to show how all is in harmony, we go on to notice the "lateral pinnacles or needles." Most unfortunately, however (and here we can rest a little to sympathise in the grief of Messrs. Street, Christian, and Stevenson), one of those needles "has suffered some restoration," and has probably been built vertical, but with intense gratification we note that the other "has its axis leaning forward 30 millimetres in a height of 1.26m," and before we leave the Porta della Carta, let us remember with deep regret that the "lower part of the structure, and the wall rising up behind it, are strictly vertical."

Of course, Sir, in all such matters of refinement in architecture, we must consider the "motive" which alone can justify their "raison d'être," and although "Védécé" has not pointed out the detrimental consequences which would have arisen had the mouldings, &c., referred to, *not* been "nodding" towards us, still we can quite see that much of the beauty would have been otherwise lost, and we are more in the debt of "Védécé" because it has been left to him to discover that "about 305 yards down the piazza" is the point from which the Brothers Bons directed the "nod."

I have scarcely a doubt that when the biography of "Védécé" is written, proper attention will be paid to that portion of his life when he grappled with, and ultimately succeeded, in bringing before the world the grand secret of the 305yd., and I am quite willing to subscribe towards the insertion of a brass or other means of spotting this 305yd. It is true that 305yd. is not, as a rule, a distance from which one can satisfactorily study the subtleties of such a building as St. Mark's; but still there it is—there is the point, and we must be thankful that we have at last found it.

But why did "Védécé" leave this Porta della Carta so suddenly? Did his eagle eye omit to discover the other subtleties of that composition? Let him, when next in Venice, take up a position—say a little less than 305yd. from the Porta, and in a direct line with the centre—neither to the right nor to the left of it—let him have erected a staging, or have a couple of men with a pair of steps, sufficiently high to bring the tops of the columns carrying the tracery within the arch under the medallion containing St. Mark, immediately on a level with the human eye; he will then find, I think, that the first column on the left of the centre is inclined to the centre. The exact amount of that inclination is not for me, but I should be extremely obliged to "Védécé" if he will obtain from the Venetian gentleman who has so kindly supplied him with measurements for his essay similar measurements for my discovery, so that your readers may be in possession of mathematical accuracy on the point. I wish it to be clearly understood that the inclination of the column referred to is not towards the beholder, but towards the first column on the right of the centre, and the "nod" in that direction is "clearly out of the reach of dispute," and shows to what astounding realms of refinement the Venetian builders of those days had reached.

Another very remarkable subtlety (this time not optical, but structural) "Védécé" failed to

notice in his essay. When columns are employed to carry a considerable weight of stone, such as in the tracery of the window over the Porta della Carta, it is customary to give them apparent support at the bases; the four columns, however, carrying this tracery all rest upon a string or sill carried through the full width of the window, thus giving a palpable idea of weakness to points where idea of strength is required, and destroying the more graceful proportion of the lights which would have been obtained had the columns been carried down to the level of the base of the shafts carrying the arch mouldings. The exact inclination which this string or sill will in various directions at some future time discover to another "Védécé," I am not now in a position to say; but the point from which the "nod" may be measured will probably be less than 305 yards down the piazza.

But after all, Sir, we need not go to Venice to feast on these subtle charms of refinement. Only the other day, in Victoria-street, Westminster, a very distinct inclination of a large flank wall in the direction of property belonging to another owner was discovered. The wretched adjoining owner—utterly lost to all regard for subtlety in workmanship—had the effrontery to consider that the inclination referred to might, in the event of his one day requiring to erect a building upon his own land, interfere with its verticality, and I believe that he was hard-hearted enough to claim a considerable sum of money because of this overhanging on his land. I have not before me the exact dimensions of the inclination; but I believe it was about 1ft. in 86ft., and its unique concord with the surroundings could be ascertained at a point distant about 10 yards from the façade. Should, however, "Védécé" wish to further and more accurately investigate the "nod" of the wall referred to, I have not a doubt that the owner of the building of which it forms a part, or the architect or builder, will, on his tipping the *wink*, be very happy to furnish him with exact measurements.

Another subtlety cannot have escaped the observant in London. If the observer will take up a position at the corner of any street, just on the granite curb, and carefully consider the line of lamp-posts on that side of the way, he will find that out of perhaps 20, one at least will be inclined somewhat to the centre of the roadway, or to the centre of the pavement, as the case may be. This is a subtlety which sometimes forms the ground of very earnest conversation between the gas company's official and the parish surveyor; and "one" may have at times noticed an endeavour on the part of the latter to ascertain and furnish the former with the exact measurement of the "nod." I have in my mind an instance where the inclination of a lamp-post was about 1 in 4—and that in a little picturesque thoroughfare off Drury-lane—showing that, even in squalor, all ideas of "inclination" and "nod" had not been abandoned.

A final example of subtlety of workmanship may occasionally be met with even in such apparently inartistic productions as suburban cottages and villas. The "inclination" or "nod" of chimney-stacks in directions sometimes towards the beholder, and sometimes the reverse, must have arrested the attention of the studious—and in carefully considering the proportions of the inclination, he may have noticed slight, but still apparent, inclination in some of the walls to assume lines and angles not precisely those which the commonplace architect, only caring for strictly accurate setting out and workmanship, would desire; and what a glorious and comforting idea it is to think that if these examples can only be kept up for a sufficiently long period, they may form the subject of earnest consideration and mathematical elucidation by the future seeker after refinement in architecture.—I am, &c.,

WM. WOODWARD.

THE PRESERVATION OF ANCIENT BUILDINGS.

Sir,—All men who love their country and are proud of its history, ought to be grateful to you for your consistent efforts to avert destruction from the glorious monuments in which so much of that history stands recorded.

But are you not a little hard on the Society for the Protection of Ancient Buildings, and on Mr. Canon Venables, as regards Tewkesbury Abbey? If they have been—I do not admit

they have been—over-zealous in defending what perhaps will not, after all, be attacked, is not that a fault on the right side?

Indeed, with the example of St. Alban's Abbey before us, it is impossible to be too vigilant. The time has come to ask whether any further sacrifice is to be made to the spirit of perverse self-sufficiency and bumptious ignorance which has been allowed to patch up St. Alban's in a style hardly worthy a third-rate conventicle.—I am, &c.,

EDM. HUTH, WALTERS.

Christ Church, Oxford, Nov. 28.

BUILDING-STONES OF SCOTLAND.

Sir,—I have read with great pleasure your report of Mr. Gowan's lecture on the above subject. He says, in his concluding remarks, that one lecture would not exhaust the subject. This is perfectly true; it is next to impossible to crowd into the short space of a lecture, even a meagre description of so many quarries and different classes of stone.

I suppose it is for this reason that Mr. Gowan dismisses Dumfriesshire, with its many valuable stones and extensive quarries, in a few lines.

My only object in troubling you with these few remarks is to point out to your readers the great similarity in chemical analysis, of the Dunmore, Polmaise, and Plean stone, and the Corsehill (Dumfriesshire) red stone, the comparisons being as follows, viz.:—

CORSEHILL.	
Silica	95.24
Alumina	5.5
Peroxide of iron	1.28
Carbonate of lime	1.40
Carbonate of magnesia	1.23
Moisture .....	.56
100.27	
PLEAN.	
Silica	95.64
Peroxide of iron	1.62
Carbonate of lime	1.20
Carbonate of magnesia .....	.52
Moisture .....	.60
99.58	

Corsehill stone is now extensively used in London and the provinces, and is much admired for its beautiful colour and texture. Craigleith is too well-known to need comment.

Of the Plean and Dalmeny stones, I may state that if more extensively used, they would be found to stand the London atmosphere, and contrast well in colour with the Dumfriesshire stones.—I am, &c.,

SAMUEL TRICKETT.

THE GLASGOW COMPETITION.

Sir,—As the drawings in the preliminary competition are now in, a few observations relative to the final competition may not be out of place.

The first thing that suggests itself to me is that the architect assessors would give more satisfaction, and act with more independence if they would, after selecting the first ten designs, hand over the mottoes to some one entirely independent of the competition, who should return the plans to their authors. This would, I feel sure, allay any heartburnings that might otherwise arise should a London or Glasgow architect be placed first.

Another matter is that the number of drawings in the final competition should be restricted to, as nearly as can be, the amount of the premium, so that the competition shall not resolve itself into one of long pockets, but one of brains. I feel sure that many competitors will join me in the assertion that already the competition has cost them fully one half the amount of one of the premiums.

In conclusion, as long a time should be given in the final competition as in the preliminary one for the preparation of the drawings.—I am, &c.,

Nov. 29. A COMPETITOR.

PRELIMINARY COMPETITIONS.

Sir,—The point of my proposal, which I think "Vigilans" has overlooked, was this:—Assuming £150 to be inadequate remuneration for the labour of getting up drawings, &c., in the final competition for the Dublin or the Glasgow buildings, I would, by a declaration of the order of merit in the preliminary selection, afford those who might so elect an opportunity of withdrawing at the earlier stage with a recompense proportionate to their trouble so far. This, to my mind, would be not only equitable but charitable.

I fail to see anything more invidious in selecting designs in their order of merit in a preliminary competition than in a final one; nor do I see exactly how the best six or ten, out of 160 or 170, could well be selected without a judgment being formed by the assessors on their relative merits. The judgment having been formed, I see no good reason why each competitor should not be made aware of the relative standing of his design. This could be done by declaring the order of merit by the mottoes only (those of equal merit being bracketted together), and the names of the authors, if they need be declared at all, could be given alphabetically. This would convey to each competitor only the information that concerned himself. The assessors of course should have power to vary the order of merit in the final competition if they thought right.

I, for one, if my design occupied sixth or tenth place, would prefer to know it, as I should, if that case, most certainly distrust my chance of the prize, and would think twice about going further, more especially if by withdrawing I should receive an equivalent for my trouble up to that point. What should be done with the balance of the £150 may be a matter of opinion.

Amongst six or ten of the best designs in a large competition there may be some of fairly even merit; but No. 1, as a rule, is more than a neck in advance. If so, how is he to be overtaken, when in the final heat all in the race are restricted to the same rate of speed, so to speak? They must all run strictly within the line of their respective sketch designs, "and no other"—in fact, merely draw the same design over again to a larger scale.

It is all very well to call preliminary drawings, such as are required in these competitions, "sketches"; they are far more than sketches. Where elevations and perspective are drawn in ink outline to 1-20th of a foot to an inch scale, and sections likewise, so much accuracy is required that really all the assessors need is a magnifying glass to convert these so-called "sketches" into carefully-drawn 1/16th scale drawings without further troubling the competitors. Such drawings should be sufficient in themselves to decide any competition on.

My proposal was not, as "Vigilans" puts it—viz., "that say seven competitors should," but that any competitor *might*, withdraw on the terms I suggested. No doubt every competitor enters the lists in the first instance with some idea of his design being successful. But if in the preliminary contest, and on good authority, it was made evident to "Vigilans" that his design was *no better*, even he, I think, would be over-sanguine and unwise to punish himself by further contention. If, however, he should entertain such a high opinion of his own production as to think that by merely enlarging it in scale he could change places with No. 1, my proposal, if adopted, would not preclude him from the venture.

A. B. C.

TESTING TRAPS.

SIR,—I find that I am expected to say something on the experiments which have recently been made with closet-traps at Messrs. Pullen and Son's works, Penton-place, Newington Butts, and I shall be glad if you will grant a space in your paper for that purpose. The public are very much indebted to you for the liberal way you have opened your columns this year to the subject of plumbing, and especially for ventilating this traps question—for good trapping is the key to sanitary plumbing.

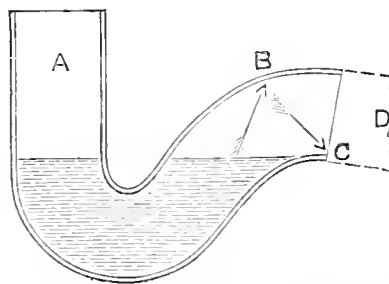
I must admit that I have not seen any of the experiments made at Messrs. Pullen and Son's; but from what I gather from the published reports—which are somewhat conflicting—I should say the experiments are incomplete. There is a difference of 25 per cent. in the depth of the dip of the \square -trap, for one gives it as 1 in., another as 1 1/2 in.; and the difference in the depth of space between the basin-plug and the water-line of the 4 in. "patent east lead trap" is greater still, for it is given at almost every inch between 6 in. and 14 in. There is also a disagreement between your report and that of the *Builder*. In the third paragraph from the bottom of the third column in your last week's issue, p. 690, you state, in speaking of the endeavours to unsiphon Beard and Dent's 4 in. traps, "with the ventilating aperture on the top of traps open and the valve closed, the charge of water unsealed the trap to the extent of 1/2 in." Does this mean that the water was lowered in the

trap half an inch, leaving it with an inch water-seal? Or if the trap had 2 1/2 in. seal (as stated in your report, 37th line down from top of third column, page 690), the water-seal of this trap is really 1 1/2 in. (but perhaps, by accident, it has got distorted), then 1 1/2 in.? Or does it mean that the water was siphoned out 1/2 in. below the seal of the trap? In the report given in the *Builder*, it is stated (commencing at the 30th line from top of third column, page 679): "The round-pipe or S-Trap (Beard and Dent's) was provided with a 2 in. ventilating-pipe between the water in the trap and the junction of the arm with the down soil-pipe, but charges of water passing down the latter under the same condition as before did not disturb the water in the trap." I am quite positive that this would be the case in well-formed round-pipe traps; but more of this later on.

According to the published letters and reports, the experiments for finding out the displacement of water in a trap by the discharge of a valve-closet fixed upon it, have been made without a proper service of water to the closet-basin. Now, if anybody were called in to see such a closet, he would order water to be laid on to it immediately, or insist upon its removal. With a proper supply of water to the valve-closet, the result of the loss of water in the trap under it would have been very different to that reported, for though the previous contents in a Beard and Dent's 4 in. trap would have been driven out (an important advantage over the D-trap) by the water from the basin falling quickly upon it, the incoming supply to the basin would have re-charged the trap, either through the basin-plug or valve, or through the overflow-arm.

In the first edition of my book, "Dulce Domum" (published in 1877), I called special attention to the great liability of Beard and Dent's 4 in. "patent east lead trap" to siphonage, and nowhere in that book—or in the second edition of it—is it shown fixed under a valve-closet; but I did not fall back upon a \square -trap for fixing under valve-closets! I illustrated a much better form of trap, as I think, the "Mansergh" trap—though I should not be satisfied with that trap now, for it is not self-cleansing enough. After stating that any plumber could make this "Mansergh" trap, I go on to say: "This trap is specially adapted to prevent a too great siphoning action in the passage of the discharges through the waste-pipes or soil-pipes." "It is specially constructed for *valve* (the italics are in the original) water-closets and slop-sinks, where the discharge is sudden and direct into the trap. . . ." The illustrations in the first edition show the square-pipe "Mansergh" trap, fixed under *valve-closet*, and the illustrations in the second edition, the improved "V-dip" or "anti- \square -trap." But as I said at the lectures—and nothing said there have I to unsay here—round-pipe traps are perfectly safe against siphonage, i.e., the water cannot be siphoned out of them when properly ventilated, to rob them of an efficient waterlock or "seal" by discharges of water sent through the piping on which they may be fixed, or into which they may be branched. Nor can the water be driven, knocked, or "momentumed" out of such traps,

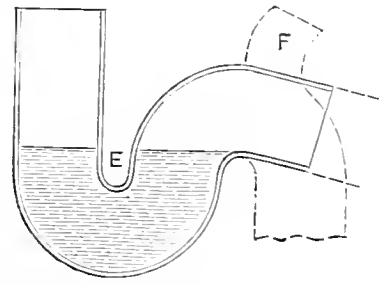
FIG. 1.



when properly made and ventilated, as shown in Fig. 2, by a discharge from any water-closet fixed upon them. I showed some specimens of such traps at the lectures, made by hand, i.e., traps bent and formed out of "patent" pipe for valve-closet and other uses; though the traps shown were of smaller size than those generally used, as I prefer traps to be as small as practicable for better cleansing purposes.

The reason why Beard and Dent's 4 in. \square or half \square -trap (the one experimented with, and illustrated in Fig. 1) is unsuited for fixing under *valve-closets*, is that its contents are easily knocked out. It is safe enough to use under the "Artisan" and "Wash-out" kind of water-closet. This 4 in. "patent east-lead trap" is faulty in form, for its rise to its outlet is much too easy. The small size "patent east-lead traps," 2 in. and 1 1/2 in., both \square 's and ∞ 's, are right enough. The water from a *valve-closet* basin, especially when it has an extra large outlet, falls flat upon the water in the dip-pipe A, and drives the standing water of the trap forcibly against its too sloping side B, which, glancing off to C, as shown by the arrows, instantly runs away, leaving the trap uncharged, unless sufficient water follows the discharge from the basin in a more broken form to re-charge it. But this would not occur in a round-pipe trap, formed as shown in Fig. 2—i.e., with the rise

FIG. 2.



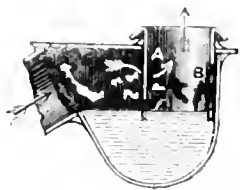
to its outlet nearly vertical. The body part of such a trap being made U-shaped, the water driven up against the dome of the outgo would partly fall back again and help to re-charge the trap. It is the easy rise to the "outgo" of Smeaton's "Eclipse" trap which accounts for that trap losing its water; this could be remedied by bossing back the outgo and making the rise to it vertical.

Though it is of the utmost importance that traps should hold their "seal" in every treatment they are likely to receive, it is equally important that traps should be self-cleansing, or they will become so many "dangers to health." The \square -trap, the "Helmet," and even the improved \square -trap are non-cleansing traps; that is, such traps will require two or three flushes of water to thoroughly cleanse them after a body of soapy water or excremental matter has been passed into them—what they may do with stones and flannels is not the question. My small "V-dip" closet-trap, which I had at one of the lectures, can be cleansed by one flush of water from a valve-closet basin, and this trap cannot be unsiphoned, though unventilated by a discharge of a valve-closet, fixed upon the same stack of piping; nor can the water be driven, knocked, or "momentumed" out of it though unventilated, by the discharge of any water-closet (valve-closet, or others) fixed upon it, even though the space between the basin-valve and water-line of the trap be 15 in. But this "V-dip" trap is not proof against siphonage under every condition, unless ventilated; nor, in fact, is the improved \square -trap. I have had a \square -trap made up on the lines laid down by Mr. Davis at the discussion, and tested. The trap was fixed on about a 50 ft. stack of soil-pipes, at about 38 ft. from the bottom. About 12 ft. above this trap a 4 in. \square -trap was fixed on a short branch of 3 1/2 in. pipe leading into the same soil-pipe. By discharging about 16 gallons of water from a small bath (the one used at the lectures), through the upper trap, by means of a closet-plug, the water in the \square -trap was drawn away from the dip during the whole time of the discharge, and was lowered appreciably, and that, too, with the top end of the soil-pipe quite open. The same experiment was made with a 2 in. air-pipe on the top of the soil-pipe, and in one discharge of the bath the trap lost 1/2 in., leaving 1/2 in. "seal" in the trap, without any air-pipe on the top of the soil-pipe; the water was drawn out below the dip, leaving the trap without any "seal"; but with Pullen's east-lead \square -trap fixed in place of the improved \square -trap; but though the water kept in a very agitated state and lowered in the trap, it could not be unsealed—but, anyone seeing the disturbed state of the water in this trap during the

discharge from the bath, would never allow a \cup -trap to be fixed without ventilation. I could fill your paper with the experiments made, all of an interesting character. I had a \cup -trap fixed on a branch near the foot of the soil-pipe, and the soil-pipe trapped, and without "foot ventilation," a discharge from a valve-closet, fixed in lieu of the bath, drove the water out of the trap to the height of 3ft. and 4ft.

Besides the evil of fouling there is danger in using any trap having a dip-pipe inside its walls, as in the \cup -trap the "Helmet," the "improved" \cup -trap, and the "Eclipse" trap; for any defect or leakage in the dip-pipe would not show itself—i.e., though the dip-pipe might be defective, and allow soil-pipe air to pass through it, there would be no escape of water to show such defect, the pipe being inside the box part of the trap; but a defect in a round-pipe trap, or in a "V-dip" trap would show a water leakage at once. That dip-pipes inside traps do become defective, and, therefore, dangerous, the illustration, Fig. 3 will show.

FIG. 3.



This trap has only recently been cut out from where it had been fixed under a valve-closet, and I intend sending it to the Parkes Museum of Hygiene, University College, Gower-street. The dip-pipe is eaten away all round between the water-line and the top of the trap, as shown in the wood-cut, and the soil-pipe air would have had an easy passage through it to the house, as shown by the arrow. If this trap had been ventilated, the gases would not have eaten the dip-pipe away, and destroyed the value of its "seal," showing that ventilation is worth its cost, even apart from its value in preventing siphonage.—I am, &c.,

S. STEVENS RELLIER.

TESTING TRAPS.

SIR,—In your last issue I notice two letters on testing-traps, the first seeming intended to confute my arguments, but as it is quite beside the point I pass it over.

In the second I am pleased to see that Mr. Emptage acknowledges his error with regard to the \cup -trap, and which was published in your journal Oct. 22nd—viz., that beneath a valve-closet was the safest place to fix a round \cup -trap. I think this is due to my having shown him my drawings, which you publish in this week's article, when in his company on the 19th instant. It is very gratifying to find that I am making substantial converts daily.—I am, &c.,

P. J. DAVIES, H.M.A.S.P.

SIR,—As one of the committee at the experiments carried out at Messrs. Pullen's on the 19th inst., I beg leave to refer to the results. The principal trials were made in connection with the valve-closet upon the centre stage, the first trap tried being the Eclipse, with $\frac{1}{2}$ n. seal, 13in. drop, and unventilated; one gallon of water discharged very suddenly unsealed the trap. A 2in. vent-pipe was then added to top of outgo, when, after doing his utmost, Mr. Davies was compelled to acknowledge that he could not untrap it, the least seal left being $\frac{1}{2}$ in.

The next trap tried was Beard and Dent's \cup or half \cup , 12in. seal and 13 $\frac{1}{2}$ in. drop; it was tried both with and without ventilation, and was untrapped by Mr. Davies under both conditions. The helmet-trap was then placed in position, $\frac{1}{2}$ in. seal and 13in. drop, and unventilated. This trap was not affected by the flushes.

The next trial was with an unventilated \cup -trap, 23in. seal upon the top stage, fitted with a sharp basin, drop 6in.; this was also untrapped by means of the plunger by Mr. Davies. It was the opinion of some of the committee that Mr. Davies, by the suddenness of his flushes, did not give the trap under the valve-closet a fair trial. I perfectly agree with them; but, at the same time, a trap to be safe must be secure against all attacks to which it is possible in practice it may be subjected. There are, however, other conditions in connection with these experiments which must be taken into consideration before the results given can be fairly valued; for instance, take what, in my opinion, based upon actual experiment, is one, if not the

most, vital point—viz., the unusual amount of drop given between the valve and water-line of trap—viz., 13 $\frac{1}{2}$ in. This is neither necessary nor sanitary; the Helmet and Eclipse, when fixed in the ordinary way, have a drop of only 10 $\frac{1}{2}$ in., while the round-pipe trap, owing to the ease with which the dip-pipe can be cut down, can, excepting in very rare cases, be fixed with a much less drop. Why, then, with these experiments so great a drop is given I cannot understand, excepting from the knowledge of the fact that it is fatal to the round \cup and Eclipse, and does no damage to the Helmet, but rather assists it.

Now, the \cup -trap proper has not been introduced at all into these experiments. I understand Mr. Davies to say that he had not tried it; had he done so he would have found that it would when ventilated have defied all his efforts to unseat it, notwithstanding the drop was greater even than what he gave to the \cup .

As I am firmly convinced, from my own experience, that this matter has not been fairly brought before the public, I now give to Mr. Davies the following challenge, provided the Messrs. Pullen will grant the use of their scaffolding and apparatus for the purpose, I will undertake to prove before a committee:—

1. That the Helmet-trap is not to be relied upon, unless protected by a soil-pipe ventilation.
2. That a \cup , or half \cup -trap can, when properly ventilated, be made perfectly safe when fixed beneath a valve-closet.
3. That a ventilated \cup -trap can be fixed beneath a valve-closet with any length of drop, and will hold its seal against the most severe attacks to which it can be subjected.
4. That a ventilated \cup -trap, fixed with its outer leg upon the top of 45ft. of soil-pipe, is perfectly safe, either under a valve or a direct-action closet.—I am, &c.,

Margate, Nov. 26. DANIEL EMPTAGE, S.E.

SIR,—In reply to Mr. Emptage, letter dated Nov. 21, respecting the alteration in his statement as to height of fall of water, I think it strange he did not correct the error of his former letters, for he was shown a Beard and Dent's \cup -trap so fixed that it has 23in. seal, and where the plunger is only 6in. from water-line in trap. If he comes to our place simply for the purpose of being critical, I ask the gentleman in all honour to be accurate when behind our back, and when asked to correct his errors to do so properly.

With regard to Mr. Hart's statement, contained in his letter of November 21 last, the Beard and Dent's \cup -trap unsealed every time, to the extent of from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. As to water supply, the w.c. was and is supplied through a $\frac{1}{2}$ in. and not $\frac{3}{4}$ in. pipe, direct off the Lambeth Water Co.'s main, at over 60ft. pressure; and I have never, in the whole of my experience, ever used $\frac{1}{2}$ in. pipe for water. As to the hose, he could not have seen it, because there is such a remarkable difference between $\frac{1}{2}$ in. canvas rubber hose and a $\frac{1}{2}$ in. hose, I must put it down as a mental error. I may state that Mr. P. J. Davies pulled up the handle of the closet in the usual manner, and dropped it from his hand in the way anyone would in testing a closet. Mr. Hart, as one of Beard and Dent's men, should know that if a closet-handle will not fall of its own accord, the closet is imperfect, as the handle should fall back quickly. I would mention that Mr. Davies did not work the handle on Monday, when the final tests were made. Probably this may interest Mr. Hart. I will not pretend to tell anyone that the tests were intended to prove the efficiency of \cup -traps. Our scaffold and stack of pipes were put up simply to test traps. I must conclude by informing all intending visitors that the scaffold cannot stand much longer, as now that the stormy season has set in, I know not how soon we may be compelled to pull it down. Such being the case, I trust that all local surveyors will avail themselves of the opportunity to really examine the difference between efficient and non-efficient forms of traps.—I am, &c.,

J. PULLEN, jun.

73, Penton-place, Walworth,
London, Nov. 28.

SIR,—I have been much interested with the articles and correspondence on this subject which have appeared in your paper recently; and being busy with a slight addition to my residence, I had a favourable opportunity of making a simple test. I beg to give particulars, which may perhaps be of some interest.

I have had one of Tyler and Son's valve-closets, with siphon-trap (Fig. 3 in their catalogue) fixed; it is on the first floor, connected to a vertical soil-pipe, with short bend, about 10ft. down to drain, and soil-pipe continued, full bore as V.P., about 10ft. higher; the trap unventilated, with $\frac{1}{2}$ in. water-seal, and $\frac{1}{2}$ in. from valve to water-luo. I made the following tests—viz.:—

No.	Conditions.	Result.
1	2 gals. water put into basin (full to overflow), and plug suddenly drawn	Trap unsealed $\frac{1}{2}$ in.
1a	Do.	Do., $\frac{1}{2}$ in.
2	1 gal. water put into basin, and plug suddenly drawn	Trap left with $\frac{1}{2}$ in. seal.
2a	Do.	Water left level with bottom of dip of trap.
3	$\frac{1}{2}$ gal. do.	Trap left with $\frac{1}{2}$ in. seal.
3a	Do.	Do.
4	1 gal. water put into basin, plug drawn, and basin flushed with another gallon	Trap left with $\frac{1}{2}$ in. seal.
4a	Do.	Trap left with full seal.
5	$\frac{3}{4}$ gal. do., and flushed with another $\frac{3}{4}$ gal. ..	Do.
5a	Do.	Do.

The above tests were made before the water was laid on to the basin; but the following were made after it was connected—viz.:—

No.	Conditions.	Result.
6	About 1 gal. water in basin (quantity of constant after flush), plug drawn, and basin flushed for about 10 seconds	Trap left with full seal.
7	Do., but flushed only for 1 or 2 seconds	Do.
8	Do., but plug dropped instantly, without any after flush	Trap unsealed $\frac{1}{2}$ in.
9	Do., and lot of paper, and flushed till all cleared away, and for a second or two after.	Trap left with full seal.

The results of these tests appear to show that under the ordinary conditions of everyday use of such apparatus, the after flush makes good any unsealing that occurs from the first rush of water.

—I am, &c.,
Nov. 30.

JAS. ROBINSON.

SIR,—Having occasion to be in London for a few hours on the 21st inst., I accidentally happened to be present when the experiments described upon page 690 were made, and I can corroborate the general fairness of your report. I find, however, that upon again reading over Mr. Davies's report on page 540, I cannot agree with all his statements, deductions, and conclusions—e.g., he says on page 510 that when the top \cup -trap was left off "it was found impossible" with the top of the soil-pipe closed to empty the top siphon-trap, because it had 3in. of dip, while the \cup -trap, having only 1 $\frac{1}{2}$ in. of dip, rather allowed air to pass through itself. Now, in my presence, when the basin above the \cup -trap was emptied, and the soil-pipe tight and closed at top, the water was at once sucked out of the siphon-trap near it, considerably below the water-seal. I think, when Mr. Davies formerly experimented, the slip of this siphon-trap was not air-tight. I do not see that Mr. Davies is exactly right in saying, on page 540, that the \cup -trap can afford to help others "without interfering with its own efficacy," as it loses half its water-seal when so doing. Still, it may have enough left for general practical purposes in prevention of bad air passing the dip-pipe.

In regard to Mr. Davies's conclusions upon page 511, that the experiment he describes (and those I saw) "prove that the \cup -trap is the only reliable trap for valve-closet work, or any closet or sink where large quantities of water have to be thrown down at once, and that the \cup -trap is quite unreliable for these same purposes," I fear he is too hasty in this assertion, and is "calculating without his host," for I have to state that so far as the siphon-trap is concerned the experiments yet published are only partial, and do not exhaust the subject, and I am astonished to find a person with such a general knowledge of the various forms of traps in the market as Mr. Davies has published such a conclusion or statement while other forms of siphon-traps, such as Mr. S. S. Rellier's anti- \cup -trap, have not to be tested, more especially as this form of siphon-trap is recommended to be used against momentum and siphonage in Mr. Rellier's work, "The Plumber and Sanitary Houses." I am sorry to have to differ thus far from Mr. Davies, but to give the question of "Which is the

best and safest form of trap?" fair-play. Messrs. Davies and Pullen must complete their experiments, and not stop in the middle of them.

In regard to the mode of conducting the experiments, I consider such fair enough for the purpose. It is, in fact, more useful than trying them with the water running into the basin all the time the basin is being emptied, for although generally the case in practice, it does not always happen.

Then as to the results of the experiments made thus far, it must be admitted that the \square -traps retained a water-seal under circumstances and tests in which the particular forms of the siphon-trap and Smeaton's trap lost their water-seal, but the question of the effect of improved shapes has yet to be tried. Seeing improved forms of the \square -traps were experimented with, why were not improved forms—already public—of the siphon-trap also experimented with? Seeing they were not, justice to the question and to the public demands further experiments. As for Smeaton's trap, it may be classed with the \square -traps as having the same fault, viz., that the tongue or dipping foul-air-barrier is out of sight and may have a hole in it, making the trap useless, where not seen. For this reason, and because I consider the siphon or pipe-trap the cleanest, it would only be (with my present ideas) in some exceptional case, as where I could not get a ventilating-pipe put in, that I would think of using either a \square -trap or a Smeaton's; and if Mr. Hellyer's style of trap would act in such circumstances as well as the \square -trap, then I should not use a \square -trap at all.

Ventilating the outer side of the trap prevents concentration of the sewage gas and quick corrosion of the lead, and also lessens or perhaps practically stops diffusion of gas through the water; hence, non-ventilation of a \square -trap has a bad effect. The worst feature in any fitted-in trap, however, is loss of water-seal, and the trap must be so suited to its situation as to resist that, or it is a sham and a "trap" in other senses than the right one.—I am, &c.

Glasgow, Nov. 25th.

W. P. BUCHAN.

WESTMINSTER ABBEY.

SIR,—Your notice of the restoration of the north portal reads as if the work was complete. Such is not the case; the central portal only being partially so, the figure-work of which is only just commenced. The masonry of the whole has been executed most carefully by Messrs. Piercy and Co.—I am, &c.,

W. BRINDLEY.

67, Westminster Bridge-road,
London, S.E. Nov. 30.

EARTHENWARE POTS BUILT INTO CHURCHES.

SIR,—Mr. Gordon M. Hills, in his recent interesting paper under this heading, seems to have overlooked three or four similar vases to those he described, which were found last year in the parish-church of St. Mary, at Luppitt, a small village upon a bold range of hills some four miles from Honiton, in Devonshire. Mr. J. H. Spencer, of Taunton, was the architect employed in the restoration of the building at the time; and I remember that drawings of the jars in question, which were of about 4in. diam., were made by Mr. R. Medley Fulford, F.R.I.B.A., of Exeter. Probably yet other examples exist.—I am, &c.,

Exeter.

HARRY HEMS.

SUNDAY ART EXHIBITION IN EAST LONDON.

SIR,—The exhibition of works executed by students of the City School of Art, which was opened on two Sundays in December last, having proved very interesting to a large number of people at the East-end of London, we have great satisfaction in announcing that arrangements have been made for again opening the Exhibition on Sundays.

The Exhibition, which is the twenty-fifth Sunday Art Exhibition opened under the auspices of the Sunday Society, will be held in the Skinner-street Hall, Bishopsgate, and will be open from 3 to 6 o'clock p.m., on Sundays, December 4th and 11th. Admission will be free (*without ticket*), and we are pleased to be able to state that in addition to the work of the students some valuable pictures from the collection at South Kensington Museum will be exhibited.

In order that the widest publicity may be secured for this effort to provide innocent recreation on the leisure day of the week, we ask you to insert this letter in your columns, seeing that the facilities in London for visiting collections of art are far too limited, and that the want of open museums and art galleries on Sundays is especially felt by the inhabitants of crowded districts at this season of the year when our climate so often practically closes the parks and gardens to them.—We are, &c.,

WILLIAM ROGERS, M.A., Chairman } City School
R. H. HADDEN, B.A., Hon. Sec. } of Art.
THOMAS BURT, M.P., President } Sunday
MARK H. JUDGE, Hon. Sec. } Society.
9, Conduit-street, W., Nov. 30.

Intercommunication.

QUESTIONS.

[6798.]—**District Surveyors' Charges.**—A garden wall dividing four properties belonging to three persons was condemned by the Metropolitan Board of Works as a dangerous structure, under the 18 and 19 Vic., cap. 122, sec. 72, and the question I wish to submit for your opinion is whether the district surveyor's fee of 20s., provided for under Part II. of second schedule of above-cited Act, is chargeable upon the whole structure or upon each of the owners, who in this case are three (but might have been six), or, in other words, is the district surveyor entitled to the sum of £1 or £3 for surveying the two sides of a garden wall one brick in thickness?—E. H. C.

[6799.]—**Contracts.**—Will someone kindly reply to the following? In a contract for laying out a new cemetery, the boundary fence consists of a dwarf stone wall, with stone piers and palisades between. A portion of this fencing is omitted, and an iron fence, 5ft. high (costing a little less than that originally intended) is substituted. This iron fencing is ordered by the architect from a firm of ironfounders and fixed by them. The account is certified by the architect and sent on to the contractor for payment; the original wall is deducted from amount of contract, and the iron fencing added. The usual clause is inserted as to extras and omissions. The point at issue is, Can the contractor charge a profit in the bill of extras on the ironfounders' account?—E. C.

[6800.]—**Liability of Builders.**—I should feel obliged if any gentleman could give me any information upon the following case:—A building is put up by contract; the final certificate is granted by the architect, and the balance paid the builder. Some time after completion (say, six months) one of the outer walls is observed to be falling forward, and continues to give until ultimately it has to be taken down and rebuilt. It can be proved that this wall was not built plumb according to contract, and that the builder knew, or should have known, this. Is the builder liable for the cost of rebuilding the wall? Has a similar case ever been tried? If so, any information as to where I could obtain particulars would greatly oblige.—ONE IN DOUBT.

[6801.]—**Professional Practice.**—Will some reader of the BUILDING NEWS kindly inform me if it is usual to give a client a copy of the bill of quantities, or a priced copy of the bill of extras and variations if asked for? It is not usual, on what grounds can they be refused?—ISQUIER.

[6802.]—**Fowl Yard and Houses.**—Will any of your readers kindly inform me as to the best mode of building houses and constructing yard for fowls where a large number are kept, say, 2,000 fowls, the kind of material best adopted, and the plan of the different houses, with run to each; also as to provision and construction of nests and perches, &c., as I have to prepare plan for same, and should like to know the best means of accommodating such a large number? Is there not some peculiar method employed by the French people in the construction of such houses?—BLACK HAMBURG.

REPLIES.

[6793.]—**French Casements.**—Yellow deal would be preferable to pitch pine; the turpentine in the latter throws off the paint and leaves the wood exposed. On Nov. 22, 1878, Mr. Aston Webb gave a lecture on windows at the Architectural Association. Perhaps "Reader" will find this of use. I should strongly advise him not to use Smith's patent water bar; the hinged flap as often as not gets shut outside the sash. This happens if the flap is in the last raised before the sash is closed; the hinges becoming clogged with dust or anything is sufficient to prevent the flap lying flat upon the sill, so even for casements which do not go down to the floor, they are not to be relied on, but for French casements they are a snare and a delusion, and I thought they had become obsolete. About half way up Dover-street, on the right-hand side going up, there is an hotel (a red-brick building with stone dressings), where "Reader" can see these water bars in working order; he will find about every other window improperly shut.—CHARLES F. MOXON.

[6784.]—**Extras.**—Under the circumstances, the particulars of which, however, are almost too meagre to form an exact opinion, it seems probable that the client would not be bound to pay for the extra work, unless at some time or other he tacitly or otherwise invested the architect with sufficient discretionary powers; but the contractor, before suing the architect would do well to see whether he could prove that his claim is for accessories and not for work irrelevant to that which he has contracted to perform. In the latter case it is essential that he holds some kind of drawing or written order for the extra work. If the contractor has been incautious in making additions without an authorising document, the architect must have been remiss in allowing the work to proceed and not giving it; whilst, to complete the all-round responsibility, the client should either have repudiated his architect's views, or else have chosen at the outset one in whom he could have reposed a little more confidence.—W. J. CHASTRY.

[6793.]—**Luminous Powders, &c.**—"Mac" will find an article on Luminous Paint in the BUILDING NEWS of 6th February, 1880. In case he hasn't the number to refer to, he may write Messrs. Illies and Horne, 31, Aldermanbury, E.C., for information.—W. U. O.

[6795.]—**Memorial.**—Pulpits, fonts, lecterns, and reredoses are regularly placed in churches as memorials, with or without inscriptions to that effect. Any one of the four may be made for the sum mentioned by "Memorial," should his design not be too ambitious. If photographs of the departed gentleman exist, a bust may be well modelled and sculptured in statuary marble at a similar cost.—HARRY HEMS.

[6794.]—**Problem.**—Lease granted for 14 years. Terms: £1,050 paid down, 250 per annum the first ten

years, £300 per annum the last four years. The lessors' interest at 4 per cent. compound would be £6603.689, viz.,
£1050 for 14 years 1818 285
£250 per annum for 10 years 3001 325
Four years comp. int. thereon 569 959
£300 per annum for 4 years 1273 920

£6,603.689
Then £6,603.689 will give the annual rent for 14 years at £471.7. If B. takes the lease from A. at the end of 10 years, his proportion of rent would be 4 years at £471.7, equal to £1886.80; but as he has to pay the last 4 years' rent, viz., £300 per annum, he is entitled to a reduction of £1273.9s. 2d., leaving a balance of £612.88. This amount not being due until the end of the lease, the present value is £237.889, or £237.17s. 10d.—G. B., Lincoln.

[6794.]—**Problem.**—The following is, I believe, a correct solution of the problem:—

The price of the lease for 14 years is £1,050
The total rent to be paid in the 14 years is 3,700
Total £4,750
£4750 for 14 years is equivalent to £339 2-7 per annum.
Now the proportion of the total sum which A. should pay is 10 years, and
£339 2-7 = £3,392 6-7
The rent paid by A. for 10 years and
£251 = 2,500
Therefore A.'s proportion of purchase-money = £892 6-7
B.'s proportion of total sum = 4 years
and £339 2-7 = 1,337 1-7
The rent paid by him for 4 years and
£300 = 1,200

£157 1-7
The answer to "Cocker's" question is, therefore, £57 2s. 10d. as the sum B. must pay. For the sake of proof, seeing "Cocker" has had so many different answers, suppose that the lease is worth £500 a year to both A. and B. for their respective terms (of course, all such questions of depreciation of value, &c., are set aside in the question), it will be found that both A. and B. will reap an equal profit of £160 14s. 3d. per annum. The value may be more or less, but the profit per annum will be the same to both A. and B. thus proving that a proportionate price has been paid by each.—W. U. O.

[6794.]—**Problem.**—Price of lease £1,050, term 14 years. Rent first 10 years, £250 p.a. Rent last four years, £300 p.a. Lease to be sold after first ten years.
Total amount of rent paid by A. = £2,500
Do. Do. to be paid by B. = £1,200

Do	for the 14 years =	£3,700
If proportionate amount on	£3,700 =	£1,050
"	"	1,050
"	"	3,700
"	"	1,050 x 1200
"	"	3,700
12600		
37		
37	12600/340	
	111	
	150	
	148	
	2)	
	2)	
	57/40(10	
	37	
	30	
	12	
	37/359.9	
	333	
	27	
	4	
	37 108.2	
	474	
	31	
	37	

£340 10s. 9d. 14 37.—J. R. R.

[6796.]—**The Sanitary Institute Examination of Surveyors.**—The office of the Institute is at 9, Conduit-street, W., and your best course would be to apply there for further information respecting the examinations.—S. S. J.

The new dockworks at Maryport were greatly injured on Wednesday week during a gale, the sea carrying away masses of the concrete wall, the inside sand embankment, and the tramways. The loss, which is estimated at from £15,000 to £20,000, will fall upon the contractor, Mr. Doherty.

Sundry serious-looking cracks having been observed in the fine old façade of the Old Guildhall at Exeter, Mr. Edward Ashworth, architect of that city, was commissioned by the town council to report and examine the same. His report was read at a recent meeting.

The parish-church of Llansadwrn, near Menai-bridge, was reopened on Tuesday after a complete restoration from the designs of Mr. Kennedy, the diocesan architect. The contract was executed by Mr. Robert Jones, Bangor.

Mr. Harry Hems, of Exeter, has been elected an Associate of the Society of the Sons of St. George, at Philadelphia, founded in A.D. 1771, and one of the oldest in America.

LEGAL INTELLIGENCE.

BREACH OF BY-LAWS.—Alfred Wm. Price, builder, of New Southgate, appeared on Monday, at Highgate Police-court, on an adjourned summons, charging him with having infringed the by-laws of the Hornsey local board by erecting four dwelling-houses on the Archway-road Estate, Hornsey, with 9in. external and party walls, instead of 13in. walls. The facts were admitted, but it was alleged that the houses were built in accordance with the plans passed by the local board. This, however, the surveyor proved, was not the case, and it was then shown that the buildings were not commenced by the defendant, and that he had completed them in accordance with the plans handed to him by the first builder, which only showed 9in. walls. The Bench said they had nothing to do with that. The by-laws had been infringed, and the defendant was responsible. The solicitor for the prosecution, in answer to the Bench, said he believed the local board would compel the defendant to carry out the by-laws by making him pull down the walls, but he could not say for certain, as the whole question was at present under the consideration of a committee. A fine of £2 10s. and costs was imposed.

THE BEER FREESTONE COMPANY.—DAMAGES CLAIMED FOR EXTRAORDINARY TRAFFIC.—At the Axminster Police-court on Tuesday week, the Beer Freestone Company, Limited, of Seaton and Beer, were summoned, at the instance of the Axminster Highway Board, for the amount of £25 5s. 6d., incurred in repairing the damage to certain roads in the parishes of Seaton and Beer, in consequence of the excessive traffic over them by order of the defendants. The Beer Freestone Company possessed a quarry in the parish of Beer, and had caused stone to be conveyed in large blocks along the highway to Seaton Station. This traffic within the past six or twelve months had increased considerably—double or treble—and the result of the extra traffic and the extra weight was that the road from the quarry to a particular point, called Town End Cross, had been considerably damaged, and extra expenditure had been deemed necessary. The extent of the road was about half a mile and 85 yards. In previous years the expenditure on that piece of road had been comparatively small, but now, in the course of about six months, £25 5s. 6d. had been spent in consequence of extraordinary traffic. From Lady-day, 1880, to Lady-day, 1881, £11 2s. 7d. was expended on the road, and in the five previous years the sums of £9 10s. 1d.; £3 2s. 6d.; £7 5s.; £5 12s.; and £3 5s. respectively were expended. Instead of two or three tons of stone, as originally, there were now six, seven, eight, and even nine tons at a time conveyed over the road. That weight had been taken over the road three and four times a day, so that there would be about 30 tons of stone passing over the road daily. The waggons drawing the stone were pulled by four, five, six, and seven horses, thus showing that there had been a tremendous increase of traffic. A variety of cases with reference to extraordinary traffic had been tried, and the outcome of them all was that the ordinary traffic of a road was to be the standard. The quarry had been almost disused at one time, and then suddenly a large business was developed, and about 100 or 150 tons of stone a week were taken over the road in question. He maintained that the stone traffic over the road being suddenly opened up was extraordinary, because the road was not adapted or made for the purpose. In conclusion, Mr. Tweed said the Bench would have to determine whether the sum claimed was reasonable in regard to the average expense of repairing the highways in the neighbourhood. The average cost of repairing the roads per mile was £6 4s. The Bench retired to consider their decision at six o'clock in the evening, having sat nearly seven hours. Upon returning into Court, the Chairman said the Bench considered that the traffic had been extraordinary and excessive within the meaning of the 23rd section of the Highway Act, and they ordered the defendants to pay the sum claimed, together with the costs. Mr. Ward intimated that a notice of appeal would be given in due course. Mr. Tweed said there was another case instituted by the Seaton Local Board against the company, and asked whether the Bench would hear it that night? One of the magistrates: Not to-night for me, thank you. (Laughter.) The case was adjourned for a fortnight.

BROKEN BRICKS: WHO IS RESPONSIBLE?—The Barham Brick, Lime, and Cement Company (Limited) v. Henry Medgett Eytton, architect, Ipswich. Action—tried at Ipswich County Court, Nov. 22nd, before Mr. F. R. xburgh, Q.C., and a jury—to recover £21 5s. 11d. for bricks sold and delivered. Plaintiffs sued for the price of certain bricks which were sent by rail from London to Ipswich, and which arrived in a damaged condition, and the question being likely to arise as to who was liable for the loss, the defendant had given the railway company notice to appear or be bound by the decision in the cause. His Honour said the question of the liability of the railway company could best be settled by an independent

action, and dismissed the railway company from the action, reserving the question of costs for a time, to see if any action were brought against them by either plaintiff or defendant. The plaintiffs are manufacturers of ornamental bricks in South London, and sued the defendant, an architect at Ipswich, for £21 5s. 11d., the price of certain patent bricks sold to him. The bricks were ordered by Mr. Eytton for use in a house which was being erected from his designs for Mr. H. H. Kingdon, on the Westerfield-road, Ipswich. In April, 1881, the bricks were ordered in a letter requesting them to be sent to Mr. Hayes, of Ipswich, the builder. The bricks, as ordered, were sent off by the Great Eastern Railway at Liverpool-street station, and arrived at Ipswich on the 14th July. The builder, Mr. Hayes, went down on receiving notice of their arrival, and found that the bricks were considerably damaged, the "arris" being chipped and broken. Defendant telegraphed that the bricks had arrived damaged in transit, and could only be accepted as paving-bricks. The secretary of the company replied that bricks were sold as delivered into trucks in London, and that after such delivery no claim could be entertained for damages, defendant's remedy being against the Railway Company. Neither party claiming the bricks from the Railway Company, they have been standing in the truck in the goods station yard at Ipswich ever since, and the plaintiffs now sued for the price. The questions in the case were—first, as to the terms of the contract, whether the delivery was to be at Liverpool-street Station; and secondly, if so, whether the bricks were properly packed in the trucks by the plaintiffs' men. With regard to the first question, Mr. Cheak deposed that it was the uniform practice of the company to limit their responsibility to the delivery at the stations; and that in previous transactions with defendant this was the contract. The plaintiffs did not pay carriage. The plaintiffs' workman, William Taylor, who packed the bricks in the railway truck, and William Breeden and Thomas Fairman, carmen, were examined as to the way in which the bricks were packed, which was with straw between the layers, but without any between the separate bricks of each layer; and said that from their experience that was the safest way to pack bricks. Mr. Bennett, of the firm of Rother and Co., said the way described by the men was the proper way to pack the bricks. It was the usual practice to sell for delivery at the wharf or railway stations. Similar evidence was given by Mr. Alfred R. Bristo, an employé of Messrs. Eastwood and Co., and Mr. T. E. Cheak, traveller to plaintiffs, proved that he saw the bricks at Ipswich, and that when he saw them a number of them in the top layer were broken, but those underneath were in fair condition. Mr. Poyser said for the defence that plaintiffs were seeking to make his client pay for what was really useless to him. The damage to the bricks was clearly not done by him. It was the fault either of the plaintiffs in not properly packing the bricks, or the Railway Company in negligently conveying them, and the right thing would be for the plaintiffs and the Railway Company to fight the case out between them. He contended that there was no acceptance by the defendant of the bricks, but that on the contrary immediately upon arrival he telegraphed refusing to accept them, and argued that if the case set up by the plaintiffs was admitted it would necessitate the sending of someone to London to superintend the packing of bricks. The packing was improper for bricks of this description, the sharp edges, on which the proper carrying out of the designs entirely depended, requiring special protection. The defendant, Mr. Eytton, said he did not limit the plaintiffs in any way as to the expense of carriage or delivery; all he wanted being that the bricks should be sent down securely. He did not consider that the bricks were properly packed. There was not sufficient straw used, and none was put between the individual bricks, so that the "arris" of the bricks was injured, and they were rendered useless. Mr. H. H. Kingdon was also examined, and said the railway could not be blamed because the bricks were not properly packed. Mr. Hayes, the builder, also testified to the damaged condition of the bricks on arrival, and his opinion that they had been improperly packed, and similar evidence was given by Mr. Wm. Gladstone, builder, Ipswich, and Mr. Edgar Catchpole, builder and brickmaker, Ipswich, and Mr. R. Seeley, the railway goods agent at Ipswich, was called to prove that the truck was placed on a back siding to obviate frequent shuntings, and had stood still nearly the whole time it had been at Ipswich. The jury found that the bricks were bought to be delivered at Liverpool-street, and that there was not sufficient evidence to prove that they were not fairly packed. His Honour said that would be a verdict for the plaintiffs, and the further question was put to them whether any authority was given by the defendant to the plaintiff to make any special contract with the railway company as to the carriage of the goods, or whether they were to be carried in the ordinary way. The jury replied that the goods were to be carried in the ordinary way.

Judgment was then entered for plaintiffs for the amount claimed.

THE EMPLOYERS' LIABILITY ACT.—An action, entitled "Adams v. Nightingale," was brought at Southwark County Court, on Monday, by a carpenter for £200 for damages sustained by the fall of a scaffold. Mr. Fitzgerald was for the plaintiff, and Mr. Kemp, Q.C., and Mr. Macdonnell for the defendant. An interesting question arose as to the serving of the six weeks' notice required by the Act. The notice was left at a box or portable office in the defendant's yard after business hours, and never came to his knowledge. The judge ruled this not to be a good notice, and nonsuited the plaintiff.

THE SHOREDITCH PAVING DISPUTE.—"Griffiths v. Steel"—"Griffiths v. Holloway."—The hearing of the appeals in these actions came on before Lords Justices Brett and Bagge, and the Chief Justice Sir John Coleridge, on the 10th November and on the 28th November Lord Justice Brett gave judgment for the plaintiff as follows:—The first question is, whether we are of opinion that this jury was justified in finding malice in fact. Now there was an election on the point of taking place, or rather voting, as to who should have the contracts, and what these defendants, practically both of them, said was that the plaintiff ought not to have the contracts because, they said, he is a man who has been contractor before, and he has put mere rubbish into the road, he has put black mud into the road instead of what he ought to have put. Now they were entitled to make such a declaration, whether in fact it was correct or not, if they believed it to be true; but as to one of them he had a year before, according to the evidence, made a similar charge against the plaintiff, and had complained to the Chairman of the Committee, who had to deal with this question of roads, and thereupon the chairman and the surveyor had inquired into this matter and they had then told this defendant that his charge was not correct, and that there was no ground for it, and they warned him that he had better not make such a charge; and for a year, or nearly a year, he had remained satisfied with that explanation, that is to say, he had done nothing substantially to question it. But at the moment when the parties were going to vote and determine who should have the contract, he suddenly resumes the accusation and calls out, "Why, this man ought not to have the contract, he mends the roads with black mud." We think that the fact of his having made the accusation a year before, and of it having been explained to him then, shows that he was not making this statement at the moment he did on the present occasion for the purpose really and truly of instructing those who were going to vote, but that in a moment—I hardly know what to call it—of enthusiasm in favour of some candidate of his own he made this statement, not candidly for the purpose of instructing those who were going to vote, but for the indirect and improper motive of obtaining by the statement the votes for his own candidate, and reckless whether the charge he was then making was true or false. If so, that is evidence upon which a jury might properly find that he was not using the privileged occasion in the way it ought to be used; but he was using it for an indirect and improper motive, and that, therefore, he was guilty of malice in fact. But as to the other defendant, it seems to me that he made the same statement without any grounds which could be presented to his mind to justify him in making it, and he accompanied with that particular statement what he alleged he had seen, which was undoubtedly untrue; and it seems to us it comes to the same with regard to him—that he made this statement for an indirect purpose, regardless whether what he stated was true or not, and that, therefore, the verdict against both these defendants was a proper verdict. But the verdict against each of them was for damages to the extent of £40, that is that this plaintiff was entitled to damages practically of £80. Now we have come to the conclusion, after considering this matter carefully and after consulting with the judges of the Divisional Court, that the election was not really influenced by what was said at all. The parties had all made up their minds before. It was not a deliberate malice; it was a malice that arose in the men's minds on the instant, and they gave way to a wrong and foolish desire to obtain the contract for their own candidate. We, therefore, do think that the damages were too high, and we think that what would be fair as to the damages would be to reduce them, but only to such a sum as should enable the plaintiff to indemnify himself, and show to anybody that the verdict was so substantial as to be a declaration that he was a person who was entitled to bring the action. On the whole, we have come to the conclusion that the damages in each case should be reduced to £15.

The Grantham board of guardians adopted last week plans by Mr. T. B. Watson for the enlargement of the hospital.

Our Office Table.

THE international exhibition at South Kensington of grates, furnaces, and other appliances for the scientific consumption of fuel was opened on Wednesday afternoon by the Lord Mayor. The Lord Mayor having briefly opened the proceedings, the report of the Committee was read by Mr. E. Hart, who gave a detailed account of the circumstances in which the exhibition was held, and of the manner in which the work of the two societies had been supported by public opinion and by the evidence of scientific men. The committee claim for the exhibition that it will tend directly to promote the better utilisation of coal and coal products, and that it will afford trustworthy information upon which a sufficient amendment of the existing law may be based. The Marquis of Lorne, Mr. Shaw-Lefevre, Sir H. Thompson, Lord Aberdare, Dr. Siemens, and others having spoken, the visitors proceeded to view the exhibition, which is housed in the galleries to the east of the Albert-hall, and of which our first notice appears elsewhere. The exhibit is roughly divided into six sections, of which the first contains open coal firegrates, stoves of all kinds, kitcheners, and kitchen-ranges; the second, gas-heating apparatus of all kinds; the third, hot-air, hot-water, and steam appliances; the fourth, gas-engines, boiler furnaces, and appliances for steam-engines and general industrial purposes; the fifth, anthracite, bituminous and semi-bituminous coals; and the sixth, all foreign exhibits, improvements in chimney-flues, and ventilating apparatus. It is proposed to award certain prizes and medals to the best exhibitors, and the arrangements under which these will be awarded will be made known as soon as practicable. Among the donors for this purpose is Dr. Siemens, who has offered a prize of 100 guineas. A ladies' prize of 100 guineas, divided into two sums, for the best domestic open grate and best kitcheners, will be given. The Society of Arts have offered a medal; the Manchester Association for Controlling the Escape of Noxious Vapours have added a prize of £50; and further prizes will also be offered.

MR. ROBERT RAWLINSON, C.B., the chief engineering inspector of the Local Government Board, according to the London correspondent of the *Manchester Guardian*, has lately been in very different health. Mr. Rawlinson is now much better, but it is not unlikely that he will at no distant date retire from the duties of his position at the Local Government Board. It is probable that in that event Mr. Rawlinson would be recommended to Her Majesty for knighthood. Mr. Rawlinson has had a long and useful career. His success at the time of the cotton famine is well known. He was Sanitary Commissioner with the British army in the Crimea, and assisted in alleviating the horrors of the disastrous winter of 1855-6. He has rendered important service in connection with the sanitary reform of the barrack system of India, and his recommendations upon the sewerage of towns have been adopted in many places in England and in other countries.

THE casting of the new bell for St. Paul's Cathedral has been completed at the Works of Messrs. J. M. Taylor and Sons, of Loughborough. Some 21 tons of metal was prepared. All being in readiness, three furnaces were opened, and liquid streams poured forth for four minutes and three-quarters before the huge casting was filled. The process being one of great delicacy and difficulty, the operation was kept strictly private. On Saturday evening the casting was steadily cooling down. When it is dug out it will weigh no less than 17½ tons. Some idea of its size may be obtained from the fact that the first Big Ben at Westminster weighed but 15 tons 8 cwt., and the second was two tons lighter; while Great Peter at York Minster is but 10¾; Great Tom of Lincoln, 5½; the previous big bell of St. Paul's, 5 1-10; that at Almutz 17 tons 18 cwt.; Vienna, 17 tons 14 cwt.; Erfurt, 13 tons 15 cwt.; Sens, 13; Paris, 12. The process of conveying the new bell to London will be one of some difficulty. The railway in this instance not being available, the casting will probably have to be conveyed by road.

At a meeting of the Sanitary Institute of Great Britain, held November 24, Prof. F. S.

B. F. DeChaumont, M.D., F.R.S., in the chair, the secretary read a list of the donations to library since last meeting, and Dr. Benjamin Browning, Mr. A. Roberts, of Sydney, and Dr. W. Robert Smith were elected Fellows of the Institute. Four members and associates were also elected, and four associates enrolled who had obtained the Institute's certificate as Inspector of Nuisances. Applications were read for ballot at next meeting. The Autumnal Congress and Exhibition is arranged to be held at Newcastle-on-Tyne in 1882.

It is announced that Mr. Ruskin has changed his plans with respect to the museum he has founded at Sheffield, and that it is his intention to devote the remainder of his life to making it about the most complete institution of this kind in the world. He has decided to send there his unique and priceless library from Brentwood, and a portion of the books and plates have already arrived. Plans for the extension of the buildings have been prepared, and a public subscription, which the Duke of Albany has promised to head, will shortly be opened to defray the cost of the enlargement.

THE Alhambra Theatre has undergone extensive repairs and alterations of a decorative and structural character. The building was erected nearly thirty years ago, by Prof. Hayter Lewis, for other purposes than those to which it is now devoted. The principal structural works which have now been undertaken, consist of the widening of the proscenium, the improvement of the accesses and staircases to the stalls, and an examination and strengthening of the main timbers and supports of the building. The width of the old proscenium had been limited by two of the iron columns supporting the main roof, but these have now been removed and new and more substantial columns carrying a deep iron girder under the base of the dome have been substituted. The works to the stage have also included the completion of a fire-proof concrete screen between the stage and the auditorium. The alterations to the approaches consist chiefly in the new and broader staircases giving access to the stalls; the alteration of the corridor to the boxes, and an increase in their number. Advantage was taken of the closing of the house, thoroughly to overhaul the whole of the construction, and the directors called in a civil engineer, Prof. Kennedy, of University College, to consult with their architects on the subject. The result has been that considerable works for the strengthening of the dome have been done, and all means taken to insure the safety of the fabric. The works were done by the contractor, Mr. Brass, of Old-street, St. Luke's, with the assistance of his foreman, Mr. Jones, for the constructional work; and his sub-contractor, Mr. W. Homann, for the decoration. Messrs. Perry and Reed were the architects.

ON Friday afternoon the fronts and sides of two partially finished shops in course of erection at the junction of Bedford Hill-road with the main road at Balham, fell down suddenly, slightly injuring two passers-by. The houses were being erected for Mr. Brown, of the saw mills, East Brixton, by Mr. Perham, of Brixton. The latter had made application to the Wandsworth District Board of Works in the usual course, for permission to build the two shops. The Board refused the request, as they wished the line of frontage to be set back 2ft. from that on which Mr. Perham proposed to build, and he therefore appealed to the Metropolitan Board of Works, whose surveyor had not yet reported on the matter. As Mr. Perham would not accede to the wishes of the Board, they refused, it is said, to grant him permission to place his scaffold poles in tubs in the road. He therefore carried his stages on beams, resting partly on the old garden-wall, remaining in front of the premises, in the other end passing under the first floor joists, on which an iron tie-beam had been laid to weight them down. On Friday the scaffolding began to work, and finally fell, bringing with it the end and side walls, and blocking up the road, but not doing so much personal injury as might have been expected from such an occurrence.

WITH the view of avoiding the bursting of water-pipes by freezing, a method of making them elliptical in section has been recently patented. As the water expands to form ice, it will alter the shape of the pipe, causing it to become circular in section, and therefore giving

more room for the ice. It is proposed to squeeze the pipes into their original shape, when by a succession of frosts they have been rounded.

CHIPS.

The town council of St. Helens, Lancashire, have applied to the Local Government Board for sanction to borrow £2,896 for work of street improvement. Mr. John Thornhill Harrison, C.E., held an inquiry on Tuesday at the town-hall into the matter. Full details were given by the town-clerk and surveyor with regard to the proposed improvements.

The Dockyard Church at Sheerness was gutted by fire on Saturday night, only the walls and tower remaining. The damage, which is estimated at £6,000, is attributed to the overheating of flue in warming apparatus.

The harbour extension works at Folkestone-pier were entirely washed away during the gale of Saturday night, including, it is believed, the foundation-stone laid a month since by the Prince of Wales.

The parish church of Blythburgh, near Southwold, one of the finest and most dilapidated examples of the semi-Flemish fifteenth century architecture of East Anglia, was closed on Sunday, under an order from the Bishop of Norwich, on the ground that the splendid hammer-beam roof is dangerous, and the walls damp.

A company has been formed for erecting an iron promenade pier on the north beach at Bridlington. The plans have been prepared by Mr. Joseph Firbank, C.E.

The students of the Gresley and Swadlincote science and art classes were presented with the prizes and certificates gained in examinations on Monday week. It was reported that 1096 drawings were sent to South Kensington in April, and gained two third grade and six second grade prizes. The late teacher, Mr. Cooke, has been appointed head master of the Sheffield school of art, and is succeeded by Mr. Bradbury, of Derby.

The local board of East Dereham made an inspection on Tuesday week of the newly-constructed works of sewerage, which have just been completed from plans by Mr. W. H. Nankivell, their surveyor.

The annual meeting and exhibition of works in connection with the Henley-on-Thames School of Art, was held on Wednesday week. The report stated that 201 students had joined since 1874, and there was an average attendance of 35 in the industrial class. The May examinations were not so successful as usual, as most of the students were recruits, but two second-grade prizes were gained. The Rev. W. Foxley Norris afterwards delivered a lecture on "Some higher influences of Sacred Art."

The Congregation of Oxford University finally considered and passed on Wednesday week a statute for the sanitary inspection of lodging-houses—a proposition which has awakened much sensitiveness in the local board and citizens generally. A controller of lodging will be appointed, and also a sanitary officer, who will not necessarily be a medical man. The delegates are empowered to call in special professional help, and to meet the expenses a fee of half a guinea per annum is to be paid by each student living in licensed lodgings—a fee which is estimated to realise about £100 yearly.

At the Norwich police-court on Friday, Henry S. Porter, a builder, was charged with stealing, in conjunction with another man, deeds of the value of £1,000, from a solicitor's office, where he had called on business. Defendant was remanded.

SMOKE ABATEMENT.

INTERNATIONAL EXHIBITION
AND TRIALS
of
SMOKE-PREVENTING APPLIANCES
at
SOUTH KENSINGTON.
NOW OPEN,

10 a.m. to 4 p.m. from 1st to 5th December, inclusive.
10 a.m. to 8 p.m. from 6th to 10th December, inclusive.
After the 10th December, Mondays, Wednesdays, and Fridays,
10 a.m. to 4 p.m. Tuesdays, Thursdays, and Saturdays, 10 a.m.
to 10 p.m.
Admission (including entrance to the conservatory), every day
except Monday, One Shilling. Mondays, Sixpence.

ROYAL INSTITUTE OF BRITISH
ARCHITECTS.—The Third Ordinary MEETING of the
Session will be held on MONDAY, the 5th inst., at 8 p.m., when
a Paper by Major Mant, Associate, on NATIVE BUILDINGS
AT THE GOLD COAST, will be read, followed by a Paper by
R. Phelps Spiers, Fellow, on THE WORKS OF THE LATE
MAJOR MANT, R.E., Fellow.
J. MACVICAR ANDERSON, Hon. Sec.
WILLIAM H. WHITE, Secretary.
9, Conduit-street, Hanover square, London, W.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—Society of Engineers. "Arrangement, Construction, and Machinery of Breweries," by W. Horns Kinsey. 7.30 p.m.
Royal Institute of British Architects. "Surveyor's Institution. "Land Legislation and Tenants' Improvements," by E. P. Squirey. 8 p.m.
Society of Arts. "Cantor Lecture No. 3. "Industrial Uses of the Calcium Compound," by T. Holm. 8 p.m.
TUESDAY.—Institution of Civil Engineers. "The Conservancy of Rivers; the Fen District of England," by W. H. Wheeler, M.I.C.E. 8 p.m.
Birmingham Architectural Association. "Chorini's address by H. H. McConnell. 7.30 p.m.
WEDNESDAY.—Sanitary Institute of Great Britain. First ordinary meeting. Announcement of award of prize for essay. Address by Dr. A. Carpenter. 7.45 p.m.
British Archaeological Association. "The Discovery of Ruins of Saxon Church in Gosforth Park," by Rev. Dr. Hoopell; "Excavation of Site of Carrow Abbey by Mr. J. J. Colman, M.P.," by E. Loftus Brock, F.S.A.; "Results of the late Malvern Congress," by T. Morgan, F.S.A. 8 p.m.
Society of Arts. "The American System of Heating Towns by Steam," by Capt. Douglas Galton, C.B. 8 p.m.
FRIDAY.—Architectural Association. "Harnacles," by Cole A. Adams. 7.30 p.m.

Epps's Cocoa.—Grateful and Comforting.—"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected Cocoa, Mr. Epps has provided our breakfast tables with a delicately flavoured beverage which may save us many heavy doctors' bills. It is by the judicious use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. Hundreds of subtle maladies are floating around us ready to attack wherever there is a weak point. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame."—*Civil Service Gazette.*—Made simply with boiling water or milk. Only in Tins, labelled "Epps's Cocoa," Homoeopathic Chemist, London.—Makers of Epps's Chocolate Essence for afternoon use.

Lamplough's Pyritic Saline is refreshing, most agreeable, and the preventive and curative of FEVERS, RHEUMATISM, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by chemists throughout the world, and the Maker, 113, Holborn Hill. *Use no substitute.* See Medical Testimony.

Holloway's Pills thoroughly purify the blood, completely cleanse the lungs, re-invigorate debilitated or vitiated nervous action, strengthen the muscles, and clear the brain. These excellent Pills are particularly recommended to all persons whose occupations are sedentary, or conducted in close rooms, and to the nervous, dyspeptic, and the low spirited.

Doubling Freestone and Ham Hill Stone of best quality. Prices, delivered at any part of the United Kingdom, given on application to **CHARLES TRASK,** Norton-sub-Hamdon, Ilminster, Somerset. —[Advt.]

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates. General Repairs and Alterations Executed. Experienced Workmen always in readiness, and sent to any part of the country.—[Advt.]

BATH STONE.
BOX GROUND,
THE BEST FOR ALL EXTERNAL USE.
CORSHAM DOWN
CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.
(See trade advt. on p. XXIII.)

TENDERS.

* * Correspondents would in all cases oblige by giving the address of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

ADMIRALTY SERVICE. For the supply of 5,000 gun-metal corks, for the Lords of the Admiralty:—
Dennis, T. H. P. and Co., London and Chelmsford accepted £1,232 0 0.
(Weight of metal, about 27 tons.)

WALWORTH. For the construction of a service reservoir and intake works at Cullwilt, for the Bathurst Local Board. Mr. Thomas Roberts, Assoc. M.I.C.E., Fortmoad, engineer:—

Williams, J., Cullwilt	£1,62 0 0
Williams, J., Foston	1,198 0 0
Owen, S. P., Fortmoad	1,059 0 0
Williams, G., Harleth	850 0 0
Frayne and Co., Birmingham	850 0 0
Engineer's estimate	1,421 0 0

No tender has yet been accepted.

BATH. For the construction of a pipe sewer near Gurneo Gardens, under the City Corporation. Mr. A. Mitchell, borough engineer:—
Matthews and Jennings accepted.

BRIMINGBY, S.E. For the completion of the town hall, for the vestry. Messrs. Elkington and Son, architects:—
For g-sittings and chandeliers:—
Steele and Co. (accepted) ... 185 10 6

BECKENHAM.—For villa residence at Beckenham. Mr. F. West, Coombe-road, Croydon, architect:—
Copeland, Beckenham ... £1,594 0 0
Astell, Beckenham ... 1,988 0 0
Ward, Warrington ... 1,940 0 0
Smith and Sons, Norwood ... 1,928 0 0
Miles and Harper, Croydon ... 1,877 0 0
Marriage, Croydon ... 1,760 0 0
Taylor, Croydon ... 1,650 0 0

BERWICK-ON-TWEED.—For reconstruction of the carriage-way at Railway-street, between the entrance to the North British Railway Station; also for lowering footpath, &c., at the North-road, near Summerhill-terrace, for the Urban Sanitary Authority. Mr. James Lawrie, surveyor:—

Reconstruction of Railway street, labour only.
Preston, J. D., Reston, Ayrton ... £114 11 6
Brough, J., Berwick-upon-Tweed ... 43 12 6

Lowering of footpath, &c., at North road, labour only.
Preston, J. D., Reston, Ayrton ... £120 7 6
Brough, J., Berwick-upon-Tweed ... 47 6 0

BETHNAL GREEN.—For rebuilding No. 8, Bawn-street, Bethnal Green, for Mr. W. Witherden. Mr. W. D. Church, architect. Quantities supplied by Messrs. Nixon and Raven:—

Wire	£1,164 10 0
Taylor, J.	1,365 0 0
Tyerman	1,362 0 0
Godden	1,353 0 0
Steel	1,280 0 0
Shurmer	1,278 0 0
Sabey and Son	1,200 0 0

BROMLEY, KENT.—For erection of farm buildings, &c., Crofton Court, Bromley, for Mr. H. Norman:—
Taylor and Son (accepted).

BURRISLAND, SCOTLAND.—For additions to the engine-house at the harbour, being contract No. 2. Mr. Robert Henderson, harbour engineer:—
Aitkin, Merchiston (accepted) ... £142 0 0

CAMDEN TOWN, LONDON, N.W.—For fittings to the London and South Western Bank, Camden Town. Messrs. Edmeston, architects:—

Laacelles	£458 0 0
Jackson and Graham	456 0 0
Lucas	417 0 0
McLachlan and Sons	410 0 0
Dowsett	389 0 0

CANDIFF.—For enlargement of South Church street School, Candiff. Mr. H. C. Harris, St. Mary-street Candiff, architect:—

Burton, C., Bath	£238 0 0
Purcell and Fry, Bath	212 0 0
Jones Brothers, Park street	210 0 0
Bird, C., Canton	199 18 0
Davies, Cousins, Catwys (accepted)	198 0 0
Jones, J., Brook-street	190 0 0

CARNARVON.—For a proposed new villa, near Carnarvon, for the Rev. J. E. Jones. Mr. J. P. Mumford, architect:—
Edwards and Owen, Caerthraw (accepted) £185.

CROWBOROUGH.—For restoration and enlargement of All Saints' Church, Crowborough, Sussex. Messrs. Whitfield and Thomas, architects. Quantities by Messrs. Evans and Deacon:—

Card and Son	£3,492 0 0
Rowles	3,226 0 0
Vaughan	3,179 0 0
Parmer and Son	3,130 0 0
Cheseman	3,128 0 0
Hughes	2,990 0 0
Ringham	2,797 0 0
Morris	2,759 0 0
Paine, J.	2,650 0 0

CROWBOROUGH, SUSSEX.—For additions to the Hermitage, for Mrs. J. H. Barclay, Crowborough. Mr. Edwin T. Hall, A.R.I.B.A., 57, Moorgate-street, E.C., architect:—
Pannett and Sons, Tunbridge (accepted) £850.

DEBENSHIRE.—For the erection of a policeman's house and strong rooms at Llandudno-y-Mochant, for the county magistrates of Denbighshire:—
Huskey, C., Wrexham (accepted) £415 0 0

DEXTON, LANC.—For construction of a single gas-holder, 80 ft. by 21 ft., and a double gas-holder 80 ft. by 21 ft., for the Denton and Houghton Joint Gas Committee, Denton. Messrs. Vevers and Wharm, engineers:—

Newton, Chambers & Co., Leeds	£5,870 0 0
Blind and Sons, Bury, Lancashire	5,639 0 0
Willey and Co., Exeter	5,535 0 0
Horton, J. and T. Smithwick	5,475 0 0
Horsely Co., Tip on	5,400 0 0
Howard, D., West Bromwich	5,300 0 0
Westwood and Wright, Dudley	5,284 0 0
Tyldesley, J., Willenhall	5,000 0 0
Crayton and Co., Leeds	4,800 0 0
Pater and Co., Lincoln	4,575 0 0
Ashmore & White, Stockton-on-Tees	4,310 0 0

ENFIELD.—For the erection of a residence at the Ridgways, Enfield, for Mr. J. Eales. Mr. W. D. Church, 12, South-place, Finsbury, architect:—
Fairhead (accepted) ... £1,680 0 0

ENFIELD.—For the erection of a pair of semi-detached residences, at the Ridgways, Enfield, for the Rev. H. S. Toms and Mr. J. Garner. Mr. W. D. Church, 12, South-place, Finsbury, E.C., architect:—
Fairhead (accepted) ... £2,560

EVERSELY.—For alterations and additions, including new conservatory, &c., to Kite Croft, Eversley, for Mrs. C. A. Tubit. Messrs. Lovejoy and Watford and Crowthorne, architects:—
Harnsworth (accepted).

FINSBURY PARK.—For new roof and general alterations to the Cottage, for Mr. T. H. Finchampstead. Messrs. Lovejoy and Watford and Crowthorne, architects:—
Accepted tenders.

Bricklayer's and slater's work:—Harnsworth.
Carpenter's and joiner's work:—Bun.h.

FINSBURY PARK.—For alterations and additions at 3 and 4, Stroud Green-road, Finsbury Park, N., for Mr. Earle. Mr. W. Smith, architect:—
Shurmer ... £495 0 0
Dunford and Langham ... 484 0 0
Cole and Chart ... 425 0 0
S. Evans Bros. ... 415 0 0
Harper, J. ... 414 0 0
Steel Bros. ... 407 0 0
Mattock Bros. ... 33 0 0

GOSSPORT.—For the erection of boundary-walls and gates to villa, Bury Cross, for Mr. J. D. Hill. Mr. R. Peters, Wool Exchange, Colman-street E.C., architect:—
Butt, J., Gosport (accepted) ... £63 0 0

GREAT MALVERN.—For brick and timber work on the sewage farm, for the local board:—
Broad (accepted) ... £21 10 0

GREAT YARMOUTH.—For additions to shop, Market-place, Great Yarmouth, for Mr. G. P. Palmer. Mr. J. W. Cockrill, Glencoe House, Gorleston, architect:—
Isaacs, Great Yarmouth ... £1,153 0 0
Beech and Cork, Great Yarmouth ... 1,028 0 0
Norfor, Southtown ... 919 0 0
Cooper, Great Yarmouth ... 900 0 0
Davy, Great Yarmouth ... 890 0 0
Springall, Great Yarmouth ... 870 0 0
Howes, T., Great Yarmouth ... 866 0 0
Want, Great Yarmouth ... 849 0 0
Bray, J. T. W., Great Yarmouth* ... 780 0 0

GREENWICH, LONDON, S.E.—For warming St. Mary's Church, Greenwich, by hot-water apparatus:—
Edmonds, J. and Co., Lillie Bridge (accepted).

HALIFAX.—For the various works required in repairing and altering the Congregational Chapel in Harrison-road, Halifax. Drawings and quantities prepared by Mr. T. H. Farrar, Halifax, architect:—

Accepted tenders.
Joiners:—
Charnock, J. and Sons, Halifax ... £922 4 0
Plumbers:—
Naylor, J., Halifax ... 135 0 0
Painter:—
Binas, J., Halifax ... 1-8 10 0
Mason:—
Jenkinson, H., Halifax ... 72 0 0
Plasterers:—
Baneroff, J. and Son, Halifax ... 69 0 0

HECKMUNDWAKE.—For levelling, flagging, paving, sewerage, arching, and channelling, of Union-street, Heckmondwike. Mr. T. Gledhill, surveyor:—

Hirst, W. H., Ravensthorp	£160 0 0
Hirst, G., Dewsbury Moor	177 13 0
Oldroyd, W., Heckmondwike*	177 10 0
Surveyor's estimate	176 0 0

HORNSEY.—For finishing five houses at Middle-lane, Hornsey, N., for Mr. Elder. Mr. J. Farrer, architect:—

King	£947 0 0
Farnborough	802 0 0
Harper	790 0 0

IPSWICH.—For removal of buildings on site of Shire-hall yard proposed school, for the Ipswich School Board:—
Grimwood (accepted) ... £71 0 0

IPSWICH.—For erection of building as stay manufactory, Ipswich. Mr. E. Catchpole, architect. Quantities not supplied:—

Jones, Gloucester	£7,850 0 0
Cox, Ipswich	7,148 10 0
Beunett, J. and F., Ipswich	7,125 0 0
Girling, Ipswich	6,908 0 0
Catchpole, Ipswich	6,780 0 0
Gibson, Ipswich	6,750 0 0

ISLEWORTH, MIDDLESEX.—For (Contract No. 2) Gordon House Estate, Isleworth, about 3,850 ft. lineal of road making, 36 ft. wide, with kerbed paths and pipe drains; about 1.6 ft. lineal of widening road, with one path; a brick bridge, 30 ft. span, across tidal water course, for the United Land Company:—

Nowell and Robson	£5,338 0 0
Pizzey, J.	5,255 0 0
Killingback, C.	4,899 0 0
Cooke and Co.	4,754 0 0
Bull, J.	4,613 0 0
Wils and Stodart	4,570 0 0
Beadle Bros.	4,550 0 0
Wilkes and Co. (too late)	4,533 6 1
Huntley, D.	4,410 0 0
Neave and Son	3,945 0 0
Edton, G.	3,647 0 0
Acock, G.	3,557 0 0
Tomes and Wimpsey	3,557 0 0
Ford and Everett (accepted)	3,333 0 0
Atkin, S. (for road only)	2,730 0 0

ISLE OF THANET.—For the erection of three cottages and garden walls at Newington, St. Lawrence, for Mr. W. Spain. Mr. E. L. Egar, architect. Quantities supplied:—

Duckett, T.	£774 5 0
Hobbs, T. S.	731 10 1
Bugden, P.	535 10 0
Egar, T.	532 0 0
Cowell, B. J.	530 0 0
Newby Bros.	514 0 3
Bowman, H.	446 0 0
Cullen, E. (too late)	480 0 0
Port, W. H.	470 0 0
Horne, C. (accepted)	435 0 0
Redman, S. B.	430 0 0

LEAMINGTON.—For a new cottage at Llanrug, for Mr. J. Morris, Cwm-y-Glo. Mr. J. P. Mumford, Carnarvon, architect:—

Edwards and Owens	£135 0 0
Gilliths, J.	135 0 0
Williams, G. (accepted)	130 0 0
Price, P.	130 0 0
Williams, J.	115 0 0

THE BUILDING NEWS.

LONDON, FRIDAY, DECEMBER 9, 1881.

THE SUBJECT AND NEIGHBOUR
LANDS OF VENICE.*

DR. EDWARD A. FREEMAN has produced a book in which ably-written descriptive essays are rendered of still greater value by illustrations from the pencil of an artist and antiquary. The essays are the results of three journeys. The first was made in 1875, took in Dalmatia and Istria, with Trieste and Aquileia. This journey was made about the time the revolt of Herzegovina had commenced. Another journey to Dalmatia was made by Dr. Freeman in 1877, and in the present year, 1881, the author paid a third visit to Dalmatia and some parts of Istria and Albania, as also a large part of Italy. The illustrations have been made chiefly from Dr. Freeman's own sketches and partly from photographs, and consist of freely-drawn outlines slightly shaded.

Lombard Austria is first described. We have papers on Treviso, Gorizia, Udine, and Cividale, Aquileia and Trieste. We cannot spare the space necessary to do justice to the author's graphic descriptions of these South Slavonic lands. Writing on Trieste, "a rival of Venice which has in a low practical view of things outstripped her," Dr. Freeman speaks of the cathedral church of St. Justus, and "It is hard to conceive a building more uninviting without," he says. But the *duomo* of Trieste is not to be judged by the outside. "A broad and almost shapeless west front is flanked by a low heavy tower, not standing detached as a campanile, as it should stand in Italy, not worked into the church as it would be worked in England or Germany; but standing forward in a kind of Scotch fashion, like Dunkeld." The walls are embedded with fragments of pilasters and fluted Corinthian columns, entablatures, trophies, &c., the remains of the temple of Jupiter which has given way to the church of St. Justus. But the interior of this church is most remarkable. Dr. Freeman says, of his experience, "The first feeling is simply puzzlement. A nave of vast width seems to be flanked by two ranges of columns on either side; columns varying even more than is usual in their height, and in the width of the arches which they support. When we look within the two lateral ranges we are not surprised to find each ending in an apse with a noble mosaic; we are surprised to find the southern range interrupted by a cupola. The church is, in fact, two churches thrown into one. When they were distinct, they must have stood even nearer than the old and new minsters at Winchester." The north church was a basilica, with marble columns and capitals of Corinthian, though of different varieties; they all carry the Ravenna stilt in a rude form. This church is attributed to the time of Theodosius, though without direct evidence. The southern church is smaller, and has a Byzantine cross plan with a central cupola.

"From Trieste to Spalato," is the title of another very interesting chapter. The author describes his sail along the coast of Dalmatia, its thoroughly fresh and unhackneyed character, and he dips into the history of the country, which has been of a very fitful kind. The harbours of Trieste and Pola are visited *en route*. Zara, with its *duomo* and smaller

churches and narrow streets, is graphically depicted, and the author halts at Sebenico, a Dalmatian hill-side city on the coast. Here the streets are rich with architectural features—the piazza, the loggia, the cathedral with its mixed, but stately architecture, and its waggon roof of stone without buttress or external roof. Dr. Freeman agrees with Mr. Neale that the cathedral is a most remarkable and effective building. The proportions internally are noble; the height is great, and the "columns, though their arches are pointed, might have stood in any basilica at Rome or Ravenna." The details are a strange mixture of Late Gothic and Renaissance, rich with bits in both styles, side by side. Dr. Freeman justly insists upon the value of seeing a place twice if possible. The process of recollection fixes it on the mind. The great Justinian Basilica at Parenzo is touched upon, and Pola, another halting-place on the Istrian coast, forms an interesting chapter. The huge amphitheatre and the Porta Gemina, a sketch of which is given with its two wide arches and columnar front of the Corinthian order, bespeak the city as once a colony of Rome. One peculiar feature is here pointed out, namely, that the columns support an entablature without the architrave. The arch mouldings answered the purpose. Other peculiarities are mentioned in the amphitheatre, such as its situation on the slope of a hill, which slope supplied a natural basement for the seats on one side, though it did away with the lower arcade on this side. The Roman antiquities of Pola are its chief attraction save, perhaps, the *duomo*.

The paper on Zara, famous for its connection in the history of the Fourth Crusade, contains many allusions to the churches. The church of St. Anastasia, rebuilt in the 13th century, is a witness, says the author, "to the way in which the Roman styles long stood its ground, though here and there is a touch of the coming pseudo-Gothic, and what is far more interesting to note, here and there is a touch of the Romanesque forms of the lands beyond the Alps." The basilica has been much transformed. The choir is remarked for its rich Cinque-cento stalls, not unlike those of Wimborne, and essentially Northern. The crypt is very interesting as showing columns with only the bases finished and of Byzantine character, and the variety of columns in the main arcades, some being single, others clustered and twisted, and with Corinthian capitals, is spoken of by Dr. Freeman as peculiar. An exquisite Romanesque church as late as 1407 is mentioned, having three apses after the best models; and we are treated to a sketch of a tower of St. Mary's, a church of nuns, Renaissance in style. The tower is referred to as the only finished one in Zara; it is of Italian type, with midwall shafts.

St. Donatus is another remarkable building described; it is a round church now disused. Dr. Freeman believes it was built with materials contributed from the spoils of a pagan building, the so-called House of Juno. It has two arched stages of great height; the columns have Composite capitals and there is a triapsidal end. It forms one of the noblest round churches to be found, says the author, and the "so-called House of Juno is almost a rival of the so-called house of Jupiter at Spalato." Two interesting sketches are furnished one, of St. Vitus, Zara, an example of real Byzantine, with a circular tower at the crossing pierced with openings. The ground-plan is square, the four arms being square-ended without, and quasi-apsidal within. This building has been ruthlessly swept away to make a smart shop-front!

The paper on "Spalato" is well worth reading. Spalato is the centre of all historical and architectural associations on this coast; its Venetian walls and buildings contribute to make it so, no less than the city was the home of Diocletian of Rome. Like

her great mistress, Spalato marks an era. Dr. Freeman sketches its earlier history with the pen of the historian well versed in antiquarian lore. Describing the palace of Diocletian, the author says: "It was not in the city, it was not close under its walls, that Diocletian fixed his home.... Not on any hill-top, but on a level spot by the coast, with the sea in front, with a background of more distant mountains, and with one peaked hill rising between the two seas like a watch-tower,—did Diocletian build the house to which he withdrew when he deemed that his work of empire was over. And in building that house he won for himself, or for the nameless genius whom he set to work, a place in the history of art worthy to rank alongside of Iktinos of Athens, and Athenios of Byzantium, of William of Durham, and of Hugh of Lincoln." We could here, if space allowed, go on quoting the picture drawn by the author of this dwelling-place. The great bell-tower, which rises over the work, is feelingly sketched, with its shafted angles and stages, and the octagon termination. "Spalato Revisited" forms the title of another chapter, in which the author corrects a few points in etymology, and acknowledges that the name Spalato has nothing to do with *Palatium*. The *r* in the popular way of writing Spalatro is an intrusion, and is unknown to the country.

We have not space to follow the author into the accounts given of Salona, Traù, Curzola, Ragusa, and other places. St. John the Baptist, Traù, is an interesting building, of Romanesque design, according to the view. The cathedral is of the most finished kind of Italian Romanesque, but the tower is Venetian Gothic.

The architecture of Ragusa forms a separate chapter; the municipal and domestic buildings have never been described or illustrated in England, though the city claims a place in the history of architecture as the author shows. The tower of the Franciscan church sketched is a very fine specimen of Italian Gothic. The tower, as usual, rises to a considerable height, is marked by four stages, and is crowned by a small octagon cupola. Mr. Freeman says it shows how long the general type of the earliest Romanesque campaniles went on. The lower part has the appearance of 11th-century work: "Three ranges of windows with mid-wall shafts rise over one another, only they are grouped under containing-arches, in what in England we should call a Norman fashion." It is not thought earlier than the 13th century. The Venetian Gothic arcade of the palace is an interesting example of the style, and a sketch of it is introduced. We are certainly disposed to think, with the author, that the Ragusan front will better stand the test of minute study than St. Mark's. All the examples of this city point, says Dr. Freeman, to "the existence of a Ragusan style, to an unbroken Romanesque tradition, which could not wholly withstand the inroads of the pseudo-Gothic of Italy, but which could keep its place alongside of the intruder." Renaissance features are seen, but they never supplanted the earlier style—the round-headed traceried window and round-arched arcades always remained, and never gave way to Gothic.

"Venice in the Footsteps of the Normans" is the heading of the concluding chapter. Trani, Otranto, Corfu, and Antivari are sketched, and their Norman characteristics pointed out. The sketch of the arcade and triforium of Trani cathedral, with its triplets of round arches, is an instructive instance of the different way in which Norman influenced the architects; or, at least, the way the Saracen introduced Romanesque forms. The coupling of two columns under a single abacus in the arcade is certainly, as thought

* Sketches from the Subject and Neighbour Lands of Venice. By EDWARD A. FREEMAN, D.C.L., LL.D., &c. London: Macmillan and Co.

by the author, one of the features found in Saracenic work. The sketches given in this section are highly interesting examples of the Byzantine and Romanesque styles, and these chapters will be read with an increased interest from the remembrance of some of the political changes which several of the places mentioned have witnessed of late years. Dr. Freeman's volume, which is a companion volume to the author's "Historical and Architectural Sketches," is more than a guide-book: it is a collection of historical essays, heightened by illustrations of remains in lands and cities which will always have a permanent interest for English readers.

THE INTERNATIONAL EXHIBITION OF SMOKE - PREVENTING AP- PLIANCES.

[SECOND NOTICE.]

RESUMING our notes of the heating and smoke-preventing appliances at South Kensington, we now refer to a few gas-heating and other stoves of some merit. The gas-heating stove of Dr. Adams, exhibited by William Harvie and Co., of Glasgow, is constructed on a cellular principle. It consists of four concentric casings, two outside and two inside, and between these is an annular flue, made tortuous, by which the burnt products escape by an upper outlet. There are two air-inlets. The air which escapes warmed can be moistened, if required, by a rim of water at the top; but it is not burnt or over-heated by direct contact with the gas-chamber. A third combustion-inlet is so arranged that the air is warmed before combining with the gas, thus giving increased heat. The action of the stove can be controlled, and the heating-chambers are made of various sizes to burn the required amount of gas. We are informed this stove has been used in invalids' rooms and conservatories without injurious results.

Ewart and Son's "New Crown" boiler for the ordinary gas-flame, and the baths attached, are economical fittings; George's patent gas "Calorigen," shown by J. F. Farwig and Co., Queen-street, appears to be a great improvement on the ordinary gas-stove. The cold air from the outside of building passes through a pipe within the cylinder of the stove, and its upper part is coiled; the cylinder is attached to two pipes, which are connected to another cylinder of smaller size outside the building. The products of combustion are carried away by the upper of these two pipes, and the cold air coming down the outside cylinder supplies the air necessary for combustion. By this arrangement the coil becomes heated, and the air passing through it is warmed, and passes out at the upper end of stove into the apartment, while the gas products are carried away. The stoves can be used in bedrooms, and burn either coal-gas or coal, and it ventilates as well as warms. The "Slow-Combustion Calorigen" is another good modification, with a fire-chamber air-chamber at the back, and air-space all round the fuel-box. It burns coke or anthracite.

Dr. Francis T. Bond, Medical Officer of Health for Gloucestershire, is the inventor of the "Euthermic Ventilating Gas Stove." The stove is simple, and consists of a cylinder of convoluted sheet-iron, within which is an inverted cone of metal. The apex at bottom is connected with an air-tube for fresh air, while the gas-chamber surrounds the cone, and the heated products are made to descend a series of outside tubes of pillar-like form, and escape by a flue-pipe. We have examined the operation of this stove, and believe it to be one of the best in the market. It is made in a cheaper and smaller form, and, for sanitary reasons, we

have pleasure in bearing our testimony to the economy of its construction, and the large heating surface obtained. "The Euthermic Gas-Burner" is a capital appliance for cooking. It burns a mixture of gas and air, which can be reduced as required, and has the appearance of an argand. Dr. Bond's ventilating gas bracket is an appliance for rendering gas-burners innocuous. A hollow cone, open at both ends, fixed to a horizontal arm, or inlet-tube, communicating with the outer air is placed over the bracket. When the gas is lighted the heated air ascends through the cone, and induces a current of cold air through the tube, which mingles with the heated products of combustion and reduces their temperature, while, at the same time, the room is supplied with a current of fresh warmed air, making up for the loss of air consumed. We believe this very simple and adjustable appliance will remove effectually the evils attending gas-burners, and, for bedrooms, it appears to be indispensable to healthy respiration, as it insures a constant supply of fresh air. The London agents of these appliances is the Wilson Engineering Co., Holborn.

Dr. Siemens' gas and coke fire, manufactured by Waddell and Main, Glasgow, is a combination of gas and coke for grates for preventing smoke. The principle is in admitting a hot blast to the underside of the fuel. The cold air passes into a chamber under the fuel, and issues at the bottom of the front bar, impinging on a line of gas-jets. Deane and Co., of London-bridge, have a register grate for burning anthracite in the ordinary open fire. The smoke from bituminous coal is consumed by its being made to pass over the fire. There are side flues, which communicate with the bottom of stove, and the products are conveyed down these, directly below the fire. F. Hammond, of Chandos-street, shows a new smokeless fire in an open grate, on Dr. Siemens's principle. The peculiarity of the appliance consists in a copper back, and a wrought-iron dead-plate, the gas-jets being arranged along the bottom in front. It can be fixed on an ordinary grate. Michel Perret, whose "Radiating Fireplace" we glanced at last week, has also an "Immersed Grate," in which the bars are very close together, so that no fuel can fall through. The bars are immersed in a water-pan underneath, and the air passes between the water surface and the hot bars. There is a firebrick baffle or cover close to the fire at the top, which throws the unconsumed fuel down. Another noticeable plan of reducing the quantity of fuel, and of burning bituminous coals without much smoke, is shown by W. A. Martin and Co., of Blackfriars-road. The grate has movable sides, which can be shifted inwards, and so reduce the fire; the coals are put on only at the sides by projecting one of the movable hobs into the fire, and then withdrawing it, the space left being filled with fresh coal. The top of the fire is left undisturbed by this arrangement of stoking, and the fresh fuel does not emit much smoke. The "Ironbridge Controlled Combustion" grates shown by the Coalbrook Dale Co., in connection with their "Kyrle Fire," minimise smoke by an arrangement of firebrick flues and inlets, by which the products of combustion are ignited before escaping. The other excellent exhibits of this firm were noticed in our last issue.

Rosser and Russell, besides exhibiting the "Reversible Grate" we mentioned last week, are the manufacturers of several warming and ventilating apparatuses. We refer, among others, to the "Improved Low-Temperature Air Warmer," to prevent the over-heating of the air common to hot-air stoves. By this apparatus a large body of air is warmed to a moderate temperature. The apparatus is square on plan, slightly inclined at the top, with a pyramidal ribbed top. Similar ribs also surround the case, and are intended

to increase the heating surface. The stove is set in brickwork, cold-air being admitted below. The smoke is made to descend between the inner and outer cases, and gradually to give up all its heat before being allowed to escape, and the exposed surfaces are said to be over 400ft. R. W. Crossthwaite, Queen Victoria-street, have on view "Armstead's stove," a slow-combustion arrangement with double the heating power of ordinary stoves. The heat rising, instead of going directly into the chimney in a hot state and being wasted, passes round a flue at the top of stove, which has a radiating surface equal to that of the body of stove itself. Any kind of fuel may be burnt. The "Clibanus" cylinders for coppers is to effect a similar retention and saving of heat, the heat and smoke being made to travel twice round the copper before it is discharged.

Among other heating appliances we may note the "ventilating fireplace," made by Yates, Haywood and Co., Upper Thames-street, in a variety of shapes, as designed by Captain Galton, which is well known to our readers; the "Kensington" smoke-consuming grate, made by Steel and Garland, by which the gases and smoke are conducted through the fuel into a bottom chamber, where they mix with air from without, and are partially consumed, besides giving out heat to the room; Brown and Green's "Smoke-Consuming Kitchener," by which the fuel is pushed in at the bottom of grate, the "Luton," and other smoke-consuming appliances. J. McMillan's patent "under-grate coaling apparatus" for kitchen grates, to be seen in action; Strode and Co.'s sanitary stove, which "lights, heats, and ventilates," an apparatus of a tall cylindrical shape, &c.

In the east lobby, F. Lönholdt, architect, Frankfort-on-Main, shows some well-constructed anthracite stoves, adapted for warming and ventilating rooms and halls, and the same inventor has a large model of an apparatus showing a system of ventilation which will repay attention. J. Baker, Euston-square, is exhibitor of a registered stove for prevention of smoke, and J. Beardmore, architect, Stoke-upon-Trent, has a design for an open coal firegrate with pipes for warming bedrooms. Another grate (a Boyd and Son) has the heating surface increased by the iron body being made of zig-zag form, and the fire projecting. Cold air is admitted below. J. Deard's "Champion" boiler is constructed on the coil principle, and has a large heating surface.

J. E. Ellison, of Leeds, is the exhibitor of the "Radiator" ventilating valve, by which air can be admitted through any wall without draught. It is a square flat disc or front, made movable, with four cross-shaped compartments, into which the air enters, and is admitted in gently spreading currents in four directions. The Radiator can be easily fixed, and is capable of being adjusted by pulling out or closing the front disc. Ewart and Son have on view, in the eastern arcade, a ventilator for the cure of smoky chimneys, called the "Empress," by which a strong up-current is maintained. Some of these have an Archimedean screw. We must also mention C. R. Stevens's steam and hot-air heater as a simple appliance easily fitted for warming rooms, and the same firm's patent circulating hot-water apparatus is an inexpensive method of supplying hot-water to any part of the house. Herbert Lea, builder, Warwick-street, W., is another inventor of a "smokeless" grate, called the "Sunderland," the action of which is very simple.

In section D there will be found much to interest and instruct the engineer and scientific visitor. This section of the exhibition is devoted chiefly to gas-engines, boiler-furnaces, and to a variety of inventions for the

purpose of economising fuel, and abating smoke for steam-engines. There are a number of mechanical stokers, more or less ingenious, but chiefly modifications of well-known contrivances, such as Juke's. The difficulty has chiefly been to regulate the supply of air necessary for perfect combustion, and to dispose the fuel on the bars in such a manner that the volatile products may be brought in contact with hot air. G. Sinclair, of Leith, in his "self-acting stoker," claims to have succeeded in thoroughly consuming the gases before leaving the furnace, all the air passing through the grate-bars. The firegrate moves backwards and forwards, and there is a feeding hopper in front. The stoker is well adapted for the purpose, and simple in construction. W. A. Martin and Co., of Blackfriars-road, show their patent smoke-preventing doors and furnace grates; the former are balanced and remain in any position, and the merit of the invention is that they allow the air to enter at a low point, and mix with the volatile products, thus saving smoke, and helping combustion. We can also speak in praise of Chubb and Co's. (New Bridge-street, Blackfriars) very simple and economical smoke-consumer and fuel-saving apparatus, which consists of a bridge readily applied to any boiler, and a small front-damper to regulate the air. The object is to secure a proper admixture of atmospheric air and oxygen with the carbon of fuel in a state sufficiently heated to insure complete combustion. The oxygen is admitted under deep fire-bars, and becoming heated, combines with the carbon and becomes flame at the bridge. In its application to bituminous coal, the bridge is undoubtedly a means of a considerable saving in fuel. We must also mention briefly Jucke's patent smoke-consuming apparatus, and Smith's mechanical stoker, shown by G. Waller and Co., Southwark; Hunter and Co.'s smoke-consumer; Michel Perret's "multiple stage furnace," a clever contrivance for burning small dusty fuel, consisting of a number of arched fire-clay stages, round which the heated air passes, well adapted for heating buildings, hothouses; McMillan's fuel-feeding apparatus; J. Moore's appliances for Cornish boilers, consisting of a series of firebrick diaphragms; Livet's improvements; Newton's mechanical stoker; Hall's furnace-grate bars, which revolve; George Green's patent water hearth for boilers; and other means for preventing clinkering and regulating combustion in boiler furnaces. The improved fuel economiser for steam-boilers and the spiral scraper shown by Duncan Bros. is worth the notice of engineers; also the "fossil meal" isolating tubes, which are filled with silicious earth, and the fossil meal composition (A. Haacke and Co., Lime-street) are valuable appliances for covering boilers, pipes, cisterns, and tanks. A covering an inch thick of the composition renders a boiler in action simply warm to the hands, and the saving in preventing radiation and loss of heat is sufficient to recommend it to the notice of all engineers and architects. We must also mention the tubular boilers and admirable coil fire-grates of R. Renton Gibbs, and Henderson's fire-door, as exhibits of interest. There are other special features of interest in the exhibition, upon which, if space permitted, we might dwell; but we have described enough to show the number and variety of the contrivances which have been brought together to assist the committee and the public in the solution of the important question of smoke abatement. With regard to domestic firegrates and stoves, the object has been sought to be attained, as we have seen, by a variety of ingenious expedients, which may be roughly summarised into attempts to supply the fresh fuel either below, at the back, or at the sides of the grate, so as to insure more complete

combustion of the products; grates in which the fuel is ignited in the ordinary way, but which have means of drawing the smoke through the fire, or of distilling the gases near or at the mouth of the fire-chamber; grates in which baffles are used; and lastly, grates for burning anthracite or other smokeless fuel. Many of them are ingenious contrivances, and some effect the object to a degree which must be assuring to the public. Few of these grates or stoves can, or profess to, get rid of smoke entirely—this is almost impossible; but many of those we have seen effect a saving of fuel of at least 50 per cent. if not more, and so nearly attain the object of perfect combustion as to save at least a considerable amount of smoke. It should not be forgotten that simplicity of construction and management lies at the very root of success. No law can compel the ordinary householder to use a complicated apparatus which requires attention, and we hope the official examiners of the merits of this competition of skill, will not disregard the very important bearing of this point on the solution of the problem the committee have undertaken in the interests of the public.

SOME NOTES ON FLOORING-BOARDS.

IN the "good old times," and before the general introduction of steam-power planing machines, there did not exist any more exhausting labour than that which was then commonly known as "thrashing" or "flogging" flooring-boards. The work had, of course, to be done entirely by hand-labour, and it was usually undertaken by gangs of men who were neither remarkable for sobriety nor for any other of the qualities supposed to be possessed by good workmen. The words "thrashing" and "flogging" had relation to the severity of the labour, and the work was always avoided by good workmen, as being of a character somewhat lessening to their dignity. At the time of which we are writing, old contractors of the present day will be able to bear evidence to the importance which was attached in their younger days to the getting out of hand the work of preparing the flooring-boards required in a newly commenced contract. In the matter of preparing flooring-boards times have happily changed much since then, and whilst some quarter of a century ago square-jointed or square-edged flooring-boards were, for economical reasons, generally employed, to the exclusion of tongued-and-grooved boards, there need not now exist any difficulty of selection on the score of their relative cost.

There is a fashion in the style of the joints of flooring-boards which is peculiar to counties; Lancashire, for instance, employing generally square-edged, and Yorkshire tongued-and-grooved boards. It is quite certain, however, that the use of square-edged boards is fast dying out, and another decade will probably find the practice an obsolete one. There is practically no reason for its retention now that the cost of the two forms of manufacture have become so exactly, or nearly, equalised by the introduction of the steam-power planing machines.

It may be the case that in making the joint rather more wood is wasted upon tongues and grooves than upon the square edges, but the loss experienced in the former kind of manufacture is, after all, insignificant. It may possibly be, as a general thing, there is wasted, say, 1-16th of an inch, or in effect one per cent. of the cost of the prepared boards. The extra labour necessitated in the laying down of tongued-and-grooved boards over that required for the square-edged may be reckoned at about 10 or 15 per cent. of the labour charge, and for this additional outlay there is a secured a dust- and water-proof

floor, a condition which square-edged boards do not supply.

It is a more important consideration as a point of economy, when we come to consider the width of flooring-boards. For high-class work narrow boards will always be employed, solely on account of the security they afford of a close-fitting joint. But the bulk of the building work of the country is not high-class. On the contrary, economy, as a rule, is a most important consideration. Narrow flooring-boards are not economical to use. It is frequently the case that flooring-boards five inches wide can be purchased at a reduction of 15 per cent. off the price of boards seven inches wide; but the saving is entirely lost by reason of the increased number of joints in narrow boards, the extra cost of laying them, and the additional weight of nails required for the purpose. Taking all things into consideration, it is highly probable that a floor constructed of seven-inch boards costs, on the whole, about 10 per cent. less than one made of boards five inches wide. Inasmuch as flooring-boards seven inches wide will not, if properly seasoned, shrink after they are laid more than from 1-32nd to 1-16th of an inch, they do very well for ordinary house-building, and on the score of economy they are to be recommended.

Passing over parquetry-oak or other descriptions of fancy flooring, which are not within the limits set out for discussion in this paper, we have before us for consideration three kinds of wood ordinarily employed for flooring purposes—viz., redwood, whitewood, and pitch-pine. For public work and for all floors exposed to much wear and tear, and intended to be left unprotected by carpet or other covering, pitch-pine is, by reason of its hardness and toughness, a highly suitable wood. When, however, it is used it should at all times be laid down in narrow widths. Pitch-pine boards should never at any time exceed five inches wide; and they may be used three or four inches wide with advantage. Of course, a floor constructed of such narrow boards becomes expensive, but it is useless putting in pitch-pine in other than narrow widths on account of the wood being of a nature so difficult to season. We are not advocates for redwood boards of common quality; we are of opinion that where economy is to be studied it is better to employ Russian or Swedish whitewood rather than common redwood, which is not only at all times sappy in nature, but the knots of which are usually more or less decayed. Good redwood flooring takes position as a useful substitute for pitch-pine boards when the cost of the latter kind is considered to be too high. For instance, they are useful for the floors of shops and other business premises where a covering of carpet is not used. For ordinary house building, whitewood boards do excellently well. Our preference is for the Riga Crown whitewood. These boards come forward in long lengths, and there is both economy and advantage in the employment of flooring-boards in long lengths. In addition to this they are somewhat freer from knots than most of the Swedish boards, and when washed they present a very clean appearance. The boards also come forward in useful widths. For Norwegian manufactured flooring-boards we have no great liking. To begin with, the wood is not "well grown," and therefore it is not of a lasting nature. In addition to that drawback it not unfrequently occurs that Norwegian planed boards require to be "eased" at the tongues before they can be laid. The lengths, too, are often of short average, and when this is so it is a serious disadvantage. It may here be reiterated that economy in flooring-boards is to be greatly consulted by using only long lengths and broad widths.

The process of seasoning flooring-boards is an important one and requires attention.

The practice, fast becoming general, of piling the boards to season in triangular form is much to be condemned. Boards piled in this manner give little opportunity for the moisture to drip away, and when the lengths are long it frequently happens that they warp and then the difficulty of connecting the joints is a serious one. The only proper way of seasoning flooring-boards is by rearing them on an end, in which position in an exposed situation they will in ordinary weather season perfectly in two or three months, and even in less time. When boards—stacked on end—are intended to be kept in stock for a length of time, it is a good plan to rear them in pairs—i.e., two boards together, taking care that the face sides are placed together. In this manner the boards season well, and there is this additional advantage—that the face sides keep perfectly clean for any reasonable period. H. S.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE third ordinary meeting for the present session was held on Monday evening, Professor T. Hayter Lewis, V.P., in the chair.

NATIVE BUILDING ON THE GOLD COAST.

Major BALE read a paper upon this subject, in which he gave his experiences on the West Coast of Africa from 1866 to the present time. Both on the coast line and far into the interior, the natives used the materials close at hand for their constructions, and there was a general agreement in their appearance. Near Cape Coast Castle, where drinking water was not to be obtained except by saving the rainfall, the dwellings all had flat roofs, but at Elmina the houses were thatched with palm leaves or branches of long grass. In the interior of the country the "crooms"—ornative villages were generally placed near a stream. Where thatch was preferred, and yet it was necessary to save the rain-water, the natives provided a gutter round the outside walls of a house. These gutters were of fine clay, laid to a sufficient fall and well puddled; the material became hard in the sun and was rubbed by hand till it was polished and smooth in the channel surface, when, with slight repairs, it would last through the rain of a season. The natural mud or clay was used for walls, with poles cut from the forest for floor and ceiling joists, which were used without any form of wall plate. Over the joists brushwood was laid which was covered with mud rendered smooth by rubbing. This formed either the floor of an upper story or a roof, for often the bamboo rain-water shoots were put through this upper surface, and the wall at the corners and the lower room formed the house, until the occupant found it desirable to raise another story in the same way. At Cape Coast, the soil, which was a ferruginous clay, was dug out for building purposes, picked free from large stones by hand and kneaded with water into puddle called "awish," which was made up on the ground by female labour into balls of about 14lb. weight. The actual builders were men who received from the women the swish-balls, and placed them with a jerk on the wall, rudely squaring the mass with their fingers. No scaffolding was used other than a timber ladder. The sun soon dried the wall hard, and all cracks were puttied up with swish. The material was not uniform in tone, and was often much discoloured with surface dirt. The floor-joists and other timbers often projected from the walls. Boards were inserted into the walls to form the frames to window openings, and the interior partitions were of boards and mud, and were carried up through the roof, which was also divided into sections. These constructions, although very rude in character, were often strikingly well planned to suit the native requirements, were fairly proportioned, and in elevation had even an effect of dignity and repose. Some of the older houses had details such as cornices, door and window openings, worked in small black burned bricks, each about 6in. by 3in. by 2in. These were stuck together with swish but in the better-class houses, lime made from burnt shells was used, and gave a durable result. Lately the natives had copied the European use

of corrugated iron imported from England, but the structures soon gave signs of decay. It was, the author thought, a remarkable coincidence that in the older examples of these huts, found far from modern civilisation, the appearance both in plan and elevation was identical with the buildings of ancient Egypt, both being built of swish, and the author entered at length into the possibility of communication between Western Africa and Egypt, either by caravans across the interior or by Phœnician or Carthaginian trading vessels. Passing on to consider the possibility of civilising the natives, Major Bale said the case was not altogether hopeless; the inhabitants showed quick imitative faculties, but no original powers of invention, but he thought that under European guidance they might be trained to higher work and a better condition of life.

THE LATE MAJOR MANT, R.E.

A short memoir of this recently deceased gentleman was read by Mr. R. PHENE SPIERS, and around the walls were hung a very large number of drawings illustrative of his principal works. We published an obituary notice of Major Mant, in the BUILDING NEWS for Sept. 30th last (p. 440), and on Oct. 23rd gave a double-page perspective illustration, with ground-plan, of his chief work—the Lukshmi Vilas Palace, now in course of erection for the Guicowar of Baroda. Mr. Spiers remarked that the subject of his paper entered the service of the Royal Engineers in 1859, at about 19 years of age, and went to India ten years afterwards; he rose through all the stages till he became, in 1874, Major. He early showed a taste for architecture, but the first important building which he carried out was Italian-Gothic in character; this was the High School at Surat, erected in 1869-71, at a cost of £25,000. Afterwards he saw the unsuitability of Gothic for India, and turned his attention to the indigenous styles, becoming very proficient in Hindu-Saracenic varieties in which all his later buildings were erected. Well acquainted with several of the native dialects, he was able to make large use of the assistance of native draughtsmen, whom he was able, to some extent, to inspire with his own spirit. In the buildings he carried out, the plans and elevations were his own, but the decorative details were worked out by Hindu assistants. His work was seen to be characterised by so much ability that he obtained an extensive practice. He was so fortunate as to attract the attention of Sir Richard Temple, and followed that gentleman when he was transferred, in 1877, from the Governorship of Bengal to Bombay; and till the time of his death held the appointment of Architectural Executive Engineer for the Bombay Presidency, besides that of Consulting Architect to several native States. Among his chief works are the High School at Kolhapur, and a monument at Florence to the Rajah of Kolhapur; Northbrook Hall, Dacca; the School of Art and a bridge at Baroda; Mayo College, Ajmere; the Hospital and Library at Baroda; and the Hospital, Kolhapur. His three most important works were the Palace at Lukshmi Vilas, Baroda; that at Kolhapur, both now in progress; and that at Kooshehar, Bengal Presidency, of which one wing was commenced when the work was stopped for want of funds. The circumstances of Major Mant's death by his own hand were misstated at the inquest. It was not correct, as then alleged, that he put an end to his life in consequence of the failure of his plans in India. He had unfortunately, when in India, invested his money in several speculations, some of which, after his return to England, had proved unfavourable, and occasioned him great anxiety. Just at this time, the failure of a tower in India, for which he was in no way responsible, led him to re-examine his own plans then in course of execution, lest a similar accident should occur in his practice. He found it desirable to strengthen, at the estimated cost of £1,000, his foundations at the Guicowar of Baroda's palace, in a portion which was then about 5ft. or 6ft. above ground, and accordingly sent out fresh instructions to that effect. As the total cost of the palace would exceed £200,000 this could not be considered a grave defect, but this and a heavy pecuniary loss unhinged his mind. It was, added Mr. Spiers, but nine years since Major Mant's first building was erected, and since then he

had carried out, or had commenced, works the cost of which would exceed three-quarters of a million sterling. He was perfectly trustworthy in all his personal and professional relations, and his anxieties were for his friends, clients, and patrons. Had he but lived another year all his losses would probably have been recouped.

Major MORANT, R.E., thanked Mr. Spiers for his notice of a lamented brother officer, which, although generous, was not too highly coloured. Those of Major Mant's works which he had seen at Kolhapur were very successful, and marked by great taste. The indigenous styles were undoubtedly better suited to meet the requirements of India than the Gothic, in which Major Mant had first worked. He had found it necessary to remove from his designs some of the extremely lavish ornament indulged in by the Hindu, and the result had been satisfactory. The conditions of working were very different in India to those which prevailed at home. There the architect had not only to prepare the designs, but to make his own bricks, procure his own materials, and, in fact, to act as his own contractor instead of simply superintending the work. There was at present a great opening for English architects in India.

Sir RICHARD TEMPLE said he could bear testimony to Major Mant's qualifications as an accomplished architect as well as to his qualities as a man and as an officer. A more talented and conscientious man never, he believed, existed in India. His career formed an important episode in the history of that country, for till his time the English had for a century been erecting public buildings which were plain, ugly, and positively debasing in their effect on public taste. At last, the British Government were erecting buildings more worthy of them, and of late years several talented architects have been at work in each of the three presidential capitals. The loss of Major Mant would be, however, one which, if not irreparable, was at least difficult to replace. He was a born genius, brought up as a military man with none of the advantages which English architects enjoyed. His distinguishing merit was, he endeavoured to use some style indigenous to the soil, with the scientific refinements to be found in European styles, and that he abandoned the practice of Gothic, which could but appear as an unhappy exotic, for a combination of native modes of working which he called Hindu-Saracenic. Towards the end of his life—a too short life—he was beginning to frame designs which combined the resources of European science with the beauties of native art. He had, in the speaker's opinion, a few defects which frequently formed the subject of conversation between them. There was, perhaps, some want of simplicity: the work was overlaid with details, and, as he often mentioned, there was a want of some crowning feature which should distinguish the design, and be an easily-recognised point in the completed building. Returning to the subject of Indian architecture, he ventured to express the belief that members of that Institute could hardly do better than visit India, for there they would see buildings of extraordinary interest. He did not alone refer to the Hindu and Buddhist edifices, but to Mahomedan ones also, and especially to the marble structures at Agra, erected by the Great Mogul, before the exceeding beauties of which all Mediæval structures paled their ineffectual fires.

Col. Sir ANDREW CLARKE (for many years Minister of Public Works in India) said he must explain that the late Major Mant, like many other engineers and architects, frequently had the wings of his genius clipped by the official scissors of the right hon. gentleman who had just sat down. The "central distinguishing feature," which ought, according to Sir Richard Temple, to be conspicuous in every design, was seriously cut down in the elevations of many buildings on the ground of expense, and, notably, in the Mayo College, Ajmere, although that particular instance was not due to Sir Richard. He added a tribute to the memory of the late Major Mant, remarking that amongst the able men still left was Captain De Fabeck and a young and promising man, Captain Cole, the son of Sir Henry Cole, of South Kensington. He agreed with the last speaker that the time was very far distant when we should be able to rely on native architects in India. Europeans were needed as administrators and directors, and, indeed, around the beautiful buildings at Agra might be seen the

tombs of the Italian architects, to whom, he believed, the conception of those beautiful structures in white marble was really due.

Sir JOSEPH PHAYRE spoke in high terms of Major Mant's works in Baroda, and added that experience showed Gothic building to be most insupportable and unsuitable for India.

The CHAIRMAN remarked that it was a question whether we were not justified in introducing the Gothic style into India, and whether, therefore, Major Mant followed the best course in adopting the indigenous modes of building. If we refused to take our style with us, it would be the only instance in history, with the notable exception of Egypt, where a conquering nation had not imposed on the vanquished one its own architecture, as well as its arts, laws, customs, and language. Furthermore, it was now possible, in going into India, to give the exact date of a building and its history from its architectural features; but this would be impossible if we copied the Indian styles of building.

THE NEW COMPULSORY ARCHITECTURAL EXAMINATION, AND WHAT IT INVOLVES.*

(Concluded from page 719.)

NOW that we have gained some idea of the object which the examination may be understood as proposing to itself, and of the general course it is to take, the question still has to be answered, How will it turn out? A great deal depends upon the examining body. This consists of a board of not less than five, or more than 12, Fellows of the Institute. The names of the members of the first board are as follows: The President, Mr. Street, R.A.; the three Vice-Presidents, Mr. Hayter Lewis (Emeritus Professor), Mr. Horace Jones, and Mr. Ewan Christian; the Honorary Secretary, Mr. Macvicar Anderson; and Messrs. James Brooks, Arthur Cates, E. A. Grüning, E. H. Martineau, E. R. Robson, Alfred Waterhouse, A.R.A., and T. H. Watson. This board will, no doubt, feel bound to carry out the statement in the published programme: "It is intended that at first the test shall not be severe." The examiners under the Building Act form a board of very similar constitution, and no doubt the useful work done by that board has influenced the decision to extend the present examination to a similar body. There will be some little difficulty in keeping the standard uniform, and there may be some trouble at first in getting so large a board into working order; but I am inclined to believe that a tolerably numerous examining body like this offers a safeguard to students against violent fluctuations. If from year to year new men are elected to replace the retiring members, still the majority of the board will remain from one examination to another; traditions will, to a certain extent, establish themselves; and, in all probability, a tolerably uniform standard and mode of procedure will be preserved. The first examinations will be looked forward to with great interest; and to pass on one of the early occasions will, no doubt, reflect credit, and even distinction, on those who do so. Very many gentlemen who might, one would have thought, have been sure of success have preferred to enter on the old principle, but some of them will, I believe, come to regret that they had not more confidence in their own powers. It would perhaps be a wise thing, if for two or three years the examination was, so to speak, made retrospective, that is to say, thrown open to gentlemen already Associates, so that some of those now in the body might have the opportunity of adding what will no doubt be a real distinction to their names.

Of all the things which may be involved in the new examination, nothing is so self-evident as that it must be prepared for, and that this Association possesses the means of aiding in that preparation to a very large extent. Three sorts of preparation may be very easily recognised, as all useful, in fact necessary. First that practical acquisition of professional knowledge, and the power to make plans and prospectuses which is gained in an office and on the works, in practice on one's own account, or as an assistant or pupil. No one must hope to pass such an examining body as that Board at Conduit-street unless he has had sufficient practical training to

enable him to do all the routine work of an architect's business, and some at least of the exceptional work. No one could, I imagine, go up from college, or classes, or any sort of instruction 'that is purely theoretical, and hope to succeed, any more than a medical student could pass his examination without having walked the hospital; and it will hardly be easy for those who have never done any work on their own responsibility to master this, the practitioner's, side of the qualifications sufficiently for success. Secondly, there is theoretical knowledge of materials and construction, of history, and of what one may call the theoretical drawing, so far as the details of one style goes. This must, equally with practical routine, be mastered, and for the acquisition of this pupillage and practice, neither of them, supply much opportunity. Classes and lectures, and private study must be used with the view of learning theory. Thirdly, and by no means of least importance, there is practice in answering papers of questions, and in replying to a *circa-voce* examination—in short, the skill to use the knowledge acquired. I propose to say something on each of these three heads. First as to what we have termed the routine of Practice. The greater number of those who are likely to desire to become Associates are probably more likely to be familiar with this than to be quite safe in either of the other two branches of preparation. Sharing for some years in actual work, or the carrying out a single building of one's own, will give good opportunities for becoming familiar with an architect's work; and the only hint, perhaps, that need be given, is to suggest to gentlemen who are pupils and assistants the importance of keeping their attention awake to all that goes on within their reach. The practical subjects which are most accessible to one man will be least so to another; but, on the whole, dealing with ruinous and dangerous structures, and planning for special purposes, appear to be the two most likely to lie a little wide of the range of many architects' pupils. As to the ruinous structures, they, as I have already hinted, occur from time to time, and if a young man is on the look out for information, he may be able to learn a good deal even from a single case of this sort. As to designing, that is mainly learnt by practice. Any one can exercise himself in planning if he pleases, especially now that so many prizes are open for such work. But on this part of preparation, let me point out that the recent formation of a class for the study of planning and specification writing, and the two classes of construction and practice, ought to aid members of the Association very materially in their acquisition and systematising of what may be termed practical knowledge. Perhaps it would be right to add the hint that some acquaintance with iron construction, will, probably, be expected now that we have fairly entered the last quarter of the 19th century. The candidate at such an examination ought, at least, to be prepared to sketch iron beams correctly, and calculate their sections, in addition to being familiar with timber, brick, and stone construction. The second part of my suggestions as to preparation for the examination refers to Theoretical Knowledge. Here, I think, there is room for a great deal of improvement in our methods of instruction, and I venture, even at the risk of giving offence, to say that much of our modern architecture has suffered in consequence of defects in this instruction. Probably the greatest service which the examinations can possibly render will be the causing many pupils and others to learn something of the history of our art, and to acquaint themselves minutely with a little bit, at any rate, of that art. My own profound impression is that a good, familiar knowledge of some of these things is of the greatest possible value of the architect, and that the question, whether he shall rise or not in his profession, depends upon his mastering a few things which he does not see are likely to be immediately useful, such for example as drawing the human figure, in addition to the things of which he has need at the moment. But many of the younger among us do not seem deeply penetrated with this idea, and for them it will, as I have hinted in an earlier part of the paper, turn out to be a great advantage, that now something has arisen which will compel a little attention to theory, and art history, and architectural study of the higher kind. This, however, is a digression; the immediate subject before us is to find out how history, and the

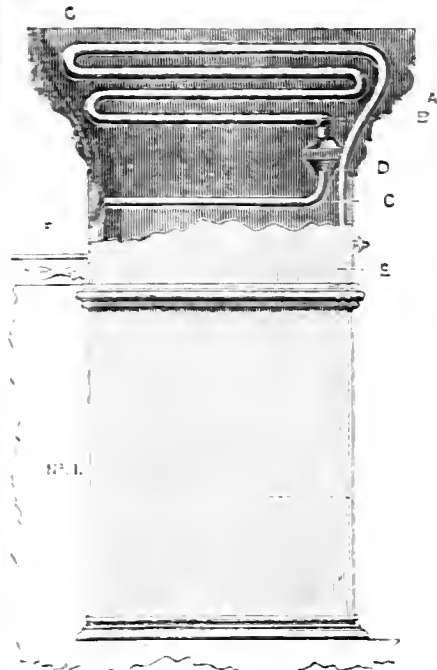
science of construction must be studied, and your committee has, very wisely, as I, at least, who am myself an instructor, must admit, determined that some direct instruction shall be afforded here in these subjects. You are, of course, all of you, aware that two courses of lectures, one of which is to be a kind of companion to the subjects in the elementary class of design, and the other similarly to accompany the subjects in the elementary class of construction are arranged, and, indeed, have already begun with every promise of success. I do not think these subjects could have been entrusted to better hands than those of Mr. Tarver and Mr. Blashill respectively, and the only thing to be regretted, is that it was not possible to make each course longer. Still as the lectures are delivered at considerable intervals of time, as they are associated with the subjects for study in the two classes, and as it will be possible for you, if you are industrious, to carry your study of each subject further than Mr. Blashill or Mr. Tarver can, within the space of an hour's lecture, take you, these courses may enable you to acquire a very considerable amount of knowledge respecting the subjects treated of. Mr. Tarver's series includes, after his introductory lecture, all those styles (or at least the most prominent of them) which combine to connect the work of the present day with that of the most artistic nation on the face of the earth. The Greeks fixed for all time a very large part of the architecture of civilised communities. Not that we, or those who went before us, are wise if we attempt to build in Greek, but that each style has been founded on the one which preceded it, and all alike inherit, from Greek originals most of their features. The Roman we all know was a coarse rendering of Greek art with the addition of the arch. The Romanesque, Byzantine, Lombard, and Rhenish are all children of Rome. The Gothic styles are their immediate descendants, and the Renaissance, the last in the series of Mr. Tarver's subjects, is a return to Roman forms animated by a modern spirit. This is the tale of Architectural History, as it affects ourselves, told in a sentence, and I sincerely hope you will all hear it told far more completely in Mr. Tarver's class. Not less comprehensive is the scheme of Mr. Blashill's constructive lectures. The first two relate to the foundations and walls of a fabric, the subjects being excavator, bricklayer, and mason. The next two relate to the completion of its carcass, namely the work of the carpenter and the tiler, and they take in that of the plasterer. The remaining four take in the most important parts of the finishing of a building, joiner and ironmonger, smith, plumber, painter, and glazier. Under the plumber you may be sure that you will, from Mr. Blashill, not only get some advice as to the construction of flues and gutters and so forth, but an account of those methods to which I have already had occasion to make allusion, that modern skill has brought to bear on the sanitary condition of dwelling-houses. The plumber has heavy responsibilities upon him: not only has he in times past set fire to many a cathedral spire and roof, but in our own days his shortcomings have been followed by disease and fatality. How to deal properly with plumber's work, means really the management of water supply, of drainage, and of sanitary fittings; in short, the protection of the inmates of a dwelling from sewer-gas. Perhaps it may not be out of place if I add the suggestion to members able to attend these courses of lectures that they will be wise to take the opportunity this session and not to postpone their attendance till another. The courses may possibly not be repeated, or if repeated, they may be in a different mould. The opportunity is presented now, and is a very valuable one, and no one will regret the very moderate fee, and the very moderate sacrifice of time which attendance on both these series of lectures would involve—and even though one in the Construction course, and two in the Art course are already given, that circumstance will not permit attendance upon which the remainder from being most desirable. The third point to which I drew attention was Practice in Examinations. It is possibly a weak point in the Architectural Association system that there is not a system of examinations connected with it. The experience of University College shows conclusively that the examination at the end of the session acts as a stimulus, and also helps the student to gain a command over his own

* A paper read before the Architectural Association by Professor T. ROGER SMITH, on Nov. 25, 1881. (See p. 717.)

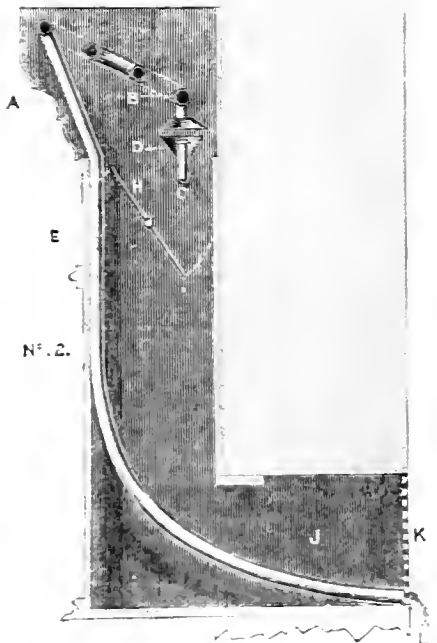
resources and his own equipment. And though I feel that I am more fortunate than my two friends just named, not only in having to treat substantially the same series of subjects in three times as many lectures, but also in having an examination and competition prizes to point to, I cannot but see that the Association, if it chose, might do more than it is easy for University teachers to attempt in the way of examination-practice, if I may use the word. No one can do full justice to what he knows in an examination whether by pen or at all, unless he be somewhat in the habit of answering questions—and answering them, so to speak, under pressure. The members of your new History Class, and those of the Construction Class will probably both of them have an opportunity of attending an examination, or perhaps more than one, and they will be wise, if they all avail themselves of that opportunity when it comes, and prepare for it well beforehand. In addition to this, however, some arrangement to afford practice in answering an examination paper on architectural subjects, within a certain limit of time, and without recourse to books of reference, it could be made, would be very serviceable for their education, as tending to give them confidence, and to show to them, where their weak points are, in time to apply a remedy. Such an arrangement would be quite practicable here, and would surely be worth attempting. One measure which has been from time to time strongly advocated in this Association, is certainly closely allied to the new examination, but is not involved in it. I allude to a diploma for architects. The two things resemble one another so much that we are apt to forget how widely they differ. It is not unlikely—at any rate not impossible—that the new examination may be found to afford the chief advantages of a diploma without some of its obvious disadvantages. Take, for example, the difficulty of deciding what is, and what is not, to be prohibited if a diploma is granted. The only art which could well be taken hold of as conferring for advantages or payments to a builder, and this, it is obvious, has to be done by engineers, naval architects, and many other classes of practitioners, so that a prohibition could be readily evaded. But if the result of the examination is to establish publicly that the Associates of the Institute are a body of architects in whom the public can place confidence, it may very possibly turn out that Associateship will be sought by every architect of skill sufficient to pass the examination, and will be accepted by the public as equivalent to a diploma. It may, on the other hand, very possibly pave the way for the grant of such a document. At any rate, what we have to consider to-night is not the diploma question, but the examination question. If once we recognise that, quite apart from any other measures or ulterior consequences, the examination ought to result in raising the status of architects, in procuring a better estimation of them by the public, and in rendering them more really deserving of public confidence, we surely must recognise something which we are glad to see established, and which we feel ourselves bound to support, by promoting the candidature of the best men in the Association, and by assisting them in the preparation. It must not be forgotten, in conclusion, that, like every untried measure or new departure, this examination is an experiment, and may fail. One serious, or at least possible, risk of failure seems to lie in the fact that so many young men have avoided the examination by becoming Associates under the old rule. The result may very possibly be that fewer candidates will, at first, be forthcoming than there ought to be; but I have every confidence that even if this is so, the Institute will persevere, and that the confidence of young architects will make them come forward in sufficient numbers. There can, in that case, be no doubt of success. Were the examinations to fail, the failure would then run back 24 years, perhaps 25 years. On the other hand, if they succeed, we shall see established in our midst what ought, under good management, to prove a powerful agency for good. The consequences ought to be far-reaching and greater still. The architect's title, for his work ought to be at once more assured and better recognised. The general estimation in which our profession is held by the public ought to be proportionally raised. Let us all, each one as he can, endeavour to contribute to this result.

IMPROVED METHOD OF WARMING FRESH AIR.

Messrs. Robert Boyle and Son, ventilating engineers, of 64, H. D. B. road, are the inventors of a simple and ingenious arrangement for warming the supply of fresh air admitted into rooms and public buildings. It consists of a miniature coil of pipe placed in the top part of a vertical tube, as shown in diagram No. 1. A is the top of tube.



made of iron or zinc to render it fireproof; B, the coil; C, an air-burner; D, shield perforated at bottom to prevent the current of air passing up the tube affecting the flame; E, the pipe to



carry off the products of combustion; F, three-eighths gas-pipe led from the most convenient source to supply air-burner; G, shows gas-pipe brought down from a bracket. Diagram No. 2: H, regulating valve in tube; J, air-hole cut through wall; K, cast-iron grate; L, mouth of pipe for carrying off the products of combustion; dimensions of air-tube 20in. by 9in. and 42in. It has been a long-felt want, some simple and effective means of warming the air admitted

into rooms, and the appliance above described will, no doubt, be hailed as a practical solution of what has hitherto been considered a very difficult problem in ventilation. This plan has also the advantage of being economical, and with it in conjunction with the air-pump ventilator, Messrs. Boyle guarantee the satisfactory ventilation of any building without the slightest disagreeable draught being experienced.

PRACTICAL NOTES ON PLUMBING.—XXI.*

By P. J. DAVIES, H.M.A.S.P., &c.

CLOSET TRAP EXPERIMENTS.

(Continued from page 657.)

I AM now in a position to explain the true working of traps, having for the last 20 years, made them one of my especial hydraulic studies, and on Monday fortnight, by experiments made before several disinterested gentlemen, I was convinced that my ideas as to the merits of the various traps have been at least in the main correct, and as I am not in any way interested in the manufacture of traps, I take it that credence may be given to my opinions. It may be remembered by the readers of this Journal that at one of the lectures given by Mr. Hellyer at the Society of Arts rooms, I proceeded to explain the faults of the U-trap, and met with various interruptions, amongst which were remarks from Mr. Hellyer, such as, "What are you?" "Who are you?" together with a storm of hisses, but happily only from the well-known Newcastle-street geese. Besides this, Mr. Hellyer has written to the paper, saying I am not worth smoke. Now, in vindication of my assertions, I am compelled to explain the result of these experiments, which will once more prove that in a sanitary point the half U-trap is decidedly a failure and that the C-trap possesses all the advantages I claimed for it. I shall not have occasion to refer to mathematics, nor even go so far as to require the explanation of the letter "g" in mechanics, but proceed to show clearly the simple principles that govern well and badly constructed traps respectively. Every plumber must know that during the time water is passing through a trap, there is necessarily motion. This motion is known as momentum, and the quantity of this momentum must be considered.

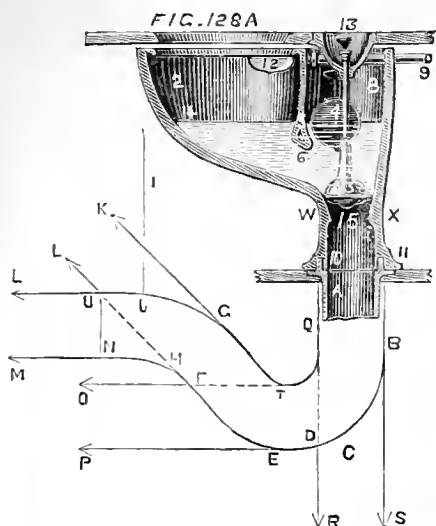
In the first law of motion we are taught to distinguish the meaning of the word "inertia," which is the simple resistance of matter to a change of state, whether of motion or of rest. Let us, for the purpose of this argument, turn to page 345, and examine Fig. 84.

In the bottom of the trap there shown will be seen the water, K, D, C, apparently stationary or in a state of inactivity. In the same diagram will also be noticed the water dribbling from the valve F. This dribble is not enough to engender sufficient momentum to instantly throw out the whole of the water within the trap; therefore the inertia of this water cannot be said to be acted upon, as it should be, by the incoming water from the valve F, and whenever this constraint occurs, there is a resistance brought into play which is known in mechanics as reaction, and which in this case is totally fatal to all self-cleansing traps. In this illustration and explanation you have a clear proof that the handle of the closet should be fully pulled up, in order to enable all the water to pass full bore and rapidly into the trap, so that the incident motion directed from the water in the basin shall have full power to expel the whole of the foul water contained within the trap. This applies to all traps—closet or otherwise.

The following figure represents B and Dent's 4in. Cast-lead Trap, which I have proved to be a failure for slop or valve-closets. This is all I want to do, as thousands are fixed yearly, and cause no end of trouble; of course, there are places where such traps can be used with safety, on the top of which is a valve-closet. If you pull up the handle and valve 3 of the closet, the water, like all other substances, will obey the definite law of gravitation—it will fall, with accelerated force, onward towards B S; but as the bottom of the trap is rounded, the water is easily turned out of its straight

* All rights reserved.

line of path from B to CDE, and at each successive instant will tend to fly off in due proportion to the speed. If the front, from E to F,



were cut away, it would fly off at the tangent, EPFO; but as the front of the trap impounds this water, it is again directed from the point of contact, HG, towards the tangent line, LK, when it again glides round the e-y, curved line, GJU, and flies off at the tangent, LM, as though it were a stone from a boy's sling.

Now the effect of this is, that with a closet-basin half-full of water, having a valve fixed only 6in. from the water-line in the trap, on the valve being properly opened, so as to cleanse the trap, the water will gain sufficient velocity to sweep onward; and as there is not sufficient reaction, neither by friction nor by the curved lines of the trap, the momentum of the water is unchecked, and consequently the trap left without sufficient water to prevent the air passage, as shown at X, Fig. 128 B. Now suppose this to be a pail of slops, it will have the same effect.

FIG. 128 B.

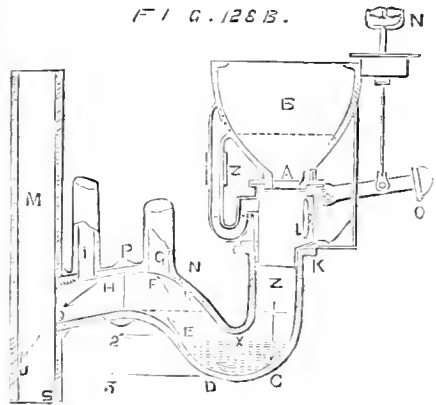
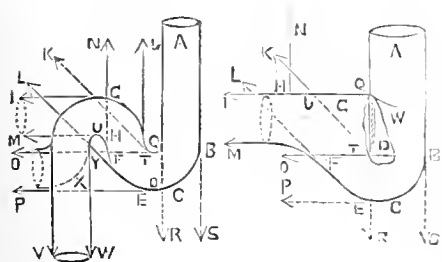


FIG. 128 B.

FIG. 128 C.



This result is palpable if you only consider the weight of the water and the curves of the trap, which may be compared to a bagatelle ball passing round the head of the table.

Now let us examine 128 G.

This is a trap to which I would have trusted

my life, until I discovered the momentum of water in traps. We are told, and it is a fact, that water will always pass onward in a straight line unless it meets with some substance to check it or divert its course. Now, suppose this trap to be fixed as shown at M, Fig. 2, page 540, having the basin C on top; three-parts fill the basin and lift the full-sized valve as shown at F 7. Fig. 3, as you would were it a valve closet; thus fill the pipe part A, Fig. 128 C. The water on falling will strike against the bottom, BC, and would fly off at the tangent line, OP, but as in the trap before referred to, it is by the very easy curve, EF, directed in the line FLT K, up against the rounded top, H, when it is redirected to the out-go. This, I think, is quite clear, and will be readily understood on reference to the dotted lines shown in my diagram between K and N, Fig. 75, page 354.

Now refer to the trap on the left-hand side of the last figure described, Fig. 128 B.

FIG. 128 D.

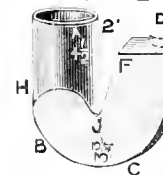
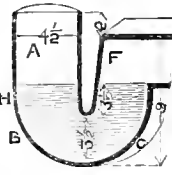


FIG. 128 E.

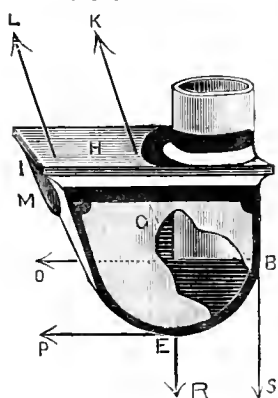


This is the complete 4in. trap; but owing to its shape is extremely unsuitable for general work, to say nothing about its being difficult to make, for instance, from outside to outside, or S to V, is 16in.; then again it is at least 10in. deep—that is from the top at G to the bottom at E, though it, of course, many years ago, has been made as Mr. Emptage suggests, with the curved out-go, Y X P, or to any other pattern. In proof of which I may here remark that these traps are excellently made to almost every conceivable shape by the patented process of Frederick Nelson Du Bois, and sold by Mr. G. Jennings, London. It should be remembered that all my drawings and writings against the trap have been in reality directed against the half trap, called a trap, generally made by Beard and Dent. The real trap has its faults, but will not momentum out like the half trap does.

MR. HELLIER'S V-TRAP.

This trap is shown at Fig. 128 E and D above.

FIG. 128 E.

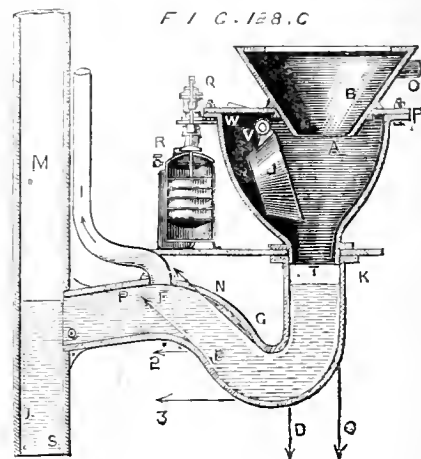


It has a round pipe inlet $4\frac{1}{2}$ diameter, and stands the usual height of the trap. It has a $1\frac{1}{2}$ water-lock, and of a V shape, holding a good body of water; it is made to the proper curves with a flat top, which at a glance will, by a mechanic, show it is proof against momentum; but, like all other traps, will require to be well ventilated for more reasons than one. I cannot, however, agree with the ventilating pipe being fixed directly on the top as shown at D in the advertisement diagram. (Vide paragraph on air pipes.) The out-go of this trap requires improving, as it is to a novice rather difficult to work to.

TRAPS.

The trap, Fig. 128 E, it is easy to see, is thoroughly proof against momentum; nor if

they are made properly to prevent siphonage, will they siphon out. But so far as siphonage is concerned, if people will not ventilate properly after so many powerful arguments have been used showing its importance, the sooner they are poisoned the better it will be for those



living who will attend to ventilation. I doubt not that now you will be quite able to comprehend the action of the water in passing through the trap. It first strikes the heel at B; otherwise it would pass in the straight line to RS, but is by the band of the trap directed to E, where it would, if not for the front of the band, pass off in the tangent line, EP, but it is guided onward until it comes to the point of contact with the tangent line L; it then strikes off in a right line, and dashes up against the top, when it is reflected or thrown back against, so to speak, its own life-giving pressure, in what I may call a state of eddy confusion, when it is greatly retarded, and passes out at the out-go, M, without any sign of loss of water within the trap from momentum,—that is, when fixed under slop or valve-closets.

SLOP-THROWING THROUGH W.C.'S, &c.

Scores of times I have been called out to examine servants' slop and other closets, and have been puzzled to find out the cause of the stinks, in consequence of the trap becoming resealed before I have had time to get to the house, and on examining the traps for air-pipes, thinking it may be siphonage, I found them all right. The reason, however, is now quite plain. Let a pail of water be thrown down the w.c., pan-closet, Fig. 128, C, and the handle shut down before the trap is recharged, and you will find the stink must rise. How often is this done when there is no water even laid on, or during the time there is no water in the cistern? and again, how often in the winter-time are we obliged to flush out the closet during the time the pipes are frozen—better known as hand-flashing? All these points have to be considered before fixing the half trap.

AIR-PIPES

You can easily understand that if you fix an air-pipe in the way of the momentum-line of the water, that the water will throw up the solid matter, such as paper, &c., and very soon cause the air-pipe to become blocked up, and consequently useless. Examine I in the above Fig. 128 C, also G, Fig. 128 B. I, in this last drawing, is the proper position for the air-pipe, as close to the round joint of the out-go as possible, so as to be out of the way of the momentum, &c., but, of course, it is not required unless the length of out-go pipe is longer than shown in the Fig. 128 B.

(To be continued.)

[This article was crowded out last week, but was in type before the letters which appeared in our last from Mr. Buchan and Mr. Emptage were received.—Ed. B.N.]

TEWKESBURY ABBEY.

IN reply to a letter in *The Times*, repeating the mistake in the anonymous writer's report first sent to that paper by the Society for the Preservation of Ancient Buildings, Mr. J.

Oldrid Scott writes:—After a very accurate description of the fine west front of the Abbey, Mr. Middleton goes on to speak of the window which has jambs and arch dating from the 14th century, with a filling-in of Late tracery about which the discussion has arisen. He states that this tracery was not made, but only repaired, in 1680, and that it belongs to a genuine Perpendicular window. This I am convinced is a mistake. It is highly improbable that if a window had been inserted by the Perpendicular builders they would have retained the Decorated jambs; and, besides this, the details of the tracery are not such as are found in Perpendicular windows, but clumsy forms, such as might well have been used by the churchwarden builders of the 17th century. The tracery does not fit the ancient jambs, and in some places old little corbels have been used to get over the difference. The history of the window is known. It was blown in during a great storm in 1661. There was great difficulty in raising money for rebuilding it, only £82 having been voted at the time for this purpose. In 1661 a further sum of £120 was provided; but it was not finished till 1680, when a rate of 9d. in the pound was voted "for completing the west window and supporting the long roof." As regards the value of the tracery in question, I imagine no one not a member of the society thinks it otherwise than unsightly: it is a literal piece of "Churchwarden's Gothic," and no doubt a good example of the style. At the same time, it has a history of its own, such as it is, and is in good repair. Moreover, it has formed an important feature in the Abbey for a long while. Its treatment has never become a "practical" question with the committee; but it has, of course, been talked of from time to time, and my advice has been that, considering the lines the committee have always laid down for themselves and the extreme narrowness of their funds, the insertion of new Decorated tracery is not a work which it would be desirable for them to undertake, though it would be highly advantageous to have the window filled with good stained glass, as in this way its defects, which are seen much more inside the building than out, might be, in a great measure, removed. It is not necessary to consider what should be done if some individual were to offer to defray the cost of new tracery. At Tewkesbury the committee are relieved from the anxious responsibility of looking gift-horses in the mouth which they suffer from at St. Alban's, by the fact that no horses are ever offered; though, happily, smaller gifts are by no means unknown.

TERRA-COTTA AND FAIENCE AS MATERIALS FOR ARCHITECTURAL AND DECORATIVE APPLICATION.*

(WITH PHOTO-LITHOGRAPHIC ILLUSTRATIONS.)

(Continued from page 722.)

MUCH depends on the quality of the material and the colour desired, and very great practical and very great technical skill is required to secure even an approach to perfection. By some makers, muffled kilns are adopted, in which the flame does not come in contact with the clay; some adopt down-draught kilns, and others up-draught, some use square kilns, and some round; there is, in fact, no rule, but the rule of experience, based upon the nature of the materials and the appliances at command; but what is essential to good terra-cotta, whatever the precise mode of securing it, is that it should be thoroughly well burnt. I need not say, however, that in some cases the rule of thumb and precedent is more blindly followed than is altogether desirable, and a thoroughly intelligent perception of cause and effect upon anything like scientific data is too often the exception rather than the rule, and hence it often happens that great irregularities occur in the degree of heat applied and in colour produced. Much greater attention has of late, and is now being given to this most important subject, and, indeed, it is obvious that it is a critical point in determining the question of the more general application of terra-cotta. Badly-made and excessively-burnt terra-cotta is simply an architectural abomination, but assuming the condi-

tions to be satisfactorily solved, as they may be, I will next allude to the question of durability.

Is terra-cotta as durable as stone? I might reply in one sentence: There are all qualities of stone and all qualities of terra-cotta, and the inferior qualities of either are undeniably bad; but I believe I might go so far as to affirm that a thoroughly well-made, well-burnt block of terra-cotta is equal in constructive durability to the best stone, and probably superior. The fact that burnt clay of a good quality is almost indestructible, is proved by the remains of bricks and tablets discovered by the researches of Layard and Rawlinson amongst the ruins of Ancient Babylon, in an almost perfect state of preservation, whilst we have modern illustrations of its durability over lengthened periods in the quaint old brick structures yet met with in England and on the Continent, affording, under trying conditions of climate, valuable evidence of the durable nature of well-burnt clay.

The great test of durability is the power of resistance to severe and sudden atmospheric changes of temperature, and to the more insidious attacks of the acid gases which, in all large cities are more or less present in the atmosphere, and often work sad havoc with buildings on which the greatest care has been exercised in the choice of materials. Instances of this are too well known and numerous to need reference. The question is, Will terra-cotta be more durable than stone?

The general use of architectural terra-cotta in this country is too recent, and the dates too imperfect to afford any very striking comparative facts on this subject; but collated evidence, I think, strongly supports the presumption that well-made and well-burnt terra-cotta is much less puerile to the action of acids than stone. As far as chemical tests are of any value, they are certainly strong in support of such a proposition.

The soft silicious bricks and terra-cotta made of silicious clay, whilst they often secure a charming architectural effect, are too porous and open in their grain to withstand any severe disintegrating action. Some qualities of silicious bricks undergo a certain degree of induration by atmospheric exposure under modified conditions, but they do this by their reception of atmospheric particles, and are therefore the more readily subject to the discolouring influences of smoke in the atmosphere of large towns, very quickly becoming choked with carbon, which is a serious drawback to their general use for enriched work. The most insidious and powerful disintegrant is alternate frost and thaw, and if these operate under conditions favourable to their action disintegration is rapid. Terra-cotta half-burnt, like a soft stone, is sure to yield to such influences sooner or later; but it may safely be affirmed that no material is more likely to resist them than a thoroughly plastic clay, good quality, the constituent parts of which have been brought not into mechanical, but into chemical combination by the requisite amount of heat.

A question of the utmost importance in connection with the use of terra-cotta is its comparative cost. This is determined partly by locality, and partly by the quality of workmanship. In districts in which good stone is abundant and readily accessible, and to which terra-cotta would have to be imported from any distance, it would probably be an open question as to the comparative cost for constructive use; but this general view is subject to large modification, and is subject to the character and extent of the structure, the proportion of repetition in the details of the design, and the quantity of mouldings and enrichments. If, on the other hand, both the stone and terra-cotta have to be imported, the probabilities are very decidedly in favour of terra-cotta being the cheapest; but the general proportion of cheapness will again be determined by the conditions I have just named. The element of cheapness in terra-cotta depends primarily in the extent to which each block can be repeated. Whether few blocks or many are required, the cost of making models and moulds has first to be incurred and calculated, and if it can be distributed over a large number of blocks, the cost per cubic foot is considerably reduced. If, on the other hand, only a few blocks are required of any certain form, the cost of models and moulds must be rated against them adversely. Sometimes, however, this is not so formidable a matter as would at first appear,

and much depends upon the nature of the details, and the practical way in which the work is designed and subsequently set out. It is often possible to introduce considerable variety in some directions without any appreciable increase of cost in model-making; whilst, on the other hand, a design may embrace almost the minimum of variation, and yet involve large additional cost. On such points it is very desirable that all architects should possess, as some do, a practical acquaintance with the mode of manipulation, in order to secure the best results; or, as in alternative, that they should elicit some practical suggestions on the subject in elaborating the details of the design, or in making the working drawings. From what I have said, you will at once see that it is difficult to name any general price for which terra-cotta work can be executed per cubic foot without reference to the structure for which it is required. It varies from about 4s. per cubic foot to double that sum, according to circumstances and the nature of the details. It may even run up to a very much higher figure than this, and still be considerably cheaper than stone for the same work. The same general principles govern the comparative cost of terra-cotta in a modified form. When applied more specifically as an enrichment, it is less necessary to take the question of distance into consideration, and in many forms of enrichment it is possible to secure great variety of design, by a judicious use of existing models. There are many instances in which this can be done in complete harmony with the artistic and architectural character of the structure, and if the designs are good ones and well modelled, a little skilled adaptation will often enable an existing model to be turned to account at very much less cost than would be involved in the special preparation of a new one. If however, for important structures original modelling is required, I believe it will be found that in most cases it is decidedly cheaper than stone or brick carving of a similar character. Of course there are all degrees of modelling as there are all degrees in carving, from very good to very bad; but taking really first-class work in spirit and execution as the basis of calculation, it is safe to say that terra-cotta will cost least, even in cases in which there is little or no repetition, whilst if there is repetition the difference in cost soon becomes considerable.

The use of terra-cotta for enrichment, in the form of bands, strings, small patterns, diapers, and similar forms has stimulated the production by machinery of a number of hard cast-iron looking designs, more or less geometrical or conventional, which have found some favour by reason of their low price; but many of these things cannot be considered as good artistic work, and I, therefore, do not venture to include them in any calculation of comparative cost—they rather rank with brick-work. I have instituted no comparison between the cost of brick-work and terra-cotta, because it is obvious that brick is decidedly the cheaper form of burnt clay, and may often with great propriety and economy be judiciously used constructively in conjunction with terra-cotta, either according to the original conception of its use by the Italian revivalists, or in more modern forms.

The decorative application of terra-cotta faience is so closely allied with terra-cotta, that it will not seem out of place if I now ask your consideration for a few minutes to its special features as a decorative material. The term implies a French origin, and as you are no doubt aware, was originally applied to a glazed pottery of somewhat stronger and heavier character than ordinary pottery made at the Faience. The term is still used in France in its original signification, but has gradually been applied in a more general sense to many forms of decorative glazed ware, and has been adopted as a not unsuitable and fairly descriptive term to a material that might also be called glazed terra-cotta, had not that term been previously adopted for a material without much character, and without beauty of either form or colour to recommend it. Under the general descriptive term of *Burmantofts Architectural Faience* is included all forms of terra-cotta, constructive or decorative, for exterior work, and also many special forms of the faience now introduced and very favourably received by the profession for interior application. The material itself may be described as a ware of finer and closer grain than terra-cotta, manipulated by practically

* Paper read before the Leeds Architectural Association on Nov 24th, by Mr. JAMES HOLDSWORTH.

the same process, and brought into the desired form by an elaboration of the methods applied to high-class terra-cotta. To give it increased hardness and character it is, however, fired at a much higher heat, and being composed of very pure and clean raw material, it is capable of receiving any colour, either by the body of the material being mixed with various oxides requisite to produce the desired results, or by being covered with coloured metallic glazes with a similar object. By both these methods, adopted alternately, according to the object to be attained, a very hard, durable, and beautiful material is produced, eminently adapted for working out, in a permanent and artistic form, both the simplest and most elaborate varieties of architectural decoration.

The specimens of the material now submitted to your judgment will, I think, bear me out in these remarks, and will render it unnecessary for me to add further description. I might, however, add that in bringing these specimens before you, I do not claim for them any further novelty than they possess. They illustrate, in fact, the modern application of a process, as old or older than history, to modern designs and uses, and in a more complete and elaborate form, and this is all that can fairly be claimed for Burman's terra-cotta. It is, in fact, the modern form of the enamelled bricks of Babylon and Nineveh, of which we still possess elaborate remains, of the Italian enamelled work, in which men like Luca del Robbia excelled many centuries ago. It differs from tiles, inasmuch as it combines constructional uses as well as decorative, or can be applied simply in a decorative form, and it differs from most modern forms of tiles also in that it is manipulated on the plastic principle entirely, and is therefore much more capable of being readily applied to any desired form and to any design, by the intervention of elaborate mechanical appliances. The beauty and mellowness of the design is not lost by transference to metal, and every minute touch of the artist can be made to tell either upon a small tile, or in a large block.

The mode of its application I can safely leave in your hands and in the hands of the profession at large, to whose ready appreciation of an effort to contribute to the range and quality of architectural material, it gives me the sincerest pleasure to make respectful recognition. I may be permitted to add but one remark. The use of colour in exterior architectural design is, no doubt, a question of some difficulty. Many attempts have been made to secure satisfactory results in that line, and there have been many failures. For thoroughly harmonious effects it, unquestionably, requires the eye and skill of a thoroughly competent artist, and some practical experience of the material to be used. In England, at least, we are, probably, not prepared by our atmospheric or natural surroundings for the wealth of colour so charming and harmonious to the eye under brighter skies; but no one not an hypochondriac can, with any propriety aver that we are not open to very considerable improvement in this respect, or be unready to welcome the judicious and tasteful use of such materials as improved methods of manufacture and increased scientific skill place at the disposal of the architect and builder.

On the general question of the application of terra-cotta, may I now be permitted to make a few practical remarks? I noticed that your esteemed president, in his opening address, alluded to the objections to the use of terra-cotta, caused by its liability to shrinkage and to the twisting, &c., of lines that should be rigid caused in this way, and there can be no doubt that in these remarks he has spoken from extensive practical experience, and yet I venture to say that if he would add yet further to his experience, taking due precaution in the matter, he would require no other arguments to convince him that the qualities he ascribes to terra-cotta do not necessarily pertain to the material, and are characteristic only of a bad form of it. No doubt there are, unfortunately, notable instances of bad terra-cotta, as there are of bad materials of almost any description; but there are also some instances exactly the reverse. This much can be said for terra-cotta: that every year increases the knowledge, skill, and appliances brought to bear in its production, and as trained and skilled workmanship is brought to bear with improved processes, the quality of the work must improve in the respect in which

I am bound to say it has been, and is still, sometimes very deficient. As a material, it has too often been resorted to by architects for its supposed cheapness, and too often it has not been the best made by the best makers, but the cheapest made by the lowest-priced maker that has been adopted. By this standard terra-cotta work has been judged and found guilty, whereas there is no material in which there is greater margin for skill and superiority of treatment, or for inefficiency and failure. I hesitate to say what I have known of the miserable shifts by which terra-cotta is sometimes turned out to meet the demand of the lowest possible price as the alternative of the greatest possible excellence, and there is little wonder that such terra-cotta is unsatisfactory.

Another objection to the use of terra-cotta, and one in which I feel there has been and is still some force, is that it is slow of production. There is no doubt that it does take more time than some forms of material for its satisfactory production, and there is no doubt also that its extensive use in a structure has sometimes caused a somewhat slower erection than has been desirable either in the interests of the builder or the owner. There is no doubt also that in such an event the terra-cotta manufacturer gets the full benefit of any irritation caused by the delay, nor will I say he is always wholly innocent, but the remedy for such a condition of things is often very obvious. It is often traceable to the supply being intrusted to a producer with an insufficient plant, and at a price that will never enable him to pay for any addition to it. He is no doubt to blame for taking more work than he can execute; but perhaps he is slack at the time and sanguine, and does his best, but if he is not in a position to start fair with his work at the first, woe be to him if he has a heavy job on hand.

The only satisfactory method in terra-cotta work is to anticipate, as far as possible, the progress of the structure, and this can only be done in the first instance by the architect making the terra-cotta the subject of special estimate as far as practicable ahead of the general work. This is now indeed almost the general rule—and it has many advantages. It brings the architect into direct contact with the producers, and they are in a better position to understand and follow his special requirements. The margin for variation in the general estimate is reduced, and the builder at once knows the amount he has to include for items, which are often a source of perplexity, and with respect to which there is sometimes such wide differences of price as possibly to prejudice one way or the other the general estimate.

The delay in getting out working drawings is also not unfrequently a source of hindrance, and if an architect has failed to realise the necessity of being well ahead with them, it is much less easy for a terra-cotta producer to arrange and set out his work in which, more than in any other material, it is of importance to see the way through from beginning to end, as far as possible from the first step.

It has also happened that difficulties have arisen in carrying out working designs. Comparatively few architects or draughtsmen have had very extensive experience in working out terra-cotta drawings; and although, of course, principles of construction apply in all cases, yet terra-cotta cannot be treated altogether as stone. The form and size of blocks, the bond, the key of the joints, mouldings, &c., require some special consideration if the work is to be carried out to the best advantage. It is not an unknown thing for a producer to struggle with a badly conceived working drawing, and so cause serious delay and inconvenience, instead of at once pointing out the practical difficulties, and suggest an efficient remedy, which might be adopted without prejudice to the constructional lines of the design; yet I venture to believe there are few architects who would not at once recognise and adopt any really intelligent suggestion thus offered when clear from any ulterior object. Nor will I say that the terra-cotta producer has always succeeded in getting the best talent necessary for his work: it is a work to which comparatively few men have been actually trained. For its successful management many good qualities are essential, and to carry out any important work in terra-cotta, there must be constructive skill sufficient correctly to read, and correct, if need be, in relation to other parts, any working drawing. In not a few cases it is the doubtful privilege of the terra-cotta

manufacturer to make the working drawings. For this are required the thorough practical training of a mason and the constructive skill of a draughtsman. There must be a practical knowledge of the material, and the best mode of treatment, sound judgment as to what can and cannot be successfully done; perception sufficiently acute to take in the idea of the architect, or any novel point of treatment; artistic taste enough to insure thoroughly good modelling of all enriched or decorative parts; and sufficient science and practical skill to secure the most perfect system of burning adapted to particular material used. It is not surprising that a producer should sometimes break down on some of these points, in the absence of men specially and technically trained. I am, however, glad to believe that this is a point in which considerable progress is now being made, and, should the use of terra-cotta become still more general, it will be far more easy for producers to meet enlarged demands than it has been in the past, when, unfortunately for themselves, and sometimes for their clients, their attempts to meet extraordinary demands have, in not a few instances, resulted in spasmodic effort and corresponding disappointment.

SOME MORE NOTES IN THE WEST.

CONTINUING our notes on p. 654 relative to the new cathedral at Truro, it may be remarked that the pleasant tone and colour that will be obtained by the admixture of brown Carnarvon granite with the grey granite can now be seen in the finished walls of the crypt. The recent selection of stone involved more labour than at first seems credible. It appears that no less than 72 varieties of stones were inspected and reported upon for the purpose of getting the best that could be obtained for use in the construction of the cathedral. Of course, the cost of working the different stones was kept in view, and wherever practicable, Cornish material was selected. Fourteen Bath oolites were inspected; six Portland oolites, including the Chilmark stone; twenty-three Cornish elvans, &c.; six varieties of limestones from Cornwall and North and South Devon; three varieties of St. Stephen's granite; three kinds of granite in the neighbourhood of Mabe; some beautiful pink elvan, from the neighbourhood of Doublebois, and a specimen of the Trap rock, from Polyphant quarries, near Launceston; also a green stone from Tarten Down Quarry, near St. Germans, the property of the Earl of Mount Edgemore, who kindly offered it for the use of the cathedral. This stone will be used largely by Mr. Pearson in every available place for decorative purposes, such as small shafts, caps, bands, &c., on account of the beauty of its colour—a sage green.

Passing reference has been made to the series of stained glass windows which have just been unveiled in Fowey Church. These memorial windows to the late Dr. Treffry will make the edifice remarkable as one of the most notable and striking in Cornwall. St. Neot Church has long been famed for its wealth of ancient stained glass; but next to St. Neot, no church in the county will be so lavishly decorated in this way. The Church of St. Finbarrus at Fowey is of very peculiar and interesting construction,—one of the very few, too, in the Western peninsula that has a clerestory; and the windows of this clerestory are filled with the figures of saints, chiefly local, in richly-harmonised colours on white backgrounds, giving the fabric a singularly effective and tasteful aspect. The saints represented are: St. Andrew, the patron of fishermen; St. Winn (female), St. Salvador, St. Blaize, patron of the woolcombers; St. Ia (female), after whom St. Ives is said to be named; St. Sampson, of the adjoining parish; St. David, St. Borin (female), St. Cadoc, St. Germanus or St. Germain, St. Dwyn (female), St. Petrocus, of Bodmin; St. Patrick, St. Etha (female), St. George, St. Piranus, patron of the Cornish tanners; St. Nouna (female), Altarnun; St. Gerain, St. Feock, St. Ursula, of the legend of the 11,000 virgins; and St. Tella—all chosen for some special fact or connection. The windows are three-light, and in each a female saint occupies the central place. The same rule is followed in the chancel window, where the figure of St. Catharine is supported by those of St. Finbarrus, the patron saint of the church,

and of St. Nicholas, the patron saint of sailors, most fittingly placed in honour, therefore, in an ancient port like that of Fowey. The Masonic window contains the figures of Hiram the builder, Solomon, and Hiram the king.

It is proposed to erect a laboratory and school of art at Redruth at a probable outlay of £1,200.

A discovery has been made at St. Cleather, near Launceston. Down in the picturesque valley of the Inney, beneath the shadow of great rocks which burst out from the hill-side like semi-fettered and fossilised giants, the remains exist of an old chapel. The external walls may be covered with moss and fern as they are—clearly defined and measure some 27ft. by 17ft. It is regularly planned, duly oriented, and has a western and north entrance. The "Holy Well" is north-east of the ruins. The most remarkable thing is that in this ancient ruin the original stone altar is still *in situ*, and the five consecration crosses are distinctly discernible.

We happened to see a curious tract the other day bearing a poor Cornish history in the 17th century. In it a certain Charles Fitz Gellery, the then rector of St. Dominick, came in for notice. He was a remarkable preacher, and he did not hesitate to use his pulpit for speaking his mind in regard to those who sat in high places. Some of his passages are extremely well expressed. He was very bitter against the landlords for their action in keeping corn, when the people were in need of it, until the price advanced. What would a congregation in these days think of a sermon in this bit of invective? "Heare and tremble all ye Nimrods, and you rough-handed Esaus, grinders of the poor, oppressors of the people; think not to fillip off those curses which your cruelties have squeezed from them! with 'Tush! what care I what the people say?'" and much more to the same effect. He was epigrammatic, too. *John*.—"Not the lion and the unicorn, but the plough and ship, under God, are the supporters of the English crown." There is indubitably a lot of meaning in that. Further on is an account of a debauch amongst Roundheads at Lostwithiel. Thereat, the toast of the evening was, "The Health of the Devil." Whether his satanic majesty was at all the better for having his health drunk in this way does not appear; but this fact was duly noted—possibly as a hint to others—that the man who proposed his health died in the same room shortly after, "raving, and blaspheming, and cursing."

What will ultimately be done with the old Eddystone Lighthouse? This is an important question. Plymouth would like to have it, and has perhaps a stronger claim than anywhere else. The Trinity Beacon upon the Plymouth Hoe will need to be replaced at no distant date, and if in its stead there is re-set up upon that commanding position Smeaton's noble tower, it would be both a useful and ornamental adjunct. The lighthouse will certainly not be taken down until next spring. The Trinity House have already received several applications for it. One has come from the Vicar of Rushorpe, near Leeds, which was Smeaton's birthplace. The Rushorpe folk would like to re-erect it in their midst as a lasting memorial to their great engineering townsmen. Looking at the matter practically, we really feel very doubtful whether the lighthouse can ever be removed in piecemeal. Every stone is cunningly and curiously dovetailed together and bedded in a particularly strong cement. The recent accident at the new lighthouse, which we passingly referred to in our last, was a remarkable one. When the usual weekly vessel for taking the men on shore came, Mr. Edmund, the engineer in charge, standing at the opening, nearly 50ft. above the basement, took hold of the lowering tackle, and called to the man on duty to let him down. Scudgily, the labourer caught hold of the wrong end of the rope and when Mr. Edmund, receiving the word that all was secure, swung himself out, down he went "with a run," pitching upon the rock full 45ft. below! Through a merciful Providence, he escaped with a mere shaking.

At Plymouth, the tower and spire of the new church of St. Jude's in Tophill lane, is up above the belfry windows. It is being erected from the designs of Messrs. Hine and Olgers, of that town. The tramways have been so successful at Plymouth that it is proposed to extend them very considerably. The new public hall

which has just been opened at Devonport is from the designs of Mr. S. Knight, architect, of Cornhill, London. Its cost is £8,100. The style of architecture is Classic. It holds about 3,000 persons. But why, in a town whose very streets are paved with marble, the front of the building is, as the local newspapers record, "elaborately decorated with handsome mouldings worked in cement," does not appear at all clear. During the early stage of the works the western wall fell down. Upon the opening day, the exits from balcony, gallery, and the body of the hall leading into the same staircase, did not win approval, and it has been determined to remedy the defect by an extra staircase. What do all the rich men who have sprung from Plymouth do with their wealth? With the exception of the carillon in St. Andrew's tower and the drinking fountain on the Hoe, and the clock-tower, it would be difficult to point out any modern gift to the town of more than trifling value. Is it that there is no local patriotism or no local wealth, or that there is a superabundance of selfishness among its possessors?

Mr. Alfred Norman, architect, of Plymouth and Devonport, has received instructions to complete the partially-erected church of St. Mark's at Ford, a suburb of those towns. The work will be immediately proceeded with.

At Exeter, it has been resolved to light up the cathedral nave for evening service from Advent Sunday to Easter Day. This resolution offered a fine opportunity for the introduction of the electric light. Two Brush lights would have lit the fine expanse superbly, and thrown out the perspective of continuous roof-groining magnificently. The old-fashioned gas arrangement, however, is to do duty. A continuous pipe now encircles the upper part of each of the nave arcade capitals, and from this are jets at regular intervals. The effect is, I must admit, good, but by daylight the contour of the beautiful-moulded capitals is ruined thereby; for instead of a definitely-defined line at the top, there is now an extra member—a roll, formed by the gaspipe, following the outline of each clustered cap. This is one of those matters which, trifling as it may seem to the outside public, make the professional world deplore that Exeter Cathedral has no appointed architect, under whose supervision such work might be done. The gas-fitting itself has been excellently carried out by Mr. Fred. M. Rice, of St. Sidwells, Exeter, who has been employed from time to time upon cathedral work for nearly 20 years. The first evening service took place on Sunday week, when hundreds were unable to get in, amongst those shut out being the writer, who had taken the precaution to go half an hour before the time. The accommodation which will be thus afforded by the nave will be much appreciated in the city. Exeter has between 40,000 and 50,000 inhabitants, and for these there is only church room for some 10,000.

Mr. F. Medley Fulford's (F.R.I.B.A.) new church of St. Matthew at Newtown, Exeter, is making good progress. It is in the Geometrical style of Early Decorated Gothic, and (exclusive of boundary walls and tower) will cost £6,000. Externally it is of local red brick, with stone dressings. Another of Mr. Fulford's churches—that of St. James's, about half a mile from St. Matthew's—had a new section opened upon the 23rd ult. The new chancel was built three years ago at a cost of £1,550; now, at a further cost of £2,550, the western portion of a fresh nave has been erected; between this and the chancel the remains of the unightly old building remains, a great eyesight than ever. Mr. Fulford's design is a pleasant one, and the piquant west end turret is a particularly picturesque feature. Mr. Fulford is also erecting a mission chapel at Wonford, just outside Exeter, and has just finished a reconstruction of the nave and aisles of St. James's Church, an ugly building of the latter days of King William the Fourth. Over the new west gable is a lead-covered wooden spire, rising to a height of 108ft.; 160 new seats are provided on the ground floor, and 105 in a west gallery at a cost of £2,550. The present section of the entire scheme for rebuilding has been executed by Mr. J. R. Gibbard. The church of St. Petrock, one part of which stands in the cathedral-yard, has been almost rebuilt, and was reopened by Bishop Temple the other day. A new Decorated chancel has been

built, the old one being altered into a baptistery; an organ-chamber has also been added. Messrs. Hayward and Son were the architects, and Mr. W. R. Cummings, also of the "ever faithful" city, has carried out the contract at a cost of £1,250. The new arcade at the head of the High-street is all but finished. It is a prominent feature in Exeter, and has been built from the designs of Mr. James Crocker, F.R.I.B.A., architect, of that city. Several other large buildings in Exeter are also in progress. At some other time we may refer to them. H.

THE FORTH BRIDGE.

THE Parliamentary plans and sections of this work were duly deposited, as required, on the 30th November; and the amended design for the great bridge, by Mr. John Fowler and Mr. B. Baker, the engineers now entrusted with the carrying out of the undertaking, will in due course be brought before the usual Parliamentary Committees for critical examination. The structure is to be a girder bridge of greater strength and rigidity than the Britannia tubular girder bridge crossing the Menai Straits. The two great openings on each side of the island of Inchgarvie are proposed to be traversed by steel girders, 1,700 feet in length. The Britannia Bridge has spans of 460 feet, and for many years it remained the largest girder bridge in the world. Quite recently a structure, having five spans of 525 feet girders, has been built at Poughkeepsie, in America; while several large girder bridges of between 400 feet and 500 feet span have been erected in Germany and Holland; but nothing so great as even one-third of the span of the Forth Bridge girders has yet been attempted. To render so large a span practicable, the proportions usually adopted for girder bridges have had to be entirely departed from. Thus it is usual to make the depth of girders about one-tenth of the span throughout; but the depth of the great girders of the Forth Bridge will be no less than 340 feet, or one-fifth of the span, at the piers, and only about 50 feet at the centre of the 1,700 feet openings. In ordinary lattice girders, the struts are usually made of a couple of angle iron or tee-irons, perhaps 4 inches or 6 inches wide, riveted together; but in the Forth Bridge the corresponding struts will be huge steel tubes, as much as 12 feet in diameter. The underside of the girders will not be level, as in most bridges of the kind, but of an arched form, the girders springing from heavy piers of masonry at a height of 20 feet above high water, and arching upwards until the required headway of 150 feet, for a width of 500 feet at the centre of each opening, is attained. The arched lower member of the structure consists of two steel tubes, tapering from 12ft. to 5ft. in diameter, and spaced 120ft. apart, centre to centre, at the piers, and 30ft. apart near the centre of the openings; the whole being firmly braced together by steel struts and ties, to resist the enormous wind pressure. A cross section of the bridge at the centre would differ little from that of any other big girder bridge; that is to say, the distance between the two girders would be about 25ft., both at top and bottom, which is the width necessary to accommodate two lines of railway. A cross section of the bridge at the piers would, however, show a vast difference. There the two main girders would be no less than 120ft. apart at the bottom, and 50ft. apart at the top, the great tubular struts and ties inclining towards each other, the better to resist the wind pressure. The upper member of the bridge being about 350ft. above high water at the piers, and only 200ft. at the centre, the structure to some extent resembles in appearance, though not in principle, a combination of a suspension bridge with an arch. In stiffness under the working of heavy railway traffic and the action of violent blasts of wind, the structure thus briefly described is expected to excel all existing bridges. The heaviest trains which could be brought on the bridge would only bend the 1,700ft. girder the extent of some 6in., or less than Brunel's 455ft. span Saltash girder bridge was deflected under its test load. Similarly under the action of a wind pressure which would hurl most railway trains in the kingdom off the rails, the lateral deflection would be only some 6in. In an ordinary suspension bridge of equal span it would be as

many feet. The strength and stiffness of the proposed bridge are calculated as partly due to the design and partly to the material. The latter will be exclusively steel, of the greatest attainable strength and ductility consistent with the other qualifications which experience in steel ship-building has proved to be necessary. About 50,000 tons of steel in all will be used in the construction of the bridge, and the estimated cost of the whole work and of the short connecting lines is about £1,600,000. The preliminary surveys and borings have been completed, and the work of the engineers, for the next six months, will consist chiefly in the elaboration of the working drawings, and preparation generally for letting the contract for the work. When the necessary Parliamentary powers have been obtained, no time will be lost in making a start with the work.

SIR ANDREW FAIRBAIRN ON ARCHITECTURE.

ADDRESSING the students and friends of the Selby School of Art last week, at the annual distribution of prizes, Sir Andrew Fairbairn said that recently a Leeds millionaire, being struck with the architecture of some Venetian buildings he had seen while travelling, had a warehouse built from a similar design in Leeds. He asked his hearers to consider, in connection with this, what had been the condition of architecture in this country. In bygone times we had had some wonderful architectural structures—the York Minster, and the Selby Abbey, for instance; but, after a while, the profession of architecture seemed to fall very low indeed, and buildings were erected without any attempt at adornment. Thirty or forty years ago there was a kind of reaction. He remembered this particularly in connection with the Leeds warehouses, in the construction of which the first architectural change was instituted by Mr. Darnton Lupton, at his warehouse in Wellington-street. Many of Mr. Lupton's townsmen were taken aback at the audacity of his alterations; but the result was that almost every building in Leeds, with the exception of the old Cloth Hall, which, he supposed, remained as a monument of what was bad, was reconstructed. Since then there scarcely existed a church in the country that had not been restored, and the change had also extended itself to the Dissenting places of worship. There had, of course, been certain crazes, such as the Gothic craze, and the existing Queen Annie mania, which would, no doubt, in its turn be succeeded by some other style. But whatever might have been the eccentricities of those various styles, the result was a great improvement on the old system of architecture. Within the last twenty years also England had received a powerful incentive to the development of art by the numerous exhibitions that had been held in the country, and, as a consequence, art schools of various descriptions had been formed. The progress of art had been very much assisted by the establishment of the South Kensington Museum, for which we were indebted to the late Prince Consort. That Museum had collected and opened to the whole of England a variety of art treasures almost without parallel. Therefore, the art student of the present day had many advantages which his forefathers did not possess, and it was to be hoped that he would make the most of his facilities. But he wished to offer a few words of advice on this point. It was well known that an Englishman who had a taste for any particular subject always aimed at the top of his particular tree. It must be remembered that it was impossible for everybody to get to the top of every tree, and the moral he wished to point was that people should not aim too high unless they were perfectly certain to succeed.

BREWERIES.

AT a meeting of the Society of Engineers held on Monday evening, December 5th, a paper was read by Mr. W. Barns Kinsey, "On Arrangement, Construction, and Machinery of Breweries." The author first stated the general principles which should govern the arrangement of the buildings and machinery; he then treated the subject of wells and water. A

simple way of preventing contamination was to bore from the surface of the ground, lining the boring with cast-iron pipes, and suspending the pump within the boring, wells of considerable depths having been constructed in this manner. He next described the machinery used in brewing, which he divided into six sections, namely, pumping, grinding, mashing, boiling, cooling, and fermenting and cleansing, stating that the simplest arrangement was by gravitation, the cold water or "liquor" being pumped to the top of the building into a vessel called a cold liquor back, thence it flowed to the hot liquor back to be heated, thence to the mash-tun to be mashed with the malt, from which the wort was run off through a perforated false bottom to the copper to be boiled with the hops, which were afterwards strained from it in the hop-back, and run on to the coolers and refrigerator to be cooled to the required temperature for fermentation. This, the most important process, was carried out in fermenting tuns, and the beer was either skimmed or cleansed. The use of attenuators, cleansing and union casks, together with yeast presses, elevators and lifts, casks, washing apparatus, &c., were duly described and illustrated by models and diagrams. Lastly, the engines and boilers should be of ample power and of the simplest construction, the Lancashire double-flued boiler being most suitable for brewery work.

CHIPS.

The system of tramways first constructed through the city of Oxford was officially inspected by Major-General Hutchinson, on behalf of the Board of Trade, on Monday week, and was opened on the following Thursday. The work has been carried out from the plans of Mr. Brunton, chief engineer, Mr. T. C. Fidler being resident engineer, and Mr. Howard, clerk of works. Mr. E. D. Matthews was the contractor.

The workmen employed on the rebuilding of Mount Stuart House, Rothsay, Isle of Bute, with their wives and sweethearts, were entertained at dinner in the public hall, Rothsay, on Thursday evening, at the cost of the Marquis of Bute, in celebration of the fixing of the roof-tree of that mansion.

A stained-glass window has been placed in St. Saviour's church, Herne-hill-road, to the memory of a deceased chorister. The figures in the two lights are David and Solomon, and the work has been executed by Mr. George Wavell, of Flaxman-road, Brixton.

The parish-church of Kemberton, Salop, is being rebuilt. The old building was erected at the beginning of the present century, and in the wretched taste of that age. The new church is in the Early Geometric style, and the walls are of local red sandstone, with open pitch-pine roofs, covered with Broseley tiles. Mr. Whittingham, of Newport, Salop, is the contractor, and the works are being carried out under the direction of Mr. Joseph Farmer, architect, of Brocklin court, Shifnal, Salop.

A stained-glass window has been placed in St. John's church, Portmadoc, to the memory of the late Mr. John Breese, F.S.A., a well-known Welsh antiquary and bibliophile.

At a meeting of the Lycett memorial committee held at the City of London Liberal Club, on Friday week, it was resolved to commission Mr. Acton Adams to execute a marble bust of the late Sir Francis Lycett, in accordance with a terra-cotta model exhibited.

The local board of West Ham have instructed their clerk, by special resolution, to promote a bill in the next Session of Parliament, giving power to the board to recover payment of fees by persons constructing and altering buildings within their district, and also for extending the powers of the board in regard to making bylaws as to the pollution of water in dwelling-houses and factories, and as to ventilating dwellings and protecting them from fire.

A new London Board-school, in Netherwood-street, Kilburn, was opened on Monday week.

The contract for the erection of the new Tay Bridge having been obtained by Messrs. W. Arrol and Co., of Dalmarnock Ironworks, Glasgow, the work of erecting the bridge will be commenced immediately. The engineer is Mr. Barlow. Operations are to be carried on on both sides of the river simultaneously.

A new deaf and dumb institute, in connection with the Smyllum orphanage, Lanark, will shortly be commenced. It has been designed by Messrs. Pugin and Pugin, of Westminster.

COMPETITIONS.

FULHAM WORKHOUSE INFIRMARY.—The Fulham board of guardians proceeded, on Thursday, the 3rd inst., to consider the selection of plans for the new infirmary. Mr. Storey proposed that the authors of five plans, other than those recommended by Mr. E. H. Currie, the referee, be called before the board to explain their designs. To this an amendment was moved by Mr. Froy, that no other envelopes containing the names of authors of designs be opened, nor the names of authors be made known until the board had decided which plan they would select. Both the original motion and the amendment were lost; but after a long discussion it was resolved that "Experience" in Circle, the plan recommended by the referee, be adopted. The authors of "Experience," as we announced a fortnight since, are Messrs. Giles and Gough.

GLASGOW MUNICIPAL BUILDINGS.—The assessors have issued a list of the mottoes of the designs they have received, which will be found elsewhere in our advertisement pages. It has been impossible for our printer to reproduce some of the emblematic mottoes, so we have had to translate them into words, and hope they will be recognised. We may just remind competitors that, in our opinion, spots in circles, and anchors, and triangles, and the like, are not good devices to use in competitions. They are difficult to identify, and almost sure to be duplicated.

ST. PANCRAS WORKHOUSE.—At the meeting of the board of guardians for St. Pancras, held on the 1st inst., it was decided, on the recommendation of the Workhouse Accommodation Committee, that five architects be chosen by ballot, to send in competitive plans for the reconstruction of the workhouse; also that, subject to the approval of the Local Government Board, the sum of £300 be divided between the four unsuccessful competitors, it being considered by the guardians that the successful architect would be sufficiently remunerated for his trouble by the appointment.

SCHOOLS OF ART.

SALISBURY SCHOOL OF SCIENCE AND ART.—The works of the students of this school were exhibited in the large room in the council-chamber on Thursday week and following days, and formed a large and highly creditable collection of drawings and paintings in the several departments of art. As is well known, this school has attained to a very high position amongst the Art Schools of the kingdom, some of the chief medals and prizes in the national competitions having been awarded to its students. On the present occasion the exhibition showed that the students are still progressing in merit, and that the school is holding its own. The national and local prizes gained by the students during the year were presented to them at a public meeting, held in the council-chamber on Friday evening, when the usual proceedings were gone through in the presence of a large gathering of the friends and supporters of the school.

A reredos has been placed in the parish-church of Frisby-on-the-Wreake, near Grantham. It is of alabaster, supported on a base of Caen stone, and is divided into three compartments of columns of Irish marble. In the central panel is a figure of our Lord in the act of teaching, and in the side panels are the A and Ω. On encaustic tiles introduced into the reredos, are symbols of the Passion of our Lord, including the hammer, the nails, the sponge, and the crown of thorns. Messrs. Jones and Willis, of London and Birmingham, carried out the work.

The annual distribution of prizes and certificates in connection with the science and art classes at the Institute, Stockwell, S.E., took place on Tuesday week. The report of the organising master, Mr. B. J. Rose, showed that during the year 296 students attended the classes, which showed a steady increase. In the science and art examinations the students obtained 55 certificates, nine Queen's prizes, and three third-grade prizes, and 20 special local prizes were also awarded. To the national competition 1,174 works were sent by students, and gained, amongst other awards, three Queen's prizes.

Mr. John Woolgar, builder and contractor, of Horsham, was killed on Saturday morning by a fall from a scaffold, some 30ft. high, on buildings he was erecting.

CONTENTS.

The Subject and Neighbour Lands of Venice	747
The International Exhibition of Smoke-Preventing Appliances	748
Some Notes on Flooring-Boards	749
Royal Institute of British Architects	750
The New Compulsory Architectural Examination, and What it Involves	751
Improved Method of Warming Fresh Air	752
Practical Notes on Plumbing.—XXI.	752
Tewkesbury Abbey	753
Terra-cotta and Pluence as Materials for Architectural and Decorative Application	754
Some More Notes on the West	755
The Forth Bridge	756
Sir Henry Fairbairn on Architecture	757
Breweries	757
Chips	757
Competitions	757
Schools of Art	757
Our Lithographic Illustrations	758
Architectural and Archaeological Societies	758
To Correspondents	771
Correspondence	771
Intercommunication	773
Legal Intelligence	774
Our Office Table	775
Meetings for the Ensuing Week	777
Tenders	777

ILLUSTRATIONS.

TYPICAL EXAMPLES OF EARLY GOTHIC DETAIL.—VILLA IN BOWLEY PARK, STAFFORD.—ST. NICHOLAS CHURCH, RUDMERSHAM.—SANDFORD-STREET BOY'S SCHOOL, SWINDON.—HEATHCOTE BUILDINGS, NOTTINGHAM.

OUR LITHOGRAPHIC ILLUSTRATIONS.

TYPICAL EXAMPLES OF EARLY GOTHIC DETAIL.

THE two sketches from Ripon Cathedral in Yorkshire, are specimens of some of the fine Transitional work in which that building abounds. The bay in the nave is interesting, as showing how small our forefathers' respect was for preceding styles, and the unconcerned way in which they altered any work to suit their own convenience. The cathedral is one of the best I know for variety of style; I am not sure whether there is any actual Norman, but with that exception I think every other style is represented. The other sketches are all the result of a little tour in the North-east of France taken a year ago. I fancy most will be familiar to your readers through Mr. Nesfield's fine book, but are such good work that there is not much fear of too often dwelling upon them. The spire at Senlis is, of course, almost if not quite unequalled, and certainly the impression it makes upon one, no matter from what point of view it is seen, is most striking. I only wish my sketch were a better representation of it. The bay from the nave of Chalons-sur-Marne shows a contrast between English and French work, it being, I think, about the same date as the Ripon example. The carving in this church is especially fine, and shows a strong Byzantine influence; it is delicate to the very last degree; the capital I give from S. Remi, Reims, is very fine and delicate, but by no means equals it. The last sketch is an internal view of the cloisters at Noyau, and is to me full of pleasant memories of sunshine and quiet.—A. L. TATE.

VILLA, BOWLEY PARK, STAFFORD.

THIS house, which has recently been erected at a cost of about £1,250, is situated on an eminence in Rowley Park, those windows which face the west commanding a fine view over Stafford Castle and the surrounding country. The walls are of red brick, with red brick mouldings and string courses; the roof is tiled. The walls on ground and upper floors are cavity walls, bonded over cavity every fourth course with thin perforated headers. The internal doors to principal rooms are executed with pitch-pine tiles and rails, and mahogany panels; all other joinery is executed in pitch-pine. The upper portions of windows are glazed with lead light glazing in various units. There are two good attics, and a bath room on second floor. The building was erected by the proprietor, Mr. William Moss, contractor, Stafford; and Mr. Robert Griffiths, County Surveyor, Stafford, was the architect.

RUDMERSHAM CHURCH.

As one of our illustrations, we give an interior view of the restored church of St. Nicholas at Rudmersham, near Sittingbourne, Kent. The

Church consists of chancel, south chapel, nave with side aisles, and a beautiful west tower. The complete restoration of the chancel and of the interior of the nave was carried out some four years since; and during the demolition of the high-backed pews which completely choked up the whole of the nave, the architect (Mr. S. Slingsby Stallwood, now of the firm of Morris and Stallwood, architects, Reading), discovered portions of the old rood screen beneath the floor and amongst the pewing, the sill and parts of the lower panelling being actually *in situ* serving to support the pulpit and reading desk. These interesting fragments were carefully preserved, and the screen has now been restored on the old lines, and the ancient woodwork renewed and taken as a guide to the new. The cross erected upon the screen measures 10 feet in height, and the four points contain sculptured representations of the four evangelists, with the *Agnus Dei* at the intersection. The church contains some very interesting 15th century oak screens and sedilia, all of which have been carefully repaired. The south chapel is private property and remains untouched, but the interior has been made "decent," and, by the addition of a second altar, restored to its original purpose.

SANDFORD STREET BOARD SCHOOLS, SWINDON.

THESE schools have been erected for the Swindon School Board in the New Town, to accommodate 794 boys. They are one of a series of schools erected by the Board to meet the educational needs of the Old and New Towns. The school is divided into three sections, junior, middle, and senior, with separate entrances and cloak-rooms, also separate play-grounds, play-sheds, and offices for each division. The head master's room is placed so as to give immediate access to all three, and commands the main entrance. The middle school is placed on the first floor above the junior school. The schools are built of local bricks, the facing being of a yellow grey brick, like London stocks, from the neighbouring parish of Dauntsey. The arches, quoins, and dressings are of thin, red bricks, specially made by Mr. Turner, of Swindon, working five courses to four of the backing. The name of the schools is arranged in a deep red, terra-cotta panel over the entrance. The dormers are also enriched with terra-cotta panels, the date of erection, 1880, alternating with the monogram S.S.B. The roofs are covered with Wilkinson's tiles. The schools are heated entirely by open fire-places, fitted with Elsey's patent warm-air grates, and ample ventilation is provided by Tobin tubes in every window sill. These are fitted with sliding covers; the upper part of the windows are hinged to open inwards, and are fitted with Elsey's patent levers. The lower parts of the windows are arranged as double hung casements. The buildings have been erected by Messrs. D. C. Jones & Co., of Gloucester, from the designs of Mr. Brightwen Binyon, A.R.I.B.A., of Ipswich, at a cost of £5,143, including all fittings.

HEATHCOTE BUILDINGS, NOTTINGHAM.

THIS block of buildings has recently been erected at the angle of a new street, recently opened in a populous portion of the borough of Nottingham, and which has been named Heathcote-street, after an inventive gentleman who made sundry improvements in the manufacture of lace and other articles. The block consists, on the ground floor, of eight sale shops and other business premises, and above are warehouse let off for the lace trade, which is the chief industry of this thriving town. The main supports of the building are greenmoor stone and cast iron, the superstructure is the best Nottingham red brick, with Hollington stone facings. Terra-cotta has been used in panels, gables, and other places. The trefoil headed panels above the plate glass of ground floor are filled in with highly-toned stained glass in lead geometrical patterns. The whole has been erected from designs by, and under the superintendence of, Messrs. S. Dutton Walker and Howett, of Nottingham, architects, by Mr. Henry Vickers, of Nottingham, contractor.

The first portion of a new church is in course of erection at Northam, near Southampton. The contract includes the erection of nave, chancel, chancel-aisle, and vestry, and has been taken by Messrs. H. and J. Bull, of Southampton, for £4,000.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

EDINBURGH ARCHITECTURAL ASSOCIATION.—The fortnightly meeting of this association was held last week. A paper was read by Mr. James Gordon, entitled "Architectural Notes in Normandy," giving some account of a sketching tour recently made by the author and two other members of the association in that part of France. Taking the order in which the towns on the line of route were visited, Mr. Gordon proceeded to describe the attractions which each presented to the architectural student, and the peculiarities of general design and detail of the various buildings. Rouen and Caen with their environs, Constance and Mont St. Michel, came in for a larger share of notice, as being especially rich in objects of interest. Many other places visited were also described. Normandy, it was stated, was, with perhaps the exception of the district round about Paris (the old "domaine royale"), the best field in which to study the beginnings and development of Gothic architecture, the wealth of examples affording abundant opportunities for comparison between the various periods. But, Mr. Gordon said, while the field in Normandy thus offered to the student quite an "embarras de richesses" most convenient for systematic study, it was not to be understood that the study of such monuments or such remnants of them as remained to us at home should be neglected. On the contrary, these were deserving of, and should first receive, the most careful study, for, although unfortunately for the most part only fragmentary, they were in no way inferior to the French examples. Few, if any, of the latter could be compared, as regards chaste refinement of detail, with what is left to us of the abbey of Dryburgh or Dunsyre, not to mention others.

CHIPS.

Commodious new showrooms are about to be erected on Pride Hill, Shrewsbury, by Messrs. J. Jones and Son, cabinet manufacturers, of Oswestry, which will be built by their own workmen, from the designs of Mr. W. Charles Evans, architect, 3a, Poets' Corner, Old Palace-yard, Westminster.

A scheme for the drainage of Woodford, South Essex, has been prepared for the urban authority of that district by Mr. Lewis Angell, C.E., surveyor to the West Ham local board. The estimated cost is £30,000.

The Grays Thurrock Gas Company have recently extended their works by building a 52ft. brick and concrete tank, engine and boiler-house, oxide and purifier sheds, coal stores, offices, photometer-house, boundary-walls, &c. The engineer was Mr. A. Williams, of 64, Bankside, and the contractor, Mr. W. J. Botterill, 110, Cannon-street, E.C.

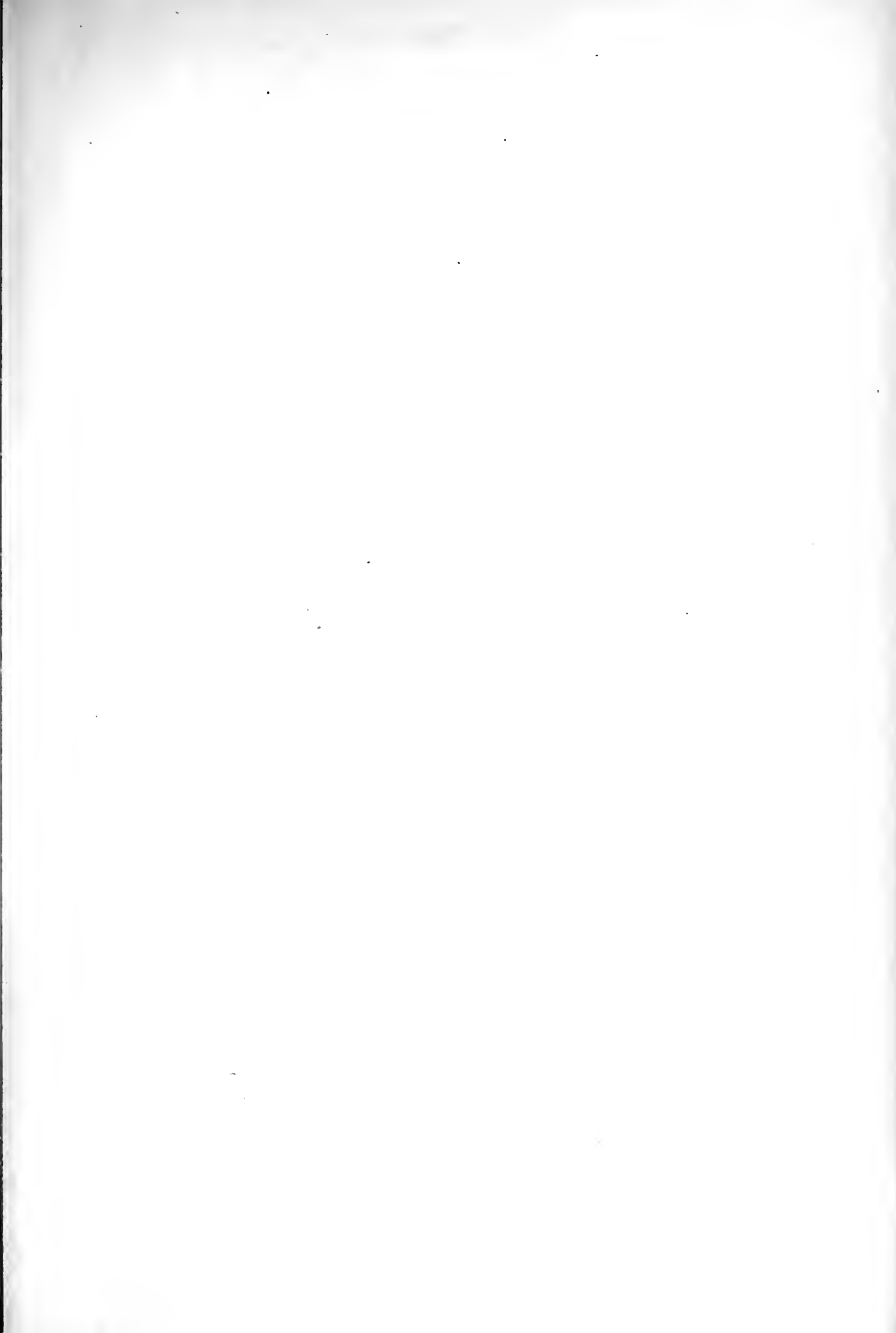
Extensive alterations have been going on to premises, No. 8, High-street, Hanley, for the Staffordshire Union Bank, Limited, a new banking company. The whole of the works, and also the decorations to manager's and other rooms, some additions, at rear of premises, &c., have been carried out under the superintendence and from the plans and detail drawings of Mr. Elijah Jones, of 18, Pall Mall, Hanley. Mr. John Roberts, jun., is the contractor.

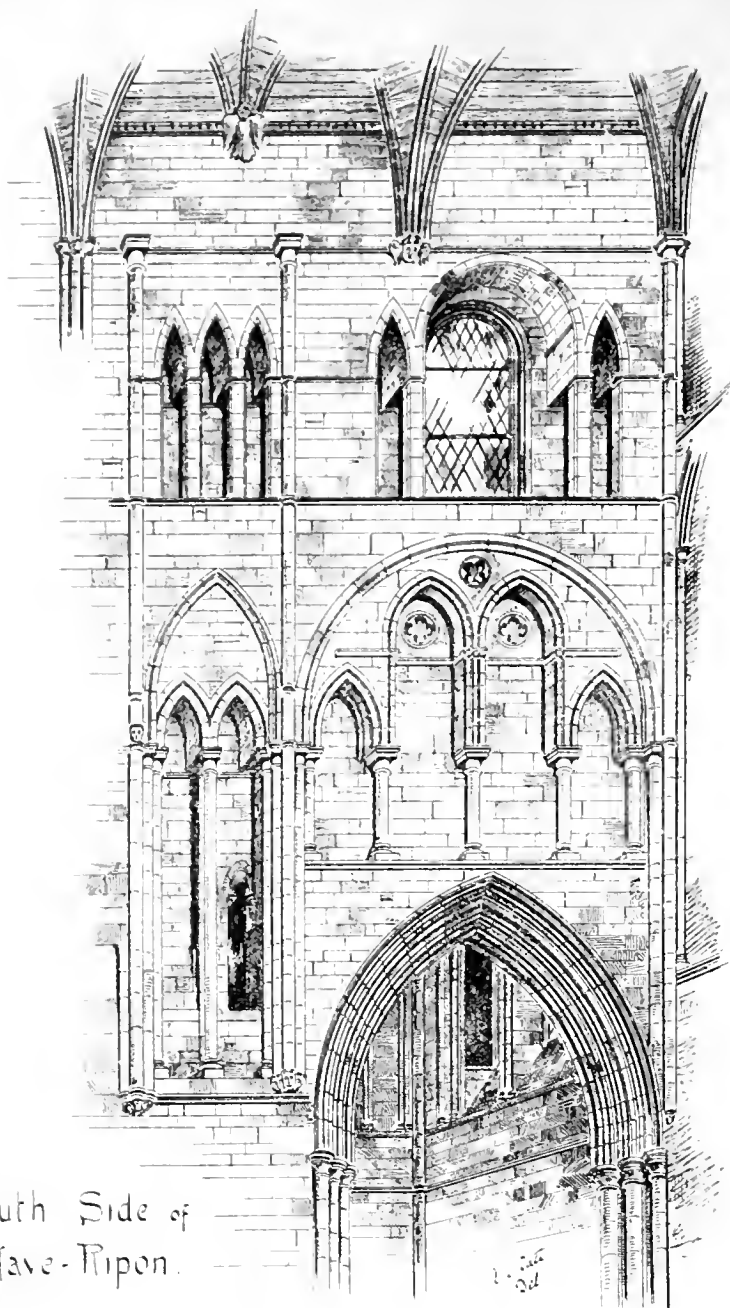
A new chancel, which has been added to Christ Church, Luton, from the designs of Mr. G. Vials, A.R.I.B.A., was consecrated on Wednesday week by the Bishop of Ely.

A new mansion, to be known as St. Andrew's, has just been completed on the hill side overlooking the Spey, at Craigellachie, near Elgin. It is in the Scottish Baronial style, and has been erected from the designs of Messrs. A. and M. Reid, architects, of Elgin. The chief contractors were, masonry, Messrs. Dow and Roy, of Rothes; carpentering, Messrs. A. and R. Dunbar; slating, Mr. Cameron, Elgin; decorations, Mr. Morrison, Dufftown.

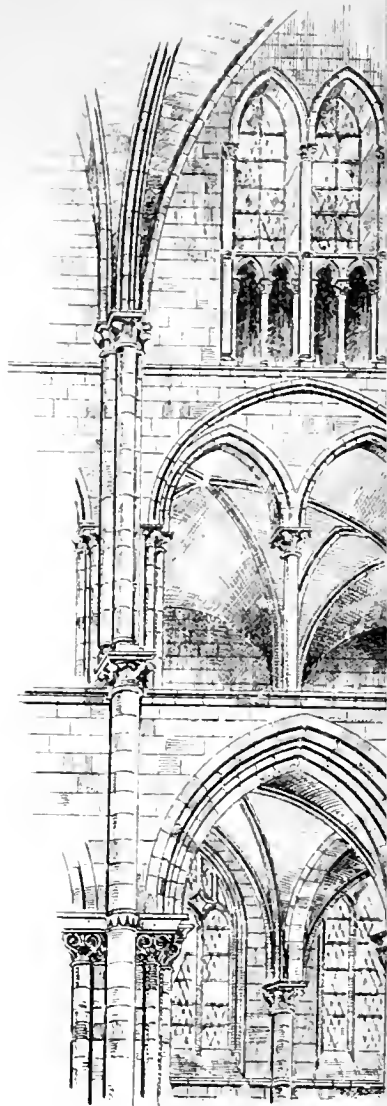
The Merthyr rural sanitary authority resolved last week to raise the salary of Mr. J. Jones, their surveyor, from £160 to £180 a year.

The Brighton town council have adopted recommendations by the borough surveyor that the damage done to the groyne by recent storms should be at once repaired, and that the groyne opposite Percival-terrace should be rebuilt for 125ft. at a cost of £600, and that opposite Chesham-place for 93ft. at a cost of £350. The work will be carried out by Messrs. Patching and Sons, builders, Brighton, under their contract with the corporation.

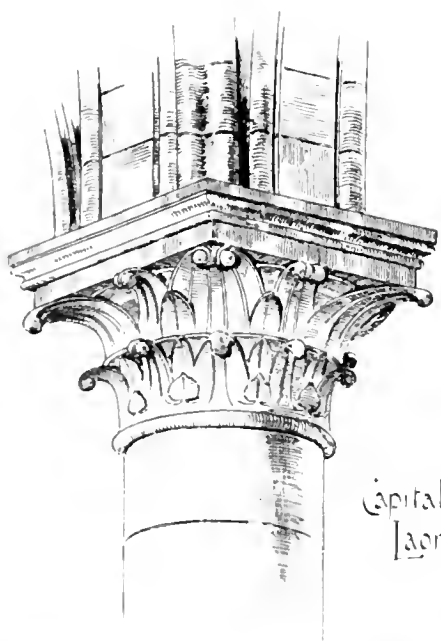




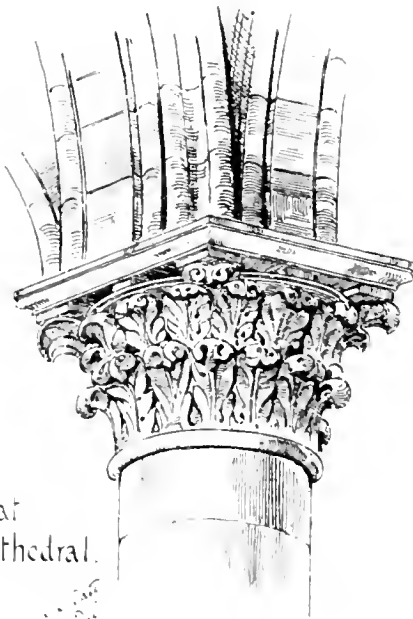
South Side of
Nave-Ripon.



Cloisters
at Hoxon.

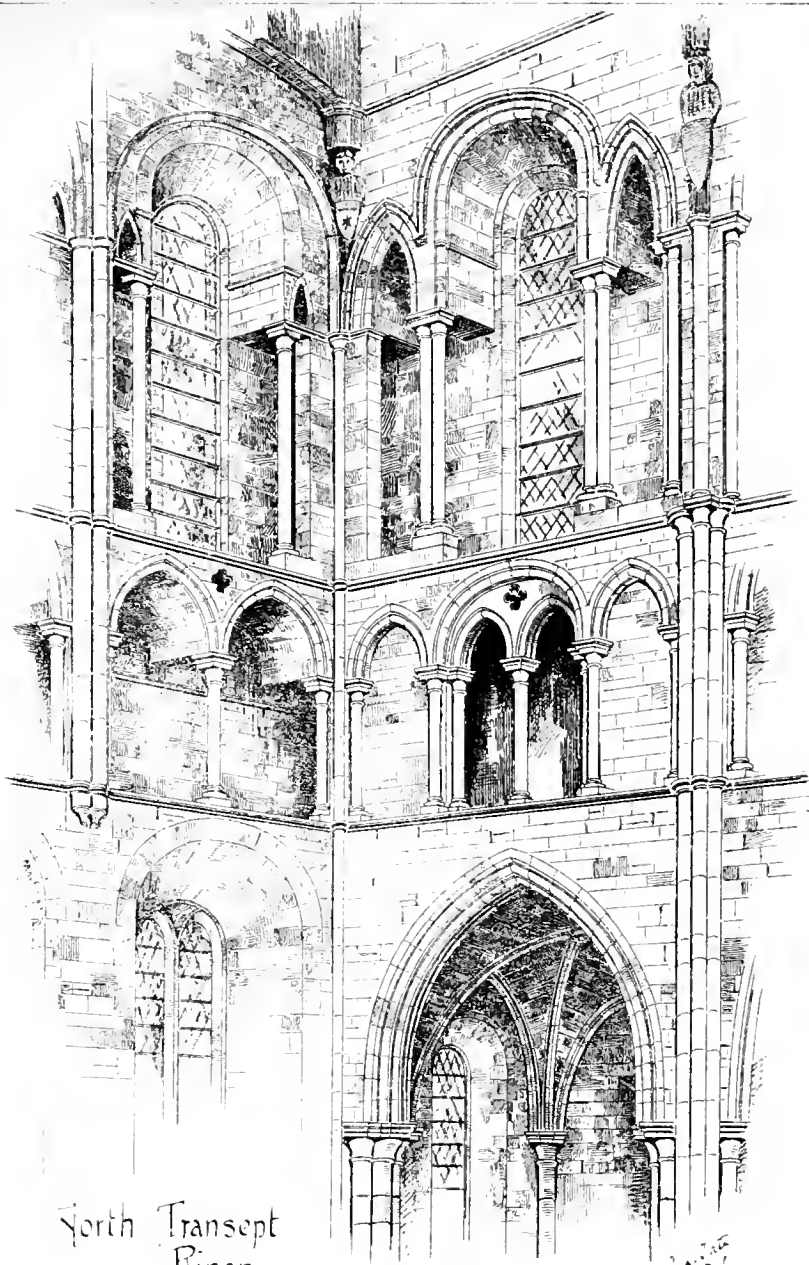


Capitals at
Laon Cathedral.

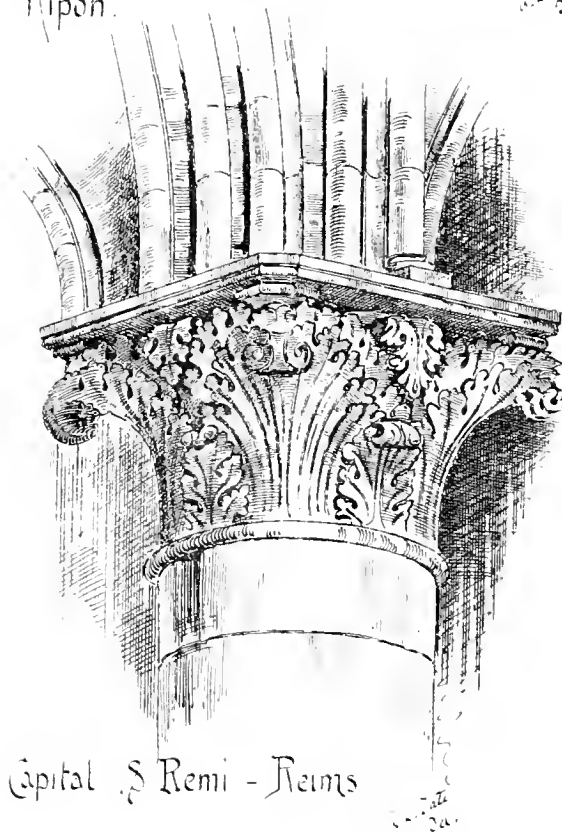
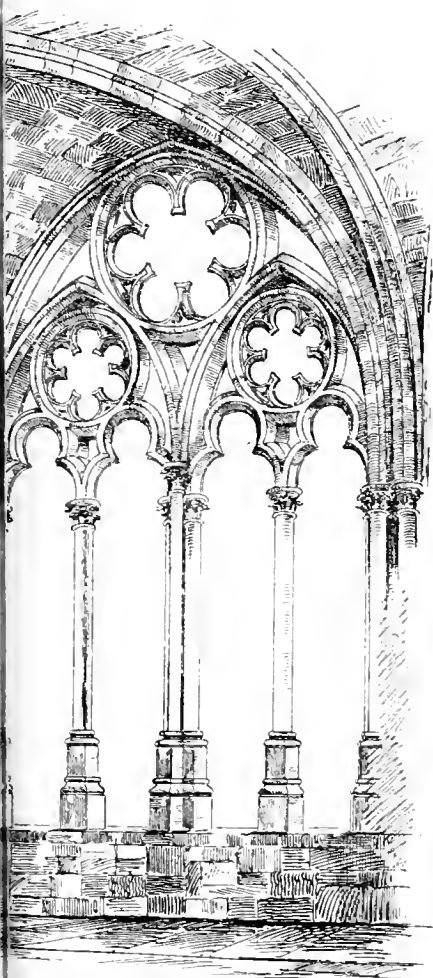




Notre Dame
Chalons-sur-Marne
South Side Nave.



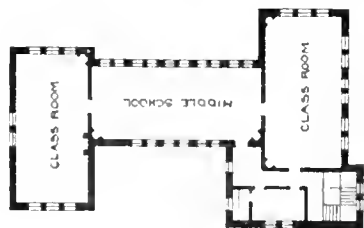
North Transept
Ripon.



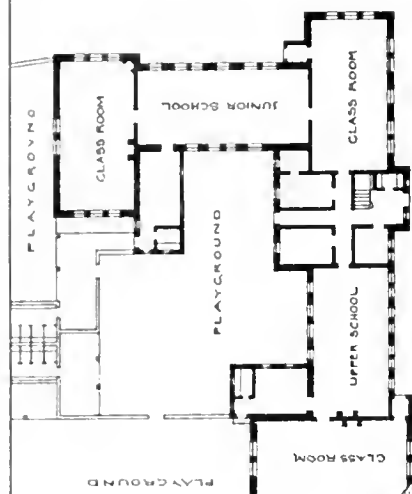
Capital S Remi - Reims



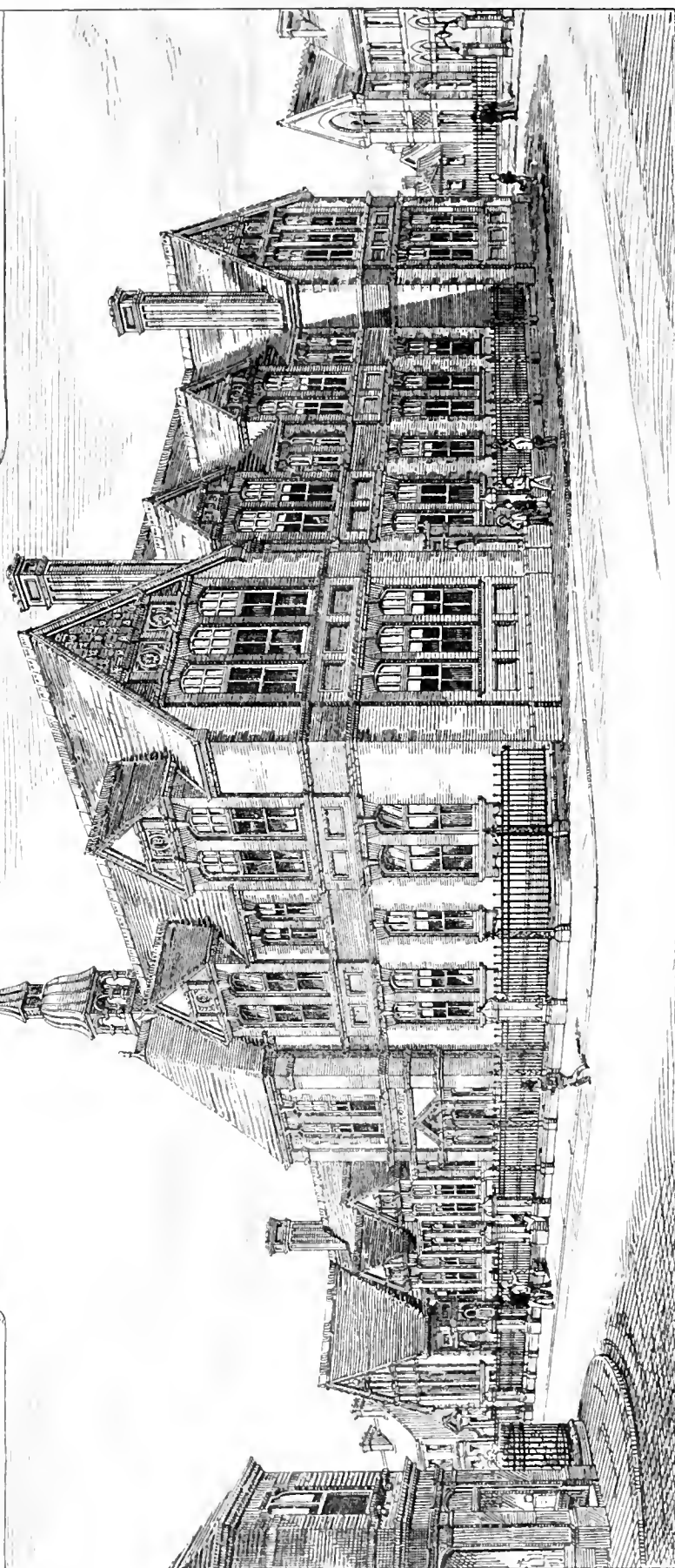




First-Floor-Plan.



Ground-Plan.



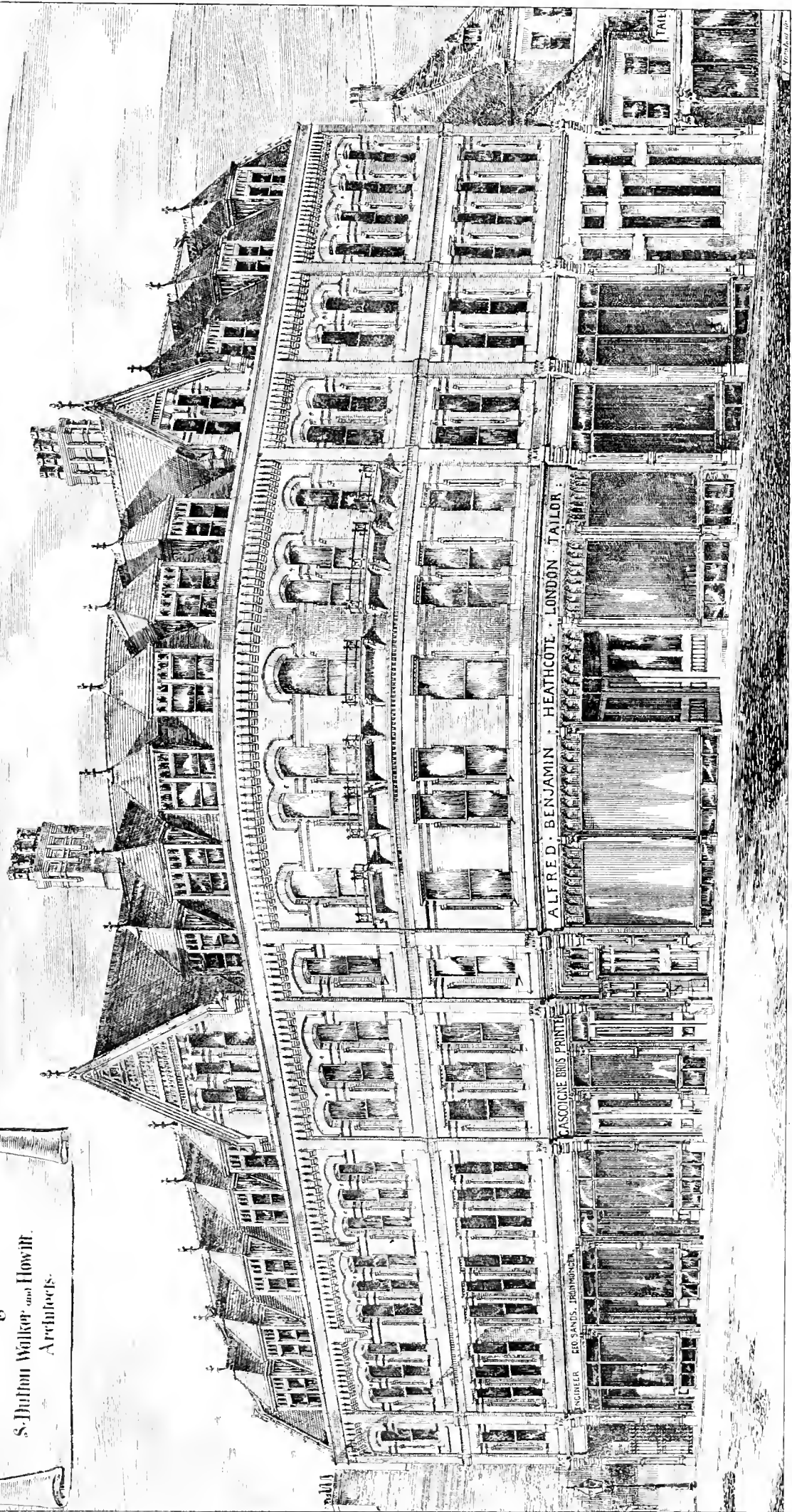
❁ School · Board · for · Swindon * SANFORD · St · BOYS' SCHOOL * Perspective · View · *Brighten Bayton · Architect · Ipswich.*

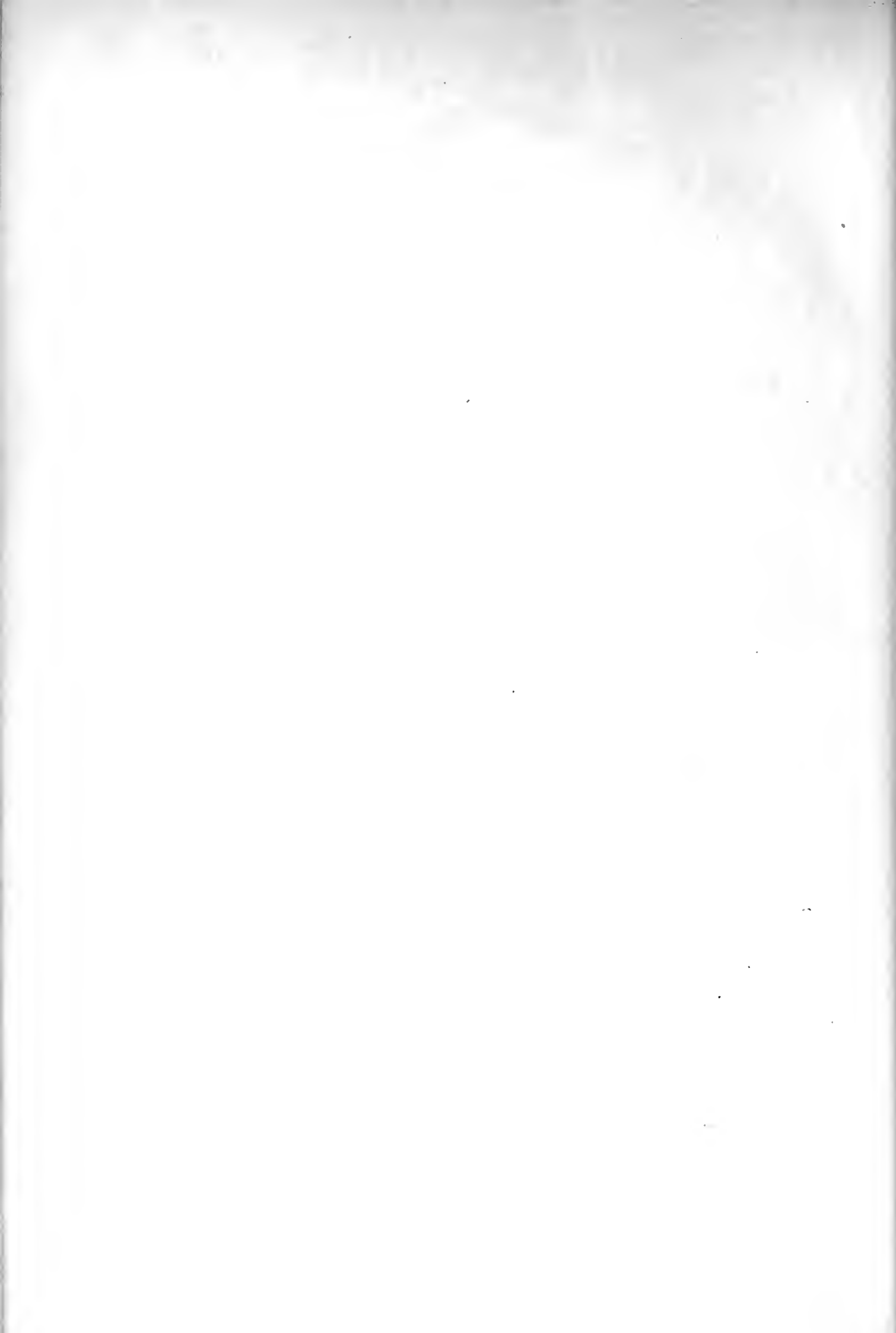
THE BUILDING DEWS, DEC. 9, 1881.

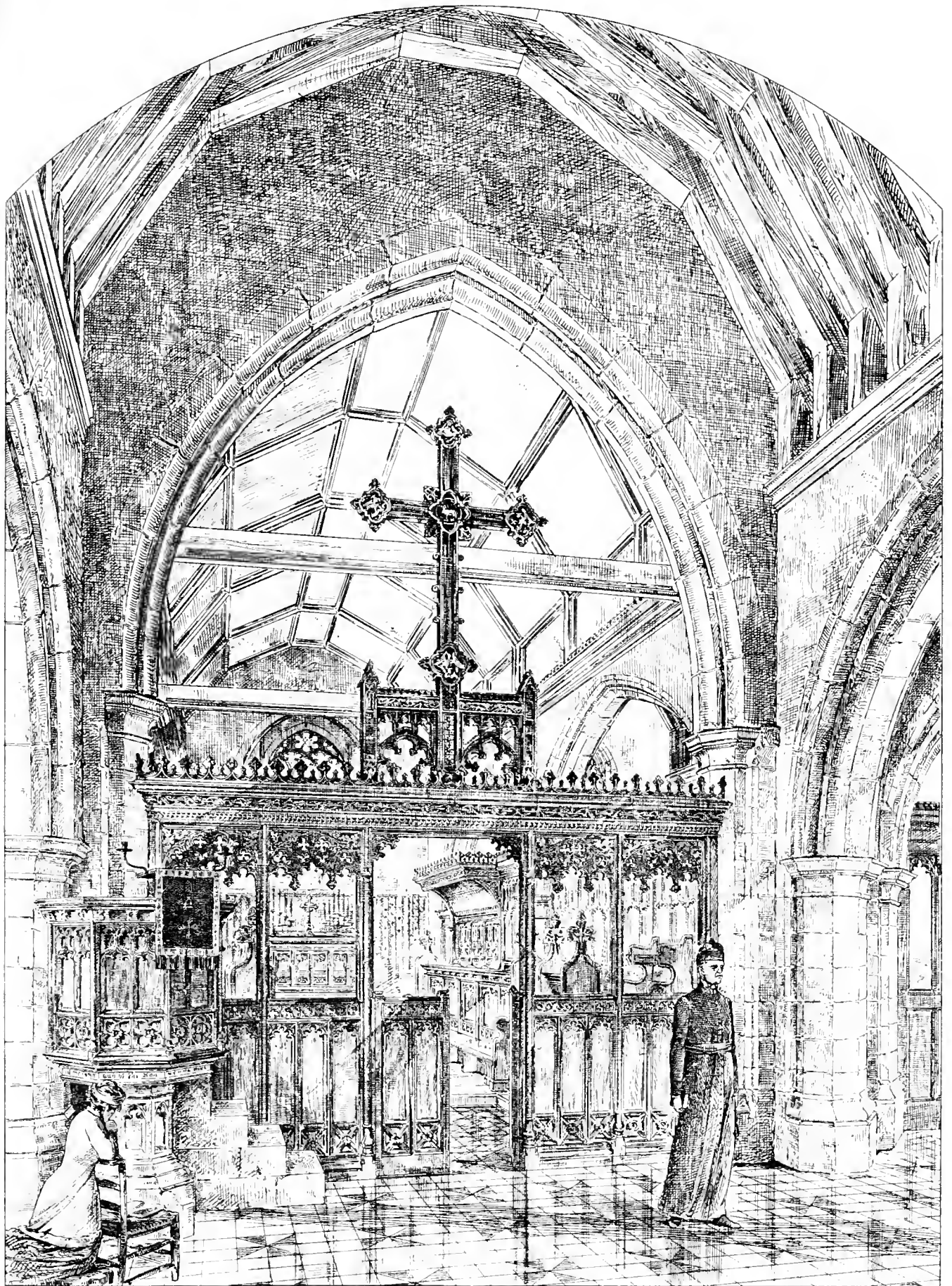
"Heathcote Buildings"

Nottingham.

S. Dutton Walker and Howitt,
Architects.







St. Nicholas * Church * Rodmersham * Kent

Restored by
H. Elmosby Plattwood : Architect :



TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.
Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 3fr. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—E. and S.—M. H.—R. M. and Son.—B. of B. W. J. S.—E. and Co.—J. H.—W. P.—G. M. and Son.—W. and Son.—W. P.—E. C. and Co.—C. and S.—G. and P.—M. and Co.

J. M. J. (Not so uncommon, unfortunately, as to call for special notice, but certainly none the less to be guarded against.)—MASON. (We do not know.)—J. F. D. GOODBYCH. (Possibly of the Secretary, if still in print. We have not published it.)

"BUILDING NEWS" DESIGNING CLUB.

DRAWINGS RECEIVED.—One of Them, Sir Naw Beuan, Self Help, T. Carré, To Be or Not to Be, K. E. S. W., Hugh, Norman, Junior, Sise qua non, Cymro Bach, Tempus Fugit, Wensley Dale, Fudge, L. in circle, V. in circle, West Countryman, Toledo, T. F. in circle, Con, Grosvenor, Try, Cross in circle, K. Exegi, Economy, Hall in circle, Melton, Yorkshire, Amicus, Confido, Tempus Fugit (2), T. D. in circle, Try Again, Ben, I Try Again, Nil Desperandum, Darby and Joan, Finem respice, Sol et Scutum, Gensborne, Ars Longa, T-square, V. in circle, Trial Dado, Lerec, Will, Economy, Triangle in circle, Chip, Damion, Iota, A. Grey, H. H. Chip, Jek, Jake, Ars Longa Vita Brevis, Subjudice, Toledo Dado, V. in circle, Simple-minded.

TO BE OR NOT TO BE. (All drawings sent in are to have the name and address of the authors.)—JUST MY LUCK, OLIVER TWIST, DADO, DEBRY, AND OTHERS. (The 60ft. frontage is the frontage of the building; side lights are better avoided. The stage may be either movable or not. The drawing-room is not for drawing classes. A bar need not be provided.)—S. H. E. PETER, EFFICIENCY, J. T. (Competitors have not to pay for return postage.)—SIGMA, ARS LONGA VITA BREVIS, F. F. in circle, HUGH, WILL, CECIL, C. F. OGDEN, SIR NAW BEUAN, L. in circle, YARRA YARRA. (The reading-room may be used as a green-room.)—PUPIL J. (A hall to hold 200 will do.)

Correspondence.

PROVINCIAL ARCHITECTS AND THE INSTITUTE.

To the Editor of the BUILDING NEWS.

SIR,—A printer's error in my letter of last week makes an allusion which I made to the Dentists Act (not dentists' art as printed), unintelligible to most readers. What this recent enactment had to say to the status of architects may not at first sight be more intelligible, and want explanation. What I conceive is the ultimate point to which we all wish to tend, is that the profession of an architect may be one with a recognised legal status, and that it shall not be open to ignorant and unqualified persons to constitute themselves architects by mere assumption of the title.

The recent enactment known as the Dentists Act has an important analogous bearing on this point. Hitherto anyone—a handy man, a waiter graduate in cork-drawing, as a matter of fact a

great many jewellers and silversmiths—were at liberty to announce themselves as dentists, and work their will on the molars and nerves of her Majesty's lieges. By a short Act of Parliament, with an elastic and reasonable procedure, this has been put an end to. Under it existing practitioners who were not legally qualified surgeons were not absolutely required to undergo examination and registration, but it was left optional to them to do so. For the future it was enacted that all dentists must be duly qualified registered practitioners. No hardship was thus inflicted on any existing interest. As a result, however, there was a rush of miscellaneous qualified practitioners of every age from all parts of the kingdom to offer themselves for examination, and secure the status attaching to registration. The examinations under these peculiar circumstances were of a common-sense and lenient character—a conversational inquiry in many cases of old gentlemen as the examiners, sufficient to establish in their mind that the candidate had a fair knowledge of his business. The successful result is that, without any revolution, dentistry was elevated from a questionable position to that of a respectable recognised profession.

It may not be practicable, perhaps, in our time to achieve for architects the legal status we all desire; but I submit there is at least an analogy for our position in the instance I have quoted. We might, I venture to suggest, go a long way towards our end in view by voluntary action. Not by pursuing our course as heretofore, laboriously entailing a small percentage in numbers of the architects of the kingdom to "Join the Institute" as Fellows or Associates, under conditions in many cases distasteful and nugatory; but by a system of registering, under the authority of the Royal Institute of British Architects, the name of every fairly competent and qualified practising architect in the three kingdoms held in his locality of practice in honest and honourable repute. What the conditions for such registration should be in detail it is unnecessary to enlarge on, but they should be as encouraging as possible. I would suggest, however, some inducements which should not be held out—viz., that the subscription should be £4 4s. per annum; front seats for the council at the R.I.B.A., if an aspirant should reach that awful elevation; and right of succession by rotation to the Presidency, be he an eminent one or not. Alluring as these may seem to some minds, they are not effective baits for the long lines that are wanted to draw widespread provincial practitioners into the reach and influence of the Institute.—I am, &c.,

Dublin. THOMAS DREW, R.H.A.

LONDON ARCHITECTS WITH PROVINCIAL WORK.

SIR,—London architects who have work in the provinces are very hard upon us poor local builders in either not giving quantities, or giving them prepared by a London (and to us a perfectly unknown) quantity surveyor, while it is notorious that quantities by a local surveyor are always understood better, and we have more confidence in them, which saves cost to the clients. I will give an example to illustrate what I mean:—

The Government recently advertised for tenders for building a post-office in Yorkshire, but no quantities were supplied, and I employed a local quantity surveyor to measure up the work. I did not get the job, and yet I had to pay him, although he admits that he has got the quantities out for four contractors (including ourselves), and that one of his clients was the successful contractor, and has added 2 per cent. on the amount of his contract to pay the surveyor, who must have made 5 or 6 per cent. on the cost of the job. It would have been nearly as bad if a London surveyor had been engaged, as we should have to get a local surveyor to explain the architectural terms they employ in our local phraseology.

I particularly object to London quantities when the work is erected by subscription. I was recently solicited to subscribe towards building a chancel to our church, but I found that a London architect was employed, and that the quantities would be prepared by a London surveyor, and that if I tendered I should have to pay at least £1 1s. to a local surveyor to interpret the items in the quantities. I, therefore, refused to subscribe, and shall not tender

for that or any work unless quantities that we can understand are supplied, or unless an allowance is made for tenders. I inclose my card.—I am, &c.,

A SUCCESSFUL BUILDER.
Dec. 5th.

DUBLIN SCIENCE AND ART MUSEUM COMPETITION.

SIR,—Some of the competitors in this important competition have already had their designs returned to them. No explanation has been given, no cause assigned; and there have yet but 15 days—but 13 working days—elapsed since the delivery of the designs to afford opportunity for the proper testing of about 70 sets of drawings as to their compliance with the conditions set.

By the "Instructions," the assessor's estimate of probable cost being in excess of £100,000, or any infraction of the conditions would alone warrant the summary exclusion of a design from the competition.

Can it be possible that within the period which has elapsed, all the designs have been properly tested as to their provisions respecting the required space, and as to their probability of execution within the prescribed amount?

The "Instructions," while seeming fair on general grounds, were somewhat vague on those which many would consider most particular. They left entirely to the judgment of competitors the requirements of each department, simply giving an amount of floor area to be provided for each, without reference to the question what department, or what portion or extent of each department, required top-light, what side-light; nor did they give any particulars as to the requisite arrangements of any of the departments.

They did not interdict the use of colour to show on the plans a competitor's proposal for the allotment of space; and architects, at least, will agree that such a method is the simplest for the indication of sub-division of space on a plan.

It is true that in one paragraph of the "Instructions" they say that "the drawing shall be in pen-and-ink, without colour of any sort." But to the understanding of those accustomed to the literal interpretation of English prosody, that paragraph refers distinctly only to the paragraph immediately preceding it, which reads thus:—"Such perspective view shall be drawn to such a scale," and so on, about the size of the perspective and its mount.

Colour was forbidden on the elevations, but no mention whatever was made of any prohibition as to colour on the plans.

It is also to be observed, on the score of fairness, that when conditions are set, all the competitors should be adjudged equally upon them. The dimensions of the site were not accurately given; and while the site is described as level, a fall exists in at least one direction, which would admit of—probably call for—particular treatment. Some competitors may have availed themselves of this "local" knowledge. Has the assessor inquired into this view of the matter? Would it not be manifestly unfair to adjudge the designs on any other than the lines given?

Under all the circumstances, surely there is cause to complain that no explanation has been offered upon the return, within so short a period, of designs to competitors who have given thought, time, labour, and money in their efforts to interpret "Instructions" which were, at the least, vague.—I am, &c.,

Dec. 1st. FAIR COMPETITION.

PRELIMINARY COMPETITIONS.

SIR,—As the idea of conducting open competitions in two heats is a novel one in practice, though I have joined with others in advocating it privately for years past. I am glad to notice the comments and suggestions of "A. B. C." and "Vigilans" on the subject; because, as we may take it for granted that competitions will continue as long as building, it is important that the conditions under which they are conducted should be developed on principles of equity and morality as rapidly as possible. I recognise in the division of competitions into two stages a great stride in the right direction, and regard it as removing many of the objections which architects of high standing have urged against entering the lists with all comers, while

quite willing to break a lance with a select few of their peers whom they may esteem to be worthy of their steel.

But as indicated by "A. B. C." in his second letter, a scale of 1-20th of an inch to 1 ft. is too large for sketch designs, in which I apprehend the general scheme and grouping of each competitor are the two principal objects sought for. This could be done perfectly well to half the scale, and would save an enormous amount of labour, for a 20-in. scale, while too small for precise accuracy in detail, is sufficiently large to enforce careful determination of proportion, not only in the large masses, but also in individual features.

Why should your correspondents discuss the distribution of the £150 per head to be given to each competitor in the final heat, as though it were a premium awarded for excellence in the first one, when the conditions for the Glasgow Municipal Buildings competition distinctly state that "each of the competitors so selected shall be paid the sum of £150 towards his expenses, provided he comply with all the conditions to be hereafter prescribed for such final competition." Obviously, the sum is intended partially to defray the cost of preparing the matured, not the sketch, design. Again, "A. B. C." seems to regard the drawings in this second competition as merely an enlargement of those submitted in the preliminary contest; but the above extract, and more directly the terms of Clause 5—viz., "Separate conditions will be issued for the final competition. They will be in strict accordance with the above, so far as applicable, but will contain such additions or alterations as may be deemed necessary, &c."—clearly point to something more sensible than a mere mechanical enlargement. I anticipate that the assessors will avail themselves of the good points, not only in the selected designs, but in any of the others, and embody them in the final instructions, if not as requirements, at least as recommendations, which each competitor will be expected to work into his matured design, while holding to the general disposition or scheme of his first sketch, the merits of which secured him a place in the second competition. In accomplishing this, quite as much ingenuity and skill may be demanded as was required for the sketch design, and might result in a complete rearrangement of the order of merit attained in the first contest. It would, I think, be unwise to announce any order of merit in the first competition; and it would be well if the assessors could possibly avoid, even mentally, arranging the selected six or ten as 1st, 2nd, 3rd, &c. But it is perfectly evident that should they arrive at a definite order of merit in the first competition, the assessors should have power to vary it in the final competition, "if they thought right," as "A. B. C." with charming simplicity, notices; else would the final award be prejudged, and the second competition a veritable wearing of the flesh.—I am, &c., G. W. B.

WALSALL SCHOOL BOARD.—COMPETITION FOR NEW SCHOOLS, WOLVERHAMPTON-ROAD.

SIR,—The previous competitions being unsatisfactory, it has been deemed necessary to send to the Board the following memorial, drawn up at a meeting of the architects practising in the town, to which the subjoined reply has been received. JONATHAN ELLIS, jun.

Walsall, Dec. 5th.

TO THE WALSALL SCHOOL BOARD.

GENTLEMEN,—In view of the approaching Competition for Proposed Schools, Wolverhampton-road, Walsall, we, the undersigned architects practising in Walsall, beg to submit the following suggestions for conditions of competition for your consideration.

The said conditions are, we think, strictly impartial, and are precisely the same as those recommended by the Royal Institute of British Architects at the General Conference, 1881, and subsequently adopted by the Glasgow, Birkenhead, and other Corporations, in recent competitions.

First.—As the preparation of finished drawings entails considerable labour upon the competitor, and the object of the competition is to obtain the most suitable plan, we think the said object may be equally well obtained by dividing the competition into two parts, Preliminary, and Final.

The Preliminary Competition to consist of geometrical drawings in pencil only; and that from the designs submitted, a number in pencil may be selected for Final Competition.

The four unsuccessful competitors to receive the sum of £5 as an acknowledgment for their trouble.

Second.—That in the Final Competition, the mode of

finishing the drawings should be distinctly set forth, whether to be finished in ink or colour.

We suggest that perspectives be strictly excluded, owing to their misleading tendency. Should you decide to admit these drawings, the way in which they are to be finished to be distinctly stated.

Third.—That the board state the kind of desk they wish to adopt. We also think it would be much better to name the sum proposed to be expended—say, £5,000—rather than state the building to be of a plain character, as such a term is open to various interpretations.

Fourth.—We consider it absolutely necessary that an architect of eminence should be employed to advise the board in their selections, and that his report on the Final Competition be published in the local papers.

Fifth.—That the drawings submitted in the Final Competition be exhibited.

Walsall, Nov. 21st.

[REPLY.]

RE WOLVERHAMPTON-ROAD SCHOOLS COMPETITION.

SIR,—The memorial, signed by yourself and other local architects, dated the 21st inst., and which I received from you, has been considered by the School Board at a Special Meeting to-day, when the following resolution was passed, viz.:—

"That the Board acknowledge the receipt of the memorial from local architects relative to the Wolverhampton-road School Competition, but that the memorialists be informed that the Board cannot adopt or act upon the conditions and proposals contained therein."

Walsall, 30th Nov."

PORTLAND CEMENT CONCRETE AS A CONSTRUCTIVE MATERIAL.

SIR,—The disaster at the Calf-rock lighthouse appears to have furnished about as good an illustration of the kind of material we have in "Portland cement concrete" as its advocates could have desired. According to the reports in the daily press, we are told that the lighthouse was 150 ft. high, and built of brickwork, its thickness at the base being 5 ft. Thirty feet in height of the lower portion has been strengthened with concrete blocks, and it would appear that this 30 ft. is all that is left intact. At some distance from the tower was a kitchen, built entirely of concrete, and of this the lighthouse-keeper writes:—"We made for the west house (after the tower was blown partly away), and after being there an hour we determined to make for the kitchen, it being, in our opinion, the strongest; we succeeded in getting there, but the sea and waves were most terrific. . . . We have stuck to that shanty ever since, and thank God it did not deceive us."

It would be well to know more about that "shanty," and the system adopted in its construction.—I am, &c., THOMAS POTTER.

CLERKS OF WORKS.

SIR,—Although architects have many associations and societies for the purpose of rendering and receiving mutual aid in various ways, a large class of men fulfilling responsible positions have none, at least, so far as is known to the writer—viz., "clerks of works and foremen builders." I think so numerous a body of men would find many advantages and derive much assistance were they to combine to form an association similar to the "foremen engineers," and many others.

As the BUILDING NEWS is largely read by the class named, and the suggestion is a good one, might I ask a favour in soliciting the valuable aid of its columns in giving publicity to the subject, and in obtaining the views of others competent to give their opinion and advice.—I am, &c.,

ANOTHER CLERK OF WORKS.

TESTING TRAPS.

SIR,—To save repetition, I would refer Mr. Hellyer to Mr. Buchan and my letter in your issue of the 2nd inst. as to the water supply, and he need not refer to conflicting reports, as he can obtain authoritative information from his own foreman as to the dip of traps, &c.; I would call Mr. H.'s special attention that it is not siphonage, so much as it is the momentum out of traps, that our public experiment went to prove, as Mr. H. spoke of the latter in the pages of his book. I wish also to ask him if, in the whole course of his lectures, he once mentioned the momentum out of traps? I believe we were the first to discover this, and am thoroughly convinced that had it not been for our demonstrating this important defect in the U-trap it would not yet have been brought to light. I am glad Mr. H. acknowledges the importance of traps holding their seal under every treatment.

I cannot agree with Mr. H. that the V-trap

is as self-cleansing as he reports, as it is no better than the new pattern U-trap. Mr. Buchan says we have not tried it. I must tell that gentleman we have, and Mr. Davies took the notes at the time, and promised to send a report in one of his articles to the BUILDING NEWS on "Practical Plumbing," so he is responsible for not having done so, and I have written to that gentleman on the matter. Mr. H. says he can siphon out Mr. Davies's pattern U-trap. This may be so; but I always understood that Mr. D. recommends ventilation with his pattern trap, as I do myself with ours, so I fail to see anything against us in this. With regard to Fig. 3 of Mr. Hellyer's letter, I cannot see why the dip part of this trap should have been affected with sewer gas any more than the top or sides; in fact, his own drawing shows that the sides are also eaten away, and therefore water would have at once run out of the U- as well as it would out of the U-trap. I am sorry to inform your readers that, owing to the gales on Saturday and Sunday morning, Nov. 26th and 27th, the scaffold to which the experimental stack of soil-pipe was fixed, was so seriously shaken and strained that we have been compelled to pull it down, but hope to erect a more substantial one at an early date, when, as hitherto, all will be welcome to judge for themselves which is the best form of trap.—I am, &c., J. PULLEN, jun.

73, Penton-place, Walworth, Dec. 5th.

SIR,—If Mr. Pullen, jun., will read my letter again, he will find he is the subject of an ocular error. I did not state that the w.c. was supplied with a 3 in. pipe, but the dribble of water was not equal to a stream through a 3 in. pipe, to which statement I still adhere.

To show how unsatisfactory the proceedings were, I should like to state that when I arrived home on Tuesday night a letter awaited me from a gentleman in Sheffield, thanking me for the letter you published, also condemning the so-called tests in such strong terms that, without his permission, I should not like to state them. There is one part of the experiments with the U-trap that has not been mentioned in the reports—that is, when the top of the soil-pipe was stopped up, and the basin of water on the U-trap (on the top scaffold) was discharged, the U-trap on the opposite side (which had 1 1/2 in. dip, owing to its not being level) had an inch of water drawn out of it. Now, if the U-trap had been level, I believe it would have become untrapped. Now, with regard to the meeting on Monday, the 21st. It seems strange, after a committee had been selected to finally test the traps, that the meeting should be adjourned without that half of the committee in favour of the round pipe trap knowing anything about it; but I suppose Messrs. Pullen and Davies thought they could do better without them.

About twelve months ago I saw a good instance of the cleanliness of U-traps. Owing to some alterations, four had to be removed that had been in about twelve years. Although they were fixed under pan-closets and 3 in. services, they had not 1-16th of an inch of corrosion on them. The same could not be said of U-traps if they had been fixed half the time.—I am, &c., J. W. HART.

91, Dorset-road, Clapham-road, Dec. 5.

ERRATUM.—TRAP-TESTING.—In Mr. S. Stevens Hellyer's letter on this subject that appeared in our last week's issue, read in thirteenth line, fifth paragraph, "Mansion" instead of "Mansergh" trap, and again at twenty-second line, same paragraph.

AN IMPROVED MODE OF CONSTRUCTING BUILDERS' IRONMONGERY.

SIR,—I take the liberty of sending you a short description of a mode of constructing certain articles of builders' ironmongery, which would greatly facilitate the fixing, and insure accuracy. This would apply particularly to sash-pivots for sashes that are hung on centres, thumbscrews for door shutters, and like fittings. The component parts of the above being independent or quite free of one another, require their relative positions to be very exact for them to work correctly.

Suppose we take a sash-pivot as now in use; it is cast somewhere on the surface of a plate that is made in the shape of a parallelogram or oblong; we have no means to readily determine the exact positions for pivot and socket in the frame and sash, or, rather, we can determine the positions; but owing to the shape of the plates, we cannot with certainty be sure they will occupy them.

The construction as now proposed: The plates to be in form of a number of detached segments of circles, the working parts of fittings to be cast central on one of the segments; the edges of these

plates might have impression left to denote centres. Three segments of circles 1 in. radius, with centres 2 in. apart, might be taken as a standard for plates; this would give a length of 2 in.

To hang a sash on these pivots, draw a horizontal line, as is usual, on the stile of sash and frame, return it on edge, a central line at right angles to this. Where the lines intersect, place the middle segment of plate; mark the centres on this line. Of course the intersections of the lines will be one centre; three shallow holes on the edge of sash, and the same on the frame, made with an inch boring-bit, would insure a much more rapid and satisfactory job than it is possible to accomplish with oblong plates that have to be sunk into wood by means of chisel.

There is no need of details for thumb screws; this principle, with a slight modification, might with advantage be applied to sash-pulleys. In sketches,

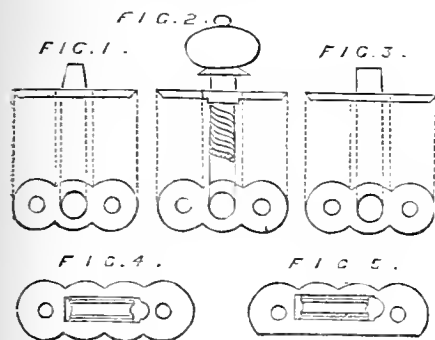


Fig. 1 is a shutter stud; Fig. 2, thumbscrew; Fig. 3, sash-centre; Figs. 4 and 5, sash-pulleys.—I am, &c., R. Gough, 123, Lower Kennington-lane, London, S.E.

CHIPS.

The export of deals from Montreal to the United Kingdom during the season of 1881 just closed stood at 33 cargoes, containing 21,838,287 ft. against 19,781,885 ft. in 1880, showing an increase of 2,056,402 ft. when the one year is compared with the other.

Amongst the gentlemen knighted by the Queen on Wednesday were Dr. George Birdwood, C.S.I., who has travelled in India to collect specimens and report for the South Kensington Museum; Mr. Erasmus Wilson, of dermatological and Cleopatra Needle fame; and Mr. Andrew C. Ramsey, of the Geological Department.

The Court of the Carpenters' Company have voted the sum of £1,000 towards the building fund of the City and Guilds of London Institute for the Advancement of Technical Education.

The Health Congress and Exhibition, to be held at the Pavilion, Brighton, will be opened on Monday next.

We are glad to learn, upon inquiry, that Mr. Street, R.A., is gradually recovering from his illness, with which he was suddenly seized about three weeks ago.

On Tuesday the church of St. John, Neath Abbey, which has been undergoing repairs and restoration, was reopened. The alterations and additions comprise a new heating-apparatus, new seating and choir stalls, tile floors to all the passages, and the decoration, the cost of the whole exceeding £1,300. The work has been executed from the designs of Mr. Edwin M. B. Vaughan, A.R.I.B.A., of Cardiff, by the contractors, Messrs. Thomas, Watkins, and Jenkins, of Swansea.

It has been decided to enlarge and improve the parish-church of Kew, and a committee has been appointed for that purpose. The intended works include the increase of accommodation to 737 sittings, by the erection of a transept and clerestoried chancel; the re-seating of the entire church, provision of choir-stalls and organ-chamber, raising the ceiling, improving ventilation and heating, and the formation of new entrance. The estimated outlay is £5,500.

Subscriptions are being raised and a committee has been organised for the restoration of St. Pinnock Church, Cornwall, which has become through neglect and decay an almost ruinous building.

The Metropolitan Board of Works, at its meeting on Friday, approved a recommendation from the Building Act Committee, arising out of the recent fall of a house in Clifton-road, Maida-vale, that, in order to prevent accidents to new buildings in course of erection, all drains should be laid in the junctions made, and the excavations filled in to the satisfaction of the district surveyor before commencing the walls.

Intercommunication.

QUESTIONS.

[6803.]—**Hoop-Iron Bond.**—Should hoop-iron bond be carried through the openings, and afterwards cut and turned up and down, or turned up and down, and not carried through? Which is best?—SIGMA.

[6804.]—**Diocesan Surveyors.**—In whom or what body is the appointment of diocesan surveyors vested?—X. Y. Z.

[6805.]—**Bath.**—A large swimming bath, lined with Portland cement, in use for sea-water, is too black-looking. I want, if possible, to make the sides and bottom white. Paint will not stand; the salt now in the cement discolours it and throws it off. Tiles are too expensive. Should be very glad of a suggestion.—ALBA.

[6806.]—**Aquarium.**—I should feel obliged for information as to the best method of fixing the glass fronts to large tanks in a public aquarium; also the most suitable kind of glass, and where to obtain same, for use in the North of England.—FISH.

[6807.]—**Excise.**—Will any of your readers inform me how I could obtain a situation on board the Revenue cutters; if there is any exam. to pass, and if the wages are good?—E. C. P.

[6808.]—**Brick Arcade Arches.**—Will Hugh McLachlan, or other able contributor, kindly advise me in the following? In turning the arcade arches in brickwork of a new church, is it necessary to have a centre made for every arch, and should they remain in position until the whole of the weight is placed upon the arches; or is it the custom to make centres for the one side only, and after weighting the arches a little and allowing the mortar to set to strike the centres and use for the opposite side? A reply will be thankfully received by—ONE IN DUBER.

[6809.]—**Repairs.**—Some houses are left by will to A., and at his death they are to become the property of B. Can B. compel A. to do any repairs to the property? If so, what repairs? Has B. or his agent the right of entering the houses to note their condition? Can B. compel A. to insure the property? If not, can B. insure it himself?—C.

[6810.]—**Ownership of Drawings.**—A. (a builder) contracts with B. to construct a building according to drawings and specification prepared by an architect C., who favours A. with a set of tracings, &c., signed by himself as evidence of their being correct. Such building completed, the period for maintenance passed, and all payments settled, C. requests A. to return the drawings; but A. refuses to do so, alleging they are now his property. Has A. any right by law or custom to retain such drawing, and, if not, what would be the best mode of recovery?—C. B.

[6811.]—**Force of Impact.**—What would be the force of a blow, measured in weight, which would be caused by the fall of 3wt. of iron from a height of 7 in.? For my purpose, the smaller variation due to friction with the air in falling may be omitted. Should feel obliged if the formula, as well as the result, were stated, and the authority for the formula.—R.

[6812.]—**Ventilating Pipes.**—I have just completed a villa, and having specified one ventilating pipe to soil-pipe to be carried to ridge, I am required by the surveyor to carry up two more, a great discommodation to the elevation, one from the servants' w.c., which is trapped, and only fit from foot of soil-pipe, with no trap intervening, and another from w.c. traps, all carried to the ridge. In addition to the w.c. traps, there is a siphon on the house side of sewer. I shall be glad of information if the above is consistent and necessary, as very little, if any, sewer-gas can penetrate past the siphon, the sewer being well ventilated in road.—ARCHITECTUS.

[6813.]—**Water.**—Will some practical reader advise me what to do in the following case? Having built a pair of villas in the summer, the cellars, which were then perfectly dry, and which were excavated to a depth of 6 ft. below the surface of the ground, are now covered with water about 1 ft. in depth, as are also the excavations for cesspools and rain-water tanks, the water in them being from 2 to 3 ft. deep. The cellars are paved with bricks laid in mortar, and grouted in cement. I have had them pumped dry, but the water rises again, and, therefore, I conclude it proceeds from land-springs. Is there no remedy but to drain the land? How is this done? Would not asphalt or cement keep the water back? Any information respecting this matter will be thankfully received by—URGENT.

[6814.]—**Moving Load of People.**—I am designing the construction of a gallery in a theatre with risers 18 in. high. Should I take the permanent load to be (1) the weight of a dense crowd, or (2) the weight of a dense crowd multiplied by its velocity on jumping down 18 in. from step to step, and what margin of safety should be allowed in either case?—X.

[6815.]—**Hospital Construction.**—When hospital wards have central stoves, I find the flues are sometimes taken across under the floor and carried up in the side walls, and sometimes carried up vertically at once. Which is the best method, when one ward is over another? Are pilot stoves necessary in the former case? How are the flues usually disposed of in using Mr. Saxon Snell's Thermo Hydric Stove in the centre of room?—SIGMA.

[6816.]—**Cracked Sewer Pipes.**—Some pipes about 12 in. in diameter, laid about thirty years ago from S to 10 ft. from surface in compact clay, were found cracked, apparently from pressure. Can any reader suggest cause of this, and say what would be a safe and reasonable depth from surface of road for laying for surface or sewage drainage, 9 in., 12 in., 15 in., 18 in., or 24 in. pipes, so as to resist injury from a ten-ton roller? Also, what thickness of pipes would be safe.—OALGEB.

[6817.]—**Whitewash.**—Would some brother reader who has had experience in removing whitewash off walls kindly give his advice as to the best means of getting the same off? Is there any chemical composition that would so scale it off that it would grow against the wall?—RUSTICUS.

[6818.]—**Ventilating W.C.**—Will any of your numerous correspondents inform me if an effluvia pipe from top of trap below the w.c. in my house will give the outside ventilation necessary to prevent siphoning on the closet being used, or is it necessary, in addition, to have ventilation secured at a low level lower down than the closet. This is an ordinary pan closet, and has the waste both from the bath and washbasin in same room carried into the soil pipe. The soil pipe is 4 in. diameter, and the effluvia pipe, which is carried up to the eave of house, is 1 in. in diameter.—W. H.

[6819.]—**Bones under Inn Floors.**—Mr. Thomas Blashill, at the meeting of the Institute on Nov. 21st, gave some particulars of an inn floor laid above horses' skulls, and seemed to be of opinion that the singular arrangement was for acoustical purposes. A curious discovery just made in the city of Oxford leads me to ask your readers whether there is any other reason for the association of horses' bones with the floors of hostleries. The workmen who were pulling down the premises next to the Coach and Horse, St. Giles's-road, West, found, about a foot beneath the ordinary wooden floor, a second one, the latter being constructed of leg bones of animals driven into the soil with the end upwards, after the style of the "petrified kidney" paving, so familiar to residents in Norwich. This bone floor was, however, almost as level as a billiard board, and as hard as an ordinary flag pavement. What could have been its purpose, for the acoustic theory evidently will not do?—WILL-O'-THE-WISP.

[6820.]—**Demurrage.**—In a contract lately completed under my superintendence, there is the following clause relative to the work not being executed in the time stipulated: "In failure whereof the contractor shall forfeit it and pay to the proprietor the sum of ten shillings for every day that the work remains unfinished and undelivered as aforesaid, which sum the proprietor shall be allowed to stop as liquidated damages out of any moneys due or to become payable to the contractor on account of the works." The works were not completed in the time agreed upon. My client holds on the advice of his solicitor that I, as architect, have no power in the matter, but am bound to certify less the whole sum for demurrage. The contractor holds also on the advice of his solicitor, that I am sole arbitrator, and can make allowance for any difficulties that may have impeded the execution of the work. The following clause in contract relates to my power as arbitrator: "Should any doubt or doubts arise during the execution of the works or at measuring the extras (should any occur), or at making out the accounts as to any extras in other works for which the contractor may consider he may have a claim over and above the contract price; the admission and allowance of any such claim or claims shall be judged of, determined, and adjusted solely by the architect, without reference in any way to any other person." Can your read advise me as to which solicitor is correct in his opinion, and would I be justified and secure in giving a certificate for the amount of contract and extras, with the endorsement, "This certificate is given without prejudice to any claim A. A. (client), may have against B. B. (contractor) for non-completion of the works in the time agreed upon?"—D. R.

REPLIES.

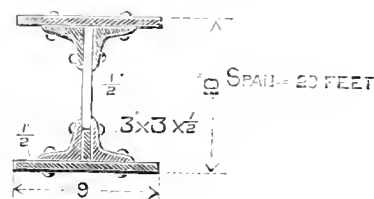
[6825.]—**Variation of Compass.**—Since inquiring through your columns as to variation of compass, I have obtained from an excellent astronomical authority (the *British Almanac* for 1881), the following list of places with their respective variations. The amounts given are all west of true North, and the variation is decreasing 9' annually. If I was correct in my remembrance of the variation in Morayshire, in 1863, being 20° 39' W., it would now be 20° 48'.

Dover	17° 43'	Scilly Islands	20° 50'
Yarmouth	17° 53'	Pembroke	21° 10'
Brighton	18° 15'	Holyhead	21° 25'
London	18° 22'	Edinburgh	21° 43'
Portsmouth	18° 50'	Glasgow	22° 30'
Portland	19° 20'	Dublin	22° 37'
Plymouth	20° 6'	Belfast	22° 55'
Sunderland	20° 16'	Cork	23° 12'
Falmouth	20° 32'	Galway	24° 5'
Liverpool	20° 49'		

This may, perhaps, be useful to some of your readers.—PETER PLAYFAIR.

[6827.]—**Breaking Weight of Girder.**—The formula for computing the breaking weight of wrought iron plate girders, when the load is in or on the centre, is as follows:— A in inches $\times D$ in inches $\times 6 = B$. W. in

tons on centre. When the load is equally distributed over entire bearing, then the girders will bear twice as much as it will when loaded in the middle. The safe load for wrought iron girders is $\frac{1}{2}$ the B. W. The letter A is the formula represents area in inches of bottom flange, including angle irons and web up to $\frac{1}{2}$ entire depth of girder. The letter D signifies depth of girder in inches,



and the number 6 is the constant for this form of girder, all these divided by 8 meaning span in feet. I have worked out the breaking weight of the girder "Inductus" draws and describes in his query, and find it to be 33 tons if loaded on centre, and 66 tons if distributed. The portion of the section crossed with the diagonal lines is included in the area of bottom flange.—ALFREDO C. HUBLEY.

gratification that an examination for young architects will henceforth be the only method of admission into the ranks of the Royal Institute of British Architects.

By the death of Mr. James Yates, J.P., D.L., of Oakwood House, Rotherham, there passes away one of the pioneers of the stove-grate and heavy casting trade in South Yorkshire. Mr. Yates expired at his residence on Saturday night, in the 84th year of his age. To the commercial world he had been known as the senior partner of the Ellingham Works (Messrs. Yates, Haywood, and Co.), Rotherham. Mr. Yates was a Liberal in politics, and nominated the late Lord Milton, M.P., at the South-West Riding election in 1865. Mr. Yates was a vice-president of the present Rotherham and District Liberal Association, and had been the president of a much older Liberal association. Mr. Yates, who has been married twice, survived both his wives. His only son was drowned at the age of eleven years, July 5th, 1841. The funeral was solemnised yesterday at noon, at the Rotherham Cemetery.

THE session of the Sanitary Institute of Great Britain was opened, on Wednesday evening, by a meeting at 9, Conduit-street, W., at which an inaugural address was delivered by Dr. Alfred Carpenter, Vice-Chairman of Council. The author congratulated the members on the position it had attained in spite of the impediments placed in its progress by older bodies, and urged that the institute could not be regarded as a rival, either to the Social Science Association, or to the societies of architects, engineers, and surveyors. One great purpose of the institute was to establish diploma examinations for sanitary inspectors, and to make examination the only entrance to such appointments. He adverted to the dangers to health incurred by taking our drinking water from sewage-polluted rivers, and predicted that some day when the temperature of the Thames was raised a few degrees above that of last summer, an epidemic would come with fearful intensity in all parts of London, except that supplied by the Kent Water Company. In the course of the evening the sealed letter accompanying the essay, to the author of which Dr. W. B. Richardson and Dr. W. Farr had awarded the prize of £200 offered by Mr. Wyatt-Edgell, formerly treasurer of the institute, was opened. The subject was "The range of hereditary tendencies in health and disease;" and twelve essays had been received. The prize was awarded to that having the motto "The subtlety of nature far exceeds the subtlety of reason." The author proved to be Mr. George Gaskin, 7, Westbourne-park, London.

On Monday last, the 5th inst., the following architects were elected diocesan surveyors for the Diocese of St. Alban's, by the Bishop, his Archdeacon and Rural Deans: Gordon Hill's, Frederick Chancellor, E. J. Dampier, J. E. K. Cutts, C. G. Vinnall, T. E. C. Streetfield. No particular portion of the diocese is given to either of the surveyors thus elected, but either may be employed at the discretion of the clergy, who are thus enabled to choose their own surveyor. Mr. Hills and Mr. Dampier were the two original diocesan surveyors who were re-elected.

CHIPS.

The Queen has accepted a copy of Mr. Fawkes' new illustrated work of reference on "Horticultural Buildings," recently published by Batsford.

The Copperhouse Wesleyan chapel, at Hoyle, West Cornwall, was reopened on Sunday week, after restoration, and the substitution of rostrum for pulpit. Mr. J. S. Hicks, of Redruth, was the architect, and Mr. Paine, of Penzance, the builder.

A new gas-holder is about to be constructed for the supply of Mold, from plans and specifications by Mr. Paterson, C.E., of Warrington.

The district of Aulsebrook, near Ashton-under-Lyne, is about to be sewered. Mr. J. C. Barton, of Ashton, is the surveyor.

The death occurred on Monday of Mr. James Mitchell, of Govan, for 44 years a prominent member of the Glasgow town council. He was mainly instrumental in carrying out the Gorbals gravitation water supply scheme, and had occupied the office of master of works for Glasgow since 1868.

A new coffee-tavern was opened in Victoria-street, Douglas, Isle of Man, on Tuesday week. Messrs. Radcliffe and Kermode, of Fiuch-road, Douglas, were the builders.

The annual distribution of prizes to the students of the Newton Abbot science and art classes was made on Friday evening, when addresses on art were delivered by the Duke of Somerset and Sir Samuel Baker.

The water was admitted on Monday for the first time into the new dock at Graugemouth, N.B., which was commenced in 1877, and is now on the point of completion. The dock proper covers an area of 11 acres, and the timber basin another eight acres. The laying of the rails round the quays is being proceeded with by the railway company, and the whole works will be opened shortly. Messrs. Charles Brand and Son are the contractors. At the same time the river Carron is being deepened to 26ft. under a contract taken by Messrs. Lawson and Best, who recently carried out the Edinburgh Docks at Leith.

The rebuilding of the tower of St. Colan Church, near St. Columb, Cornwall, which was recently carried out under the superintendence of the Rev. F. C. Hingston-Raudolph, has just been completed by the erection of a stained-glass three-light window, in memory of the late vicar. The central light is occupied by a figure of the patron saint of the church, who was a Cornish missionary, and on either side are St. Mary, patron saint of Truro, and St. Peter, of Exeter. The work was executed by Mr. Horwood, of Frome Selwood.

At a meeting of the trustees of Wells's Charity, at Cardiff, on Monday, the question arose as to the appointment of an architect and surveyor. Mr. J. A. B. Williams, the borough engineer, was proposed, to which a counter-proposition was made that Mr. James, of the firm of James, Seward, and Thomas, Cardiff, be elected. After some personal discussion, the choice was deferred for a fortnight.

The local board of Ilkeston agreed on Tuesday to purchase farming land at Little Hallum for use in sewage disposal, at the price of £1,400.

The highway board of Worral, North-West Cheshire, proceeded on Monday to the election of a district surveyor. There were 83 applicants for the appointment, the salary being £200 a year, with the obligations of keeping a horse and trap, and attending exclusively to the duties of the post. In the event Mr. T. R. Heywood, clerk of works, Wrexham, was selected, a local farmer being placed second, while the unsuccessful candidates included many borough and highway surveyors.

At the meeting on Monday of the Mountain Ash local board the very sudden death of the medical officer of health, Dr. E. W. S. Davis, was announced.

The town council of Stockton resolved on Tuesday night to instruct Messrs. Neate and Haynes, of London, to prepare plans and specifications for the proposed new bridge across the river Tees. The estimated cost is £40,000, of which half will be borne by Stockton and South Stockton.

Mr. J. Wallan, contractor, of Glasgow, was killed on the railway at Bishopbriggs, near Glasgow, on Tuesday.

The local board of St. Mary Church, near Torquay, decided on Thursday, the 1st inst., after much discussion, to purchase a site opposite the coffee-tavern, for the purpose of erecting thereon a town-hall, and to advertise for competition plans, designs, and estimates for the proposed building.

The Lieut.-Governor of the Isle of Man has proposed to follow up the new promenade improvement at Douglas, which has just been successfully completed, by the establishment in that town of winter gardens and a museum, free library and a reading-room. The proposition has been favourably received by the Manxmen, and Castle Mona, formerly the governor's residence, now an hotel, is suggested as a site.

The completion of a new mansion near Truro, to be known as Peneulnick House, was celebrated on Tuesday week by a dinner to the workmen. Amongst those present were the chief contractor, Mr. May, of Poole, the clerk of works, Mr. Thomas May, and Mr. Roberts, the builder's foreman.

The Carnarvon school-board on Monday adopted plans by Messrs. Thomas and Hughton for proposed school extensions.

The channel of the Ribble, a few miles above Lytham, having lately become so circuitous as to lengthen the course to be taken by vessels by from one to two miles, an effort is being made, by means of boards attached to chains, to control the tide so as to cause the current to reopen the channel which it has silted up with sand. The plan is devised by a Preston fisherman, named Fairclough, who has signed a contract for £100 on the "no cure no pay" system.

At a meeting of the Upper Brue District Drainage Board, held at Glastonbury last week, it was resolved to pay Mr. J. Spire, their surveyor, a salary of £100 a year.

Reopening services were held at St. Faith's Church, Maidstone, yesterday (Thursday), to commemorate the erection of a tower. It has been erected from the designs of Mr. E. W. Stephens, F.R.I.B.A., of Week-street, Maidstone, and is of Kentish ragstone, with numerous dressings of Bath stone. It has at each corner a stone pinnacle, the cornice, parapet, coping, and pinnacles being of solid masonry. The height to the top of the pinnacles is about 110ft. An addition has also been made to the vestry, with extra accommodation in the basement. It is in general character with the chancel. The contractor was Mr. Edward Vaughan, of Tunbridge-road, Maidstone, and the clock, manufactured by Messrs. Gillett and Bland, of Croydon, has three 5ft. dials.

The new Leadenhall market will be opened on Thursday next, the 15th inst., without public ceremony.

The church of St. Tendrick, at Mathern, about two miles from Chepstow, was reopened on Wednesday week, after the complete restoration of the chancel, from plans by Mr. Ewan Christian. During the progress of the work, a stone coffin, 5ft. 7in. long, by 20in. wide, and 11in. deep, external measurements, was found under the south wall; it contained bones and mould, &c., and is supposed to be that of Theoderick, King of Morgannack, who was, according to old chronicles, slain in battle against the Saxons, and buried on this spot, circa A.D. 600, when the church was founded. The contractor was Mr. William White, of Abergavenny, who has also in hand the restoration of the nave, its aisles, the tower, and porch, which are in progress, from plans by Mr. G. Pritchard, of Llandaff. The cost of the chancel restoration has been £2,500.

A bust of Grote, the historian, executed by Mr. Boehm, has just been presented to the City Liberal Club.

The Corporation of Bridgwater appointed on Friday Mr. George Laffan, of Croydon, as borough surveyor and inspector of nuisances at a salary of £200 per annum. There were nearly 100 applications for the appointment.

The workmen employed on the new town-hall at Great Yarmouth were entertained at dinner in the building one evening last week, in celebration of its approaching completion. Amongst those present were the architect, Mr. J. Bond-Peake, of Norwich, and the contractors, Messrs. J. W. and H. Lacey, of the same city.

The members of the Norfolk and Norwich Archeological Society had a day's excursion in Norwich on Thursday, the 1st inst. In the morning a visit was paid to the site of Carrow Abbey, which has been excavated by the owner, Mr. J. J. Colman, M.P. Here a descriptive paper was read by Mr. R. Makilwaine Phipson, architect, and the members afterwards visited the house on the grounds, now known as Carrow Abbey, and occupied by Mr. J. H. Tillet, M.P., which contains some Elizabethan carving. The old music-house in King-street, and several of the churches in that neighbourhood were afterwards visited.

A reredos has recently been completed for Frisby church, in Leicester, by Messrs. Jones and Willis, of Birmingham and London. The reredos proper is of alabaster, and has three panels, the centre one with the figure of our Lord in glory. The outer panels have carved cusped trefoils, with red marble columns to support caps. The side-wings are of hand-painted tiles.

It is mentioned, as illustrating the sudden increase of speculation exhibited by the applications to Parliament for the right to make new public works, that the list of new enterprises requiring Parliamentary sanction is larger than it has been since the year 1868. For 13 years there has not been such activity.

The opening meeting of the present session of the Civil and Mechanical Engineers' Society was held last (Thursday) evening at 7, Westminster Chambers, S.W., when the president, Mr. A. T. Walmisley, A.K.C., A.M.I.C.E., delivered an address.

Another mural painting for Ely Palace Diocesan Chapel, in illustration of English church history, has just been added thereto at the cost of the Lord Bishop. The subject (treated in oils) is the martyrdom of St. Alban. The grouping of the figures is specially effective, the artists being, as before, the Messrs. Powell Bros., Park-square, Leeds.

A stained-glass window of three lancet lights was last week placed over the north door of St. Giles's parish-church, Oxford. The subjects are the mustard seed, the net, and the pearl; and the work has been designed and executed by Messrs. J. Hardman and Co., of Birmingham.

The Finchley local board of health on Monday last appointed Mr. Francis James Baneroff as junior assistant in their surveyor's office. He has served the past two years in the surveyor of highways department, Islington vestry.

HOMERTON.—For alterations to entrance gates, and raising boundary wall at Homerton Hospital, for the managers of the Metropolitan Asylum District Board Mr. W. J. Walker, architect.

Shumair accepted.

KING'S LYNN, NORFOLK.—For the formation and levelling of the Gaywood Marsh-road, for the Urban Sanitary Authority. Mr. John Hall, borough surveyor.

CLARE LEVERINGTON, NORFOLK (accepted); T. F. Denness, Lynn; Benjamin Hubbard, Lynn; F. Hammond and Co., Lynn.

LAMBETH, S.E.—For pulling down and rebuilding 57, Bird-street, Lambeth, for Mr. W. Hart. Mr. B. Fletcher, architect.

Buckham £278 0 0
Cook 250 0 0
Eldridge and Gee (accepted) 220 0 0

LYONS.—For further works in the erection of stores, cellars, &c., for Messrs. Wright Bros., at their new brewery, Leeds. Messrs. Davison, Inskip, and Mackenzie, 62, Leadenhall-street, E.C., architects.

Boothman and Son £915 0 0
Irwin and Co. (accepted) 855 0 0

LEEK.—For the erection of a large newspaper kiosk in Broad-street, Leek, for Mr. S. Rader. Mr. W. Sugden and Son, Leek, architects.

For the whole:—
Drainage £135 0 0

Brickwork:—
Grace 79 0 0
Hall 75 0 0
Knowles (accepted) 66 0 0

Woodwork:—
Hudson, J. 95 10 0
Tomkinson 63 0 0
Bailey and Morris 61 15 0
Hall 63 0 0
Mackrell 59 10 0
Hudson, James 55 0 0
Taiton 59 5 0
Carding, H. (accepted) 38 10 0

Plumbing:—
Carding, M. 23 0 0
Stevenson 20 11 0
Johnson, T. (accepted) 19 5 6

LEICESTER.—For supply of various stores to the Corporation for the twelve months commencing Dec. 1st. Mr. J. Gordon, C.E., borough surveyor:—

Broof, R., Leicester £150 16 1
Clarke, Nettleship and Bailey, Leicester 150 4 1
Butler, E. H., Leicester 153 3 0
Cooper and Sturgess, Leicester 151 19 1
Butler & Sons, Leicester (accepted) 145 10 8

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Langley Mill Engineering Co., Notts. £251 15 5
Payne and Holliday, Kettering 185 15 5
Sharpe and Co. 150 0 0
Smith, Patterson & Co., Blaydon-on-Tyne 165 5 0
The Executors of the late D. Clarke, Carlisle 158 0 0
Cort and Paine, Leicester 151 2 6
Goodwin, Barsby and Co., Leicester 151 10 0
Richards and Son, Leicester 138 0 0
Wright, B. and E., Leicester 129 9 0
Jukes, Coulson, Stokes and Co., Sheffield 113 4 2
Mason and Co., Leicester (accepted) 101 3 4

LONDON.—For the erection of new premises for the Birbeck Scientific and Literary Institution, Chancery-lane. Messrs. Fowler and Hill, 9, Sergeant's Inn, Fleet-street, architects. Quantities supplied:—

	Portland.	Bath.
Bangs, W., and Co.* ...	£19,749	£18,709
Higgs and Hill ...	19,449	18,940
Hock, D. ...	19,476	18,468
Beale, W. J. ...	19,337	18,537
Bywater, G. H., and A. ...	18,574	18,063
Rick and Randall ...	18,574	17,520
Taylor, J. ...	18,497	17,517
Pack Brothers ...	18,259	17,520
Bull, J., and Sons ...	18,229	17,500
Mowlem, J., and Co. ...	17,969	17,282
McGregor, W., and D. ...	17,905	17,272
Crocker, T. W. ...	17,778	17,409
Vaughan, E. ...	17,733	16,876
Perry and Co. ...	17,697	16,867
Manley, M. ...	17,693	17,236
Chappell, J. T. ...	17,165	16,500
Nightingale, B. E. ...	17,015	16,161

*Accepted.

MARKET RASEN.—For vagrant wards, Market Raseen. Messrs. Bellamy and Hardy, Lincoln, architects:—

Walls, C., Caistor ...	£1,552 4 3
Night-ingle and Dimby, Grimsby ...	1,180 17 7
Walter & Hensman, Horncastle ...	1,128 0 0
Chapman, J., Grimsby ...	1,421 4 0
Dent, G., Brigg ...	1,370 0 0
Wilson, T., East Markham ...	1,263 0 0
Sanderson, C., Market Raseen ...	1,256 0 0
Malins & Freeman, Market Raseen ...	1,251 13 1
Walls, T. H. W., & H., Spalding ...	1,230 0 0
Rendall, C., Market Raseen ...	1,235 15 0
Harrison, J., Market Raseen ...	1,210 0 0
Brownlow, C., Market Raseen ...	1,200 11 0

MOUSCRAIN ASH.—For the building of retaining wall of the road at Ynyssywl, for the Mountain Ash local board. Mr. J. Jenkins, surveyor:—

Taylor and Son, Pontypridd ...	Per cubic yard.
Taylor, T., Mountain Ash ...	9s. 6d.
(Surveyor's estimate, 7s. per cubic yard.)	

NEWCASTLE-ON-TYNE.—For the erection of shops facing St. Andrew's-street and extending the eastern end of the Wholesale Vegetable Market roof, Newcastle-upon-Tyne. Mr. A. M. Fowler, M.I.C.E., borough surveyor:—

Watson, N., Fyle £1,471 2 6
Middlemiss, M., Fyle 3,782 6 6
Simpson, J. T., Fyle 3,742 18 0
Jackson, W. E., Fyle 3,087 0 0
Spoor, J., Gosforth 3,615 0 0
Lamb, M., Newcastle 3,674 12 0
Irvine, J., Newcastle 2,875 15 0
King, C., Gateshead (accepted) 2,755 17 0

NORWICH.—For new bakery at the workhouse, for the board of guardians:—

Youngs, J. (accepted) £212 0 0
(Lowest of nine tenders, the highest being £198).

NOTTINGHAM.—For construction of sewerage works in Red-lane and Mansfield-road, Nottingham. Mr. A. Brown, borough surveyor:—

Knight, J., Loughborough £220 19 0
Coridon, W., Nottingham 153 12 0
Smart, T., Nottingham (accepted) 115 0 0

OAKHAM.—For construction of a flushing tank to main sewers. Mr. R. W. Johnson, Melton Mowbray, surveyor:—

Ingram, Oakham £203 10 0
Edwards, Oakham 188 0 0
Barlow, Oakham 148 9 0
Haynes, Melton 145 0 0

OVENDEN.—For mason's work (labour only) required in the alteration of ashed, &c., for Messrs. S. Priestly and Son, of Grove Mill, Ovenden, Yorks. Mr. C. F. Horsfall, 1, Lord-street, Halifax, architect. Quantities supplied by the architect:—

Accepted tenders.
Mason (labour only):—

Hall, J., Halifax Joizier:— £75 0 0
Greenwood, S., Halifax 213 10 0
Plasterers and slaters:—
Rushworth and Firth, Halifax 111 0 0
Plumber and glazier:—
Halsbaw, C. A., Halifax 66 10 0
Ironfounders:—
Barker and Son, Todmorden 240 0 0

£704 0 0

PLYMOUTH.—For alterations to oakum-picking room at the Woolwich Union, for the board of guardians. Mr. J. O. Cook, 24, William-street, Woolwich, architect to the board:—

Coombs, H., Plymouth (accepted) £135 0 0

PLYMOUTH.—For Ford Church, near Plymouth. Mr. A. Norman, F.R.I.B.A., architect:—

Gill, Devonport £1,687 0 0
Gould, Plymouth 3,340 0 0
Goss, Torquay 3,264 0 0
Jinkin, Devonport 3,020 0 0
Martin, Devonport 2,867 0 0
Fletcher, Plymouth 2,839 0 0
Dart, Plymouth 2,780 0 0
Blowey, Plymouth 2,680 0 0
Finch, Plymouth 2,617 0 0
Lethbridge and May, Plymouth 2,549 0 0
Harley, Plymouth 2,474 0 0
Lapthorne and Goad, Plymouth 2,318 0 0

PLYMOUTH.—For erection of a police-station in Harbour-avenue, Plymouth. Mr. Henry Atty, C.E., borough surveyor:—

Husley, J., Plymouth £410 0 0
Foot, L., Plymouth 410 0 0
Parsen, J. B., Plymouth 410 0 0
Finch, J., Plymouth 308 0 0
Gill, H., Plymouth 388 0 0
Goadyear, G. H., Plymouth 331 0 0
Rawlin, W., Plymouth (accepted) 285 0 0

POTTON.—For boundary walls, fences, gates, and laying out of new cemetery, Potton, Beds., for the Potton Burial Board. Usher and Anthony, Bedford, architects:—

Edey and Wade, St. Neot's £162 17 0
Foster, S., Kempston 331 0 0
Bartle, Potton 289 13 0
Woodman, Potton 266 0 0
Burnage, Potton (accepted) 263 5 0

RUGBY.—For the construction of the stations on the Rugby and Northampton line, for the London and North Western Railway:—

Farnell and Sons, Rugby (accepted).

SOUTHWARK.—For new hall and offices in the South work Bridge-road. Messrs. A. and C. Harston, architects:—

Brass £5,110 0 0
Wall Bros. 5,050 0 0
Goodman 4,481 0 0
Hall, Beddall and Co. 4,445 0 0
Kibbey 4,400 0 0
Shumair 4,095 0 0
Crockett 3,846 0 0

SOVERBY BRIDGE.—For supply of a quantity of 12in. and 4in. gullies to the Soverby Bridge Local Board. Mr. J. Marsland, engineer and manager:—

Mitchell and Seddall, Soverby Bridge 12in. per ton. £4 15 0
Shorrocks, J. and R., Over Darwen 5 5 0
Laidlaw, R. and Son, Glasgow 5 5 0
Macfarlane and Co., Glasgow 5 2 0
Dempster, R. and Son, Elland 4 15 0
Newton, Chambers and Co., Sheffield 5 0 0
Rushforth and Thornton, Bradford 4 15 0
Teesdale Iron Works, Middlesbrough 4 17 6
Furness, C. E., Bros., Stourbridge 4 11 3
Jukes, Coulson, Stokes & Co., Sheffield & London 4 5 0
Halsey, G. and W. H., Bradford 4 13 4
Rushworth and Co., Soverby Bridge 4 13 4
Stanton Ironworks Co., Nottingham 1 6 6

*Accepted.

POTTON.—For boundary walls, fences, gates, and laying out of new cemetery, Potton, Beds., for the Potton Burial Board. Usher and Anthony, Bedford, architects:—

Edey and Wade, St. Neot's £162 17 0
Foster, S., Kempston 331 0 0
Bartle, Potton 289 13 0
Woodman, Potton 266 0 0
Burnage, Potton (accepted) 263 5 0

RUGBY.—For the construction of the stations on the Rugby and Northampton line, for the London and North Western Railway:—

Farnell and Sons, Rugby (accepted).

SOUTHWARK.—For new hall and offices in the South work Bridge-road. Messrs. A. and C. Harston, architects:—

Brass £5,110 0 0
Wall Bros. 5,050 0 0
Goodman 4,481 0 0
Hall, Beddall and Co. 4,445 0 0
Kibbey 4,400 0 0
Shumair 4,095 0 0
Crockett 3,846 0 0

SOVERBY BRIDGE.—For supply of a quantity of 12in. and 4in. gullies to the Soverby Bridge Local Board. Mr. J. Marsland, engineer and manager:—

Mitchell and Seddall, Soverby Bridge 12in. per ton. £4 15 0
Shorrocks, J. and R., Over Darwen 5 5 0
Laidlaw, R. and Son, Glasgow 5 5 0
Macfarlane and Co., Glasgow 5 2 0
Dempster, R. and Son, Elland 4 15 0
Newton, Chambers and Co., Sheffield 5 0 0
Rushforth and Thornton, Bradford 4 15 0
Teesdale Iron Works, Middlesbrough 4 17 6
Furness, C. E., Bros., Stourbridge 4 11 3
Jukes, Coulson, Stokes & Co., Sheffield & London 4 5 0
Halsey, G. and W. H., Bradford 4 13 4
Rushworth and Co., Soverby Bridge 4 13 4
Stanton Ironworks Co., Nottingham 1 6 6

*Accepted.

ST. PANCRAS.—Accepted for works at the vestry hall, by the St. Pancras vestry:—

Additional bookshelves. £57 10 0
Steep Bros.
New matting and relaying of old £28 2 0
Isont, T.

ST. GEORGE'S, EAST.—For the supply of 100 iron bedsteads at the workhouse, for the St. George's board of guardians:—

Hawkey, R., Whitechapel-road (accepted), 8s. 6d. each. (Lowest tender received.)

STAMFORD HILL.—For the erection of the Stamford-hill schools:—

Rawlinson, H., Tottenham £10,866 18 0
Harradine, S., Gloucester road, S.E. 10,080 0 0
Humphreys, M. A., & Son, Tottenham 9,975 0 0
Morton, A., Crouch-hill 9,785 0 0
Harper, J., Hackney 9,775 0 0
Shumair, W., Lower Clapton* 9,750 0 0
Harris and Wardrop, Woodwood st. 9,520 0 0
Crockett, W., St. Pancras 9,500 0 0
Goodman, W., Barnsbury 9,494 0 0
Mattock Bros., Wood Green 9,393 0 0
Seal Bros., Richmond 9,345 0 0
Higgs, J., Upper Park-lane, N.W. 9,330 0 0
Gardener, W., Waltham Abbey 9,283 0 0
Linzell, J., Tottenham 9,233 0 0
Perry and Co., Bow 9,137 0 0
Agood, J., Finsbury Park 9,100 0 0
Bentley, J., Waltham Abbey 8,965 0 0
Barker, G., Peckham 8,946 0 0
Higgs, F., Loughboro' Junction 8,892 0 0
Richardson, J. O., Clapham and Peckham 8,781 0 0
Vernon & Ewens, Westminster Chambers 8,781 0 0
Wall, C., Chelsea 8,780 0 0
Palmer, M. A., & Sons, St. George's in the East 8,653 0 0
Wood, B. T., Hackney 8,511 0 0
Childs, C. J., Tottenham 8,400 0 0
Wheeler, W., Ravenscourt Park 8,260 0 0

*Accepted.

SPOKE ON-TABNT, STAFFS.—For supply of an ordinary steam boiler, capable of working at a maximum pressure of 60lb. per square inch, for use at the Spitals workhouse of the Stoke Union, with fittings, &c., complete:—

Hawksley and Wild, Sheffield £160 0 0

THE BUILDING NEWS.

LONDON, FRIDAY, DECEMBER 16, 1881.

THE FULHAM UNION INFIRMARY COMPETITION.

THE competitive designs for this Union Infirmary were at last thrown open for inspection on Saturday, and have remained on view during the present week. We are now in a position, therefore, to give our readers the results of a more detailed examination of the selected plans than we were enabled to make before, as well as a review of the other designs.

As we intimated last week, the Board of Guardians, at their last meeting, have scrupulously followed Mr. Currey's report, have awarded the respective premiums to the authors of "Experience" in Circle, and "Simplicity," and have decided that the former plan shall be carried out. There is, we hear, a strong local feeling expressed by some of the competitors, that justice has not been done. It is alleged that one of the conditions has not been strictly complied with by a certain fortunate competitor, and there seems to be a just ground of complaint, urged by some, that a few of the best plans have been overlooked, while others, which have been tinted in direct violation of the instructions, have been favourably viewed by the board. It is, perhaps, rather rigidly enforcing the instruction respecting colour, that competitors should be disqualified who have indicated the departments of their plans by different tints, yet it appears to us that if instructions count for anything, full justice is not given to those who have been careful to avoid the blandishments which, at least, attract the eye of the uninitiated.

With regard to the instruction of cost, there is also, it is alleged by some, a want of scrupulous exactness on the part of many of the competitors. One of the conditions made it a requirement that fire-proof construction was to be considered, though it is quite certain that many of the estimates have been framed at too low a price to allow for flooring on this system, and there seems to be a very wide difference between the estimates of several designs in other respects similar, ranging as they do from £20,000 to £66,700. This variation in cost has given rise to considerable discussion at the board, and it is questioned whether the selected design can be carried out for the sum named by its authors. In a few of the plans, the authors of them have not very clearly shown how the future extension of the wards can be provided, a probability which, in a fast-growing district like Fulham ought not to be disregarded. It also suggests to us the importance of sufficiently large administrative offices being provided. Some very excellent plans seem to have lost sight of this contingency in making a roadway between the workhouse and the infirmary buildings, and in crowding together the pavilions.

The plans are, generally, on the corridor and pavilion system, and most of them have placed the pavilions fronting, and at right angles to Margravine-road. There are a few notable exceptions to this arrangement, and we notice one or two very good plans which have departed from the general rule of distribution by making the short side of the land facing Fulham-road the main front.

"Experience" in Circle (Messrs. Giles and Gough), the design to be carried out, has adopted four main pavilions of wards, with a centre administrative block, connected by a corridor along the Margravine-road frontage.

Two blocks for each sex are provided, giving an excess of 24, and a third block for females is indicated as an extension. To describe more in detail this plan, we may observe that the central block has the medical officer's apartments and matron's rooms on left of the central hall, and on the right-hand the matron's office, steward's sitting-room, assistant medical officer and committee rooms. These offices form a long range in the road side of the corridors. On the south side of corridor the main administrative offices are placed, traversed by two serving corridors, one of which gives access to assistant matron's room and messroom for servants on the female side; the other corridor leads to, first, the dispensary in a convenient position near entrance, the steward's office, and to mess-room. Between these lateral corridors, and in a central position, is the kitchen, with scullery behind, and a large steward's store-room in front. Behind this block is a separate range, with washhouse and laundry. The kitchen and scullery are kept low, and are well lighted by top lights, the nurses' rooms, or cubicles, forming the first floor over the side offices. Each of the ward pavilions, 96ft. by 24ft., is of three stories and there are 32 beds shown on each floor, these being arranged in pairs between the windows on each side. A ward kitchen is provided on one side of the entrance from corridor, and a staircase and lift on the other, while projecting in front to the Margravine-road is the day-room, conveniently placed, and with its own separate store and w.c., the isolation ward being over. The bath-rooms and w.c.'s of the ward project as semi-isolated towers at the rear end, at angles; and an excellent feature is to be noticed here, adopted in some other plans, namely, a balcony for the use of convalescents in the ward, obtained between the projecting latrines. The ward is heated by two stoves in the centre. A space of 48ft. intervenes between the pavilions; there are male and female receiving-rooms on the ground-floor between each pair, and each of these has a separate entrance into corridor, and a bath and w.c. The infectious wards are placed at ends as separate pavilions, with twelve beds on the female side, and eight beds on the male side, with bath and w.c. isolated at the rear end, and a kitchen and stairs and lift near the corridor. The authors have shown a connecting-passage to the day-room in front, and the main corridors connecting these wards are provided with doors to shut them off from the other pavilions. The elevations are treated in a plain but sensible style, in brick with stone lintels and windows, and stringcourses. The connecting balconies on the upper floors are shown of a light iron construction, the administrative block having a central tower over the hall. There is much in this design to justify Mr. Currey's decision; the planning is simple and the details well studied, the open gallery allows of a free cross current between the pavilions, the subway or basement corridor for gas, water, coals, &c., in communication with the lift is well devised; the only point requiring reconsideration appears to be that the medical officers' office be placed nearer the dispensary. The estimate is £39,750, calculated at 5d. per foot;—rather a low figure.

"Simplicity" (Messrs. Young and Hall), the second premiated design, shown by a neatly-prepared set of plans coloured, follows the same general distribution, with four pavilions and end infectious wards. In the central administration block there is an entrance-hall in front, and the medical officers' apartments on the left side. The planning of the main block is, like that of "Experience," simple and satisfactory; two passages at right angles to the main one giving access to the kitchen and dispensary in the centre, and the nurses' rooms, mess-rooms, and stores on each side. The laundry,

&c., form a separate block in the rear. The kitchen, dispensary, and stores of the administrative block are only one story in height, and are top-lighted and ventilated, round which above are the bedrooms for nurses, &c. The laundry has also top-light and ventilation. The end entrance for patients is rather an objectionable arrangement.

Examining the ward arrangement, we find a very similar plan to the last—a small ward-scullery and a staircase are placed on the sides of entrances from main corridor, and a separation ward on the front side of corridor. The wards are each 94ft. by 24ft., each provides for 30 beds, which are placed in couples. At the south angles are lateral bath-rooms and w.c.'s isolated; the itch and venereal wards are placed at the extreme ends of corridor. The latter is arched with glazed openings, the blocks are three-story, and are treated in a plain style; the exterior to the administration block is rather flat and commonplace. A cart-way to the administration block is provided at the back. The estimate is £40,923.

"M.D." is a well-drawn set of plans having in composition much that is common to the two designs just described. The pavilions are placed so as to leave good spaces for light and ventilation between; and the kitchen block in the centre is shown top-lighted and ventilated; the laundry range is placed behind, isolated, and the medical offices and nurses' dormitories occupy a long narrow block in front, separated from the corridor and parallel thereto, to which it is connected by a short passage. The wards are of good proportion, but not communicable on the upper floors; the stairs are made to project on the front side of the corridor, and are made telling external features in place of the day-rooms of the plan described. These staircases in the elevation are lighted by lofty pointed windows. The separation wards are not so conveniently placed as in the former. The elevations are designed in a plain brick Gothic style with high roofs. The cost estimated is £23,500, a sum certainly below the mark.

"Plan" has also the same arrangement of wards connected by a front corridor; the administration is in the centre, and forms a long transverse block traversed by a middle corridor. Each ward of the pavilion has a kitchen and stairs on one side and an isolating ward on the other side of entrance with angle latrines, and in the centre of each ward the conveniences connected by a short isolating lobby are planned as towers placed diagonally. The end of administration block presents a rather meagre elevation to the road, and the elevations are rather commonplace. There are good points in the plan, the author of which estimates its cost at £34,000.

"South Aspect," a set of neatly-drawn plans in colour, presents the usual disposition of blocks with the infectious wards at one end; the chief difference is the broken corridor, which is recessed in front of the administration block—a plan open to the objection that it does not allow of a straight line of communication. The central administration block has a middle corridor, on one side of which are the kitchen and mess-room, with the laundry department forming a long cross range at the back, but connected. The day-rooms and isolation wards are placed on one side of the main pavilion and partly fill up the space; they have access from the corridor. The ward staircase and kitchen are in the usual position, and the conveniences project at one of the angles of ward, which is planned to hold 31 beds. We do not see the advantage of taking a roadway to the mortuary out of the area of land. The elevations are not equal in point of merit, the features have a stereotyped appearance despite the symmetrical balance and the architectural recession of the centre. The estimate is £37,317.

HOMERTON.—For alterations to entrance gates, and raising boundary wall at Homerton Hospital, for the managers of the Metropolitan Asylum District Board. Mr. W. J. Walker, architect:—
Shummar (accepted).

KING'S LYNN, NORFOLK.—For the formation and levelling of the Gaywood Marsh-road, for the Urban Sanitary Authority. Mr. John Hall, borough surveyor:—
Clare Leverington, Overton, Norfolk (accepted); T. F. Deane, Lynn; Benjamin Hubbard, Lynn; F. Hammond and Co., Lynn.

LAMBETH, S.E.—For pulling down and rebuilding 57, Biril-street, Lambeth, for Mr. W. Hart. Mr. B. Fletcher, architect:—

Buckham	...	...	2278 0 0
Cook	...	...	250 0 0
Eldridge and Gee (accepted)	...	...	220 0 0

LEEDS.—For further works in the erection of stores, cellars, &c., for Messrs. Wright Bros., at their new brewery, Leeds. Messrs. Davison, Inskip, and Mackenzie, 62, Lendenhall street, E.C., architects:—
Boothman and Son ... £345 0 0
Irwin and Co. (accepted) ... 855 0 0

LEEK.—For the erection of a large newspaper kiosk in Broad-street, Leek, for Mr. S. Rider. Mr. W. Sugden and son, Leek, architects:—

Bromage	£135 0 0
---------	-----	-----	----------

Brickwork:—

Grace	...	...	79 0 0
Hall	...	...	75 0 0
Knowles (accepted)	...	...	66 0 0

Woodwork:—

Hudson, J.	...	...	95 10 0
Tomkinson	...	...	63 0 0
Bailey and Morris	...	...	61 15 0
Hall	...	...	61 0 0
Mackrell	...	...	59 10 0
Hudson, James	...	...	55 0 0
Talton	...	...	51 5 0
Carding, H. (accepted)	...	...	38 10 0

Plumbing:—

Carding, M.	...	...	23 0 0
Stevenson	...	...	20 11 0
Johnson, T. (accepted)	...	...	19 5 6

LEICESTER.—For supply of various stores to the Corporation for the twelve months commencing Dec. 1st. Mr. J. Gordon, C.E., borough surveyor:—

Broof, R., Leicester	...	...	£150 16 1
Clarke, Nettleship and Bailey, Leicester	...	...	150 4 1
Butler, E. H., Leicester	...	...	153 3 0
Cooper and Sturgess, Leicester	...	...	151 19 1
Butler & Sons, Leicester (accepted)	...	...	145 10 8

LEICESTER.—For supply of 100 large and 40 small cast-iron gullies, with removable sludge boxes, for the Corporation. Mr. J. Gordon, C.E., borough surveyor:—

Station.	Delivered at.	Boat Yard.
Langley Mill Engineering Co., Notts.	£251 15 5	£254 7 11
Payne and Holliday, Kettering	185 15 5	187 19 7
Sharpe and Co.	180 0 0	186 0 0
Smith, Patterson & Co., Blaydon-on-Tyne	165 5 0	165 5 0
The Executors of the late D. Clarke, Carlisle	158 0 0	158 0 0
Cort and Paine, Leicester	151 2 6	151 2 6
Goodwin, Bursley and Co., Leicester	151 10 0	151 10 0
Richards and Son, Leicester	138 0 0	138 0 0
Wright, B. and E., Leicester	129 0 0	129 0 0
Jukes, Coulson, Stokes and Co., Sheffield	113 4 2	115 2 6
Mason and Co., Leicester (accepted)	101 3 4	101 3 4

LONDON.—For additions to a workshop at No. 114, Packington street, for Mr. J. Wright. Mr. F. Hill, architect:—

Hughes	...	...	£320 0 0
Grover	...	...	297 0 0
Fernley	...	...	280 0 0
Deering and Son (accepted)	...	...	290 0 0

LONDON.—For repairs, &c., to houses, Lewis-road, Streatham, and 59, Russell-square. Mr. W. Paice, architect:—

Smith, W. H. (accepted)
-------------------------	-----	-----	-----

LONDON.—For the erection of shops and offices, No. 1, Great James street, London, W.C. Mr. F. C. Notley, 3, Crooked-lane, E.C., architect. Quantities by Mr. W. Barrett:—

Bolding, A. G.	...	...	£3,792 0 0
Hayworth, S.	...	...	3,718 0 0
Payman and Fotheringham	...	...	3,623 0 0
Macey and Sons	...	...	3,632 0 0
Greenwood, J.	...	...	3,490 0 0
Langmead and Way	...	...	3,475 0 0
Lawrence, E.	...	...	3,380 0 0
Nightingale, B. E.	...	...	3,237 0 0
Axtell, J. B.	...	...	3,175 0 0
Allen, J., and Sons	...	...	3,150 0 0
Scott, S. J.	...	...	3,113 0 0

* Accepted with modifications.

LONDON.—For the supply of cast-iron to the City Commissioners of sewers. Mr. W. Haywood, engineer:—

Richards, W., Middlesborough (accepted)
---	-----	-----	-----

LONDON.—For the erection of new premises for the Birbeck Scientific and Literary Institution, Chancery-lane. Messrs. Fowler and Hill, 9, 8, present's Inn, Fleet-street, architects. Quantities supplied:—

	Portland.	Bath.
Bings, W., and Co.	£19,749	£18,709
Higgs and Hall	19,480	18,940
Hack, D.	19,476	18,498
Beale, W. J.	19,237	18,537
Bywater, G. H., and A.	18,974	18,063
Kirk and Randall	18,574	17,520
Taylor, J.	18,497	17,517
Pack Brothers	18,253	17,220
Bull, J., and Sons	18,220	17,500
Mowlem, J., and Co.	17,989	17,282
McGregor, W., and P.	17,905	17,262
Crookitt, W.	17,778	17,400
Parry and Co.	17,736	16,876
Manley, M.	17,097	16,867
Chappell, J. T.	17,693	17,235
Nightingale, B. E.	17,165	16,590
	17,045	16,161

* Accepted.

MARKET RASEN.—For vagrant wards, Market Raseen. Messrs. Bellamy and Hardy, Lincoln, architects:—

Walls, C., Caistor	...	£1,552 4 3
Nightingale and Danby, Grimsby	...	1,480 17 7
Walter & Hensman, Horncastle	...	1,428 0 0
Chapman, J., Grimsby	...	1,421 4 0
Dent, G., Brigg	...	1,370 0 0
Wilson, T., East Markham	...	1,369 0 0
Sanderson, C., Market Raseen	...	1,256 0 0
Malim & Freeman, Market Raseen	...	1,254 13 1
Wallis, T. H. W. & H., Spalding	...	1,239 0 0
Kendall, C., Market Raseen	...	1,235 15 0
Harrison, J., Market Raseen	...	1,210 0 0
Brownlow, C., Market Raseen	...	1,209 11 0

MOUNTAIN ASH.—For the building of retaining wall of the road at Ynysbwl, for the Mountain Ash local board. Mr. J. Jenkins, surveyor:—

	Per cubic yard.
Taylor and Son, Pontypridd	9s. 6d.
Taylor, T., Mountain Ash	9s. 0d.

(Surveyor's estimate, 7s. per cubic yard).

NEWCASTLE-ON-TYNE.—For the erection of shops facing St. Andrew's street and extending the eastern end of the Wholesale Vegetable Market road, Newcastle-upon-Tyne. Mr. A. M. Fowler, M.L.C.E., borough surveyor:—

Watson, N., Fyle	...	£1,471 2 6
Middlemiss, M., Fyle	...	3,742 18 0
Sunpson, J. T., Fyle	...	3,687 0 0
Jackson, W. E., Fyle	...	3,615 0 0
Spoor, J., Gosforth	...	3,374 12 0
Lamb, M., Newcastle	...	2,875 15 0
Irving, J., Newcastle	...	2,795 17 0
King, C., Gateshead (accepted)	...	2,795 17 0

NORWICH.—For new bakery at the workhouse, for the board of guardians:—

Youngs, J. (accepted)	...	£212 0 0
-----------------------	-----	----------

(Lowest of nine tenders, the highest being £498).

NOTTINGHAM.—For construction of sewerage works in Red-lane and Mansfield-road, Nottingham. Mr. A. Brown, borough surveyor:—

Knight, J., Loughborough	...	£220 10 0
Cordon, W., Nottingham	...	153 12 0
Smart, T., Nottingham (accepted)	...	115 0 0

OAKHAM.—For construction of a flushing tank to main sewers. Mr. H. W. Johnson, Melton Mowbray, surveyor:—

Ingram, Oakham	...	£203 10 0
Edwards, Oakham	...	188 0 0
Barlow, Oakham	...	148 9 0
Haynes, Melton	...	145 0 0

OVENDEN.—For mason's work (labour only) required in the alteration of ashed, &c., for Messrs. S. Priestly and Son, of Grove Mill, Ovenden, Yorks. Mr. C. F. Horsfall, 1, Lord-street, Halifax, architect. Quantities supplied by the architect:—

Accepted tenders.	...	...
Mason (labour only):—	...	...
Hall, J., Halifax	...	£75 0 0

Orestwood, S., Halifax	...	213 10 0
Plasterers and slaters:—	...	...
Rushworth and Firth, Halifax	...	111 0 0

Plumber and glazier:—	...	...
Halshaw, C. A., Halifax	...	66 10 0
Ironfounders:—	...	...
Barker and Son, Todmorden	...	240 0 0

£704 0 0

PLUMSTEAD.—For alterations to oakum-picking room at the Woolwich Union, for the board of guardians. Mr. J. O. Cook, 24, William street, Woolwich, architect to the board:—

Coombs, H., Plumstead (accepted)	...	£135 0 0
----------------------------------	-----	----------

PLYMOUTH.—For Ford Church, near Plymouth. Mr. A. Norman, F.R.I.B.A., architect:—

Gill, Devonport	...	£1,687 0 0
Goodyear, Stonehouse	...	3,310 0 0
Goss, Torquay	...	3,284 0 0
Junkin, Devonport	...	3,020 0 0
Martin, Devonport	...	2,867 0 0
Feer, Plymouth	...	2,830 0 0
Dart, Plymouth	...	2,780 0 0
Blower, Plymouth	...	2,680 0 0
Finch, Plymouth	...	2,647 0 0
Lethbridge and May, Plymouth	...	2,549 0 0
Lapley, Plymouth	...	2,474 0 0
Lathorne and Goad, Plymouth	...	2,318 0 0

PLYMOUTH.—For erection of a police-station in Harbour-avenue, Plymouth. Mr. Henry Alty, C.E., borough surveyor:—

Hartley, J., Plymouth	...	£140 0 0
Foot, I., Plymouth	...	440 0 0
Parson, J. B., Plymouth	...	410 0 0
Finch, J., Plymouth	...	388 0 0
Gill, H., Plymouth	...	388 0 0
Goodyear, G. H., Plymouth	...	334 0 0
Rawlin, W., Plymouth (accepted)	...	285 0 0

POTTON.—For boundary walls, fences, gates, and the laying out of new cemetery, Potton, Beds., for the Potton Burial Board. Usher and Anthony, Bedford, architects:—

Edley and Wade, St. Neot's	...	£162 17 0
Foster, S. Kempston	...	331 0 0
Barthe, Potton	...	289 19 0
Woodman, Potton	...	256 0 0
Burnage, Potton (accepted)	...	263 5 0

RUGBY.—For the construction of the stations on the Rugby and Northampton line, for the London and North Western Railway:—
Farnell and Sons, Rugby (accepted).

SOUTHWARK.—For new hall and offices in the Southwark Bridge-road. Messrs. A. and C. Harston, architects:—

Brass	...	...	£5,110 0 0
Wall Bros.	...	...	5,050 0 0
Goodman	...	...	4,481 0 0
Hall, Beddall and Co.	...	...	4,445 0 0
Kilbey	...	...	4,470 0 0
Shummar	...	...	4,495 0 0
Crockett	...	...	3,846 0 0

SOWERBY BRIDGE.—For supply of a quantity of 12in. and 4in. pipes to the Sowerby Bridge Local Board. Mr. J. Marsland, engineer and manager:—

	12in. per ton.	4in. per ton.
Mitchell and Seddall, Sowerby Bridge	£1 15 0	5 10 0
Shorrocks, J. and R., Over Darwen	5 5 0	5 9 0
Ladlaw, R. and Son, Glasgow	5 5 0	5 5 0
Macfarlane and Co., Glasgow	5 2 0	5 5 0
Dempster, R. and Son, Elland	4 15 0	5 2 6
Newton, Chambers and Co., Sheffield	5 0 0	5 0 0
Rushforth and Thornton, Bradford	4 15 0	5 0 0
Teesdale Iron Works, Middleborough	4 17 6	4 17 6
Firmstone, C. E., Bros., Stourbridge	4 11 3	4 15 0
Jukes, Coulson, Stokes & Co., Sheffield & London	4 5 0	4 13 9
Haley, G. and W. H., Bradford	4 13 4	4 13 4
Rushworth and Co., Sowerby Bridge	4 13 4	4 13 4
Stanton Ironworks Co., Nottingham	4 6 6	4 7 6

* Accepted.

ST. PANCRAS.—Accepted for works at the vestry hall, by the St. Pancras vestry:—

Additional bookshelves.	...	£57 10 0
Steed Bros.	...	...
New matting and relaying of old.	...	...
Isom, T.	...	£23 2 0

ST. GEORGE'S, EAST.—For the supply of 100 iron bedsteads at the workhouse, for the St. George's board of guardians:—

Hawkey, R., Whitechapel-road (accepted)	...	Ss. 6d. each.
---	-----	---------------

(Lowest tender received.)

STAMFORD HILL.—For the erection of the Stamford-hill schools:—

Rawlinson, H., Tottenham	...	£10,566 18 0
Harradine, S., Gloucester road, S.E.	...	10,080 0 0
Humphreys, M. A., & Son, Tottenham	...	9,975 0 0
Morton, A., Crouch-hill	...	9,785 0 0
Harper, J., Hackney	...	9,775 0 0
Shummar, W., Lower Clapton	...	9,750 0 0
Harris and Wardrop, Woodwork st.	...	9,520 0 0
Crockett, W., St. Pancras	...	9,500 0 0
Goodman, W., Barnsbury	...	9,494 0 0
Matlock Bros., Wood Green	...	9,393 0 0
Seal Bros., Richmond	...	9,345 0 0
Higgs, J., Upper Park-lane, N.W.	...	9,330 0 0
Gardener, W., Waltham Abbey	...	9,283 0 0
Linzell, J., Tottenham	...	9,238 0 0
Perry and Co., Bow	...	9,127 0 0
Angood, J., Finsbury Park	...	9,100 0 0
Bentley, J., Waltham Abbey	...	8,965 0 0
Parker, G., Peckham	...	8,946 0 0
Higgs, F., Loughboro Junction	...	8,892 0 0
Richardson, J. O., Clapham and Peckham	...	8,784 0 0
Vernon & Evans, Westminster	...	8,781 0 0
Chambers	...	8,780 0 0
Wall, C., Chelsea	...	8,780 0 0
Palmer, M. A., & Sons, St. George's in the East	...	8,653 0 0
Wood, B. T., Hackney	...	8,541 0 0
Childs, C. J., Tottenham	...	8,400 0 0
Wheeler, W., Ravenscourt Park	...	8,260 0 0

* Accepted.

STOKE-ON-TRENT, STAFFS.—For supply of an ordinary steam boiler, capable of working at a maximum pressure of 60lb. per square inch, for use at the Spitals workhouse of the Stoke Union, with fittings, &c., complete:—

Hawksley and Wild, Sheffield	...	£160 0 0
Gallaway, W. J., & Sons, Manchester	...	150 0 0
Bradford, T., & Co., Manchester	...	145 0 0
Executors of G. Barker, Kulsgrave	...	138 10 0
Russell and Co., Workingham	...	122 10 0
Baxter, H., Bros., Stoke-upon-Trent	...	110 0 0
Hartley & Harmer, Stoke-upon-Trent	...	110 0 0

* Accepted.

TORQUAY.—For alteration of galleries at Torre parish church. Mr. J. Watson, architect:—

Ireland, Torquay	...	£59 10 0
Goss, W. A.	...	56 4 7
Matthews, P., Torquay (accepted)	...	55 0 0

THE BUILDING NEWS.

LONDON, FRIDAY, DECEMBER 16, 1881.

THE FULHAM UNION INFIRMARY COMPETITION.

THE competitive designs for this Union Infirmary were at last thrown open for inspection on Saturday, and have remained on view during the present week. We are now in a position, therefore, to give our readers the results of a more detailed examination of the selected plans than we were enabled to make before, as well as a review of the other designs.

As we intimated last week, the Board of Guardians, at their last meeting, have scrupulously followed Mr. Currey's report, have awarded the respective premiums to the authors of "Experience" in Circle, and "Simplicity," and have decided that the former plan shall be carried out. There is, we hear, a strong local feeling expressed by some of the competitors, that justice has not been done. It is alleged that one of the conditions has not been strictly complied with by a certain fortunate competitor, and there seems to be a just ground of complaint, urged by some, that a few of the best plans have been overlooked, while others, which have been tinted in direct violation of the instructions, have been favourably viewed by the board. It is, perhaps, rather rigidly enforcing the instruction respecting colour, that competitors should be disqualified who have indicated the departments of their plans by different tints, yet it appears to us that if instructions count for anything, full justice is not given to those who have been careful to avoid the blandishments which, at least, attract the eye of the initiated.

With regard to the instruction of cost, there is also, it is alleged by some, a want of scrupulous exactness on the part of many of the competitors. One of the conditions made it a requirement that fire-proof construction was to be considered, though it is quite certain that many of the estimates have been framed at too low a price to allow for flooring on this system, and there seems to be a very wide difference between the estimates of several designs in other respects similar, ranging as they do from £20,000 to £66,700. This variation in cost has given rise to considerable discussion at the board, and it is questioned whether the selected design can be carried out for the sum named by its authors. In a few of the plans, the authors of them have not very clearly shown how the future extension of the wards can be provided, a probability which, in a fast-growing district like Fulham ought not to be disregarded. It also suggests to us the importance of sufficiently large administrative offices being provided. Some very excellent plans seem to have lost sight of this contingency in making a roadway between the workhouse and the infirmary buildings, and in crowding together the pavilions.

The plans are, generally, on the corridor and pavilion system, and most of them have placed the pavilions fronting, and at right angles to Margrave-road. There are a few notable exceptions to this arrangement, and we notice one or two very good plans which have departed from the general rule of distribution by making the short side of the land facing Fulham-road the main front.

"Experience" in Circle (Messrs. Giles and Gough), the design to be carried out, has adopted four main pavilions of wards, with a centre administrative block, connected by a corridor along the Margrave-road frontage.

Two blocks for each sex are provided, giving an excess of 24, and a third block for females is indicated as an extension. To describe more in detail this plan, we may observe that the central block has the medical officer's apartments and matron's rooms on left of the central hall, and on the right-hand the matron's office, steward's sitting-room, assistant medical officer and committee rooms. These offices form a long range in the road side of the corridors. On the south side of corridor the main administrative offices are placed, traversed by two serving corridors, one of which gives access to assistant matron's room and messroom for servants on the female side; the other corridor leads to, first, the dispensary in a convenient position near entrance, the steward's office, and to mess-room. Between these lateral corridors, and in a central position, is the kitchen, with scullery behind, and a large steward's store-room in front. Behind this block is a separate range, with washhouse and laundry. The kitchen and scullery are kept low, and are well lighted by top lights, the nurses' rooms, or cubicles, forming the first floor over the side offices. Each of the ward pavilions, 96ft. by 24ft., is of three stories and there are 32 beds shown on each floor, these being arranged in pairs between the windows on each side. A ward kitchen is provided on one side of the entrance from corridor, and a staircase and lift on the other, while projecting in front to the Margrave-road is the day-room, conveniently placed, and with its own separate store and w.c., the isolation ward being over. The bath-rooms and w.c.'s of the ward project as semi-isolated towers at the rear end, at angles; and an excellent feature is to be noticed here, adopted in some other plans, namely, a balcony for the use of convalescents in the ward, obtained between the projecting latrines. The ward is heated by two stoves in the centre. A space of 48ft. intervenes between the pavilions; there are male and female receiving-rooms on the ground-floor between each pair, and each of these has a separate entrance into corridor, and a bath and w.c. The infectious wards are placed at ends as separate pavilions, with twelve beds on the female side, and eight beds on the male side, with bath and w.c. isolated at the rear end, and a kitchen and stairs and lift near the corridor. The authors have shown a connecting-passage to the day-room in front, and the main corridors connecting these wards are provided with doors to shut them off from the other pavilions. The elevations are treated in a plain but sensible style, in brick with stone lintels and windows, and stringcourses. The connecting balconies on the upper floors are shown of a light iron construction, the administrative block having a central tower over the hall. There is much in this design to justify Mr. Currey's decision; the planning is simple and the details well studied, the open gallery allows of a free cross current between the pavilions, the subway or basement corridor for gas, water, coals, &c., in communication with the lift is well devised; the only point requiring reconsideration appears to be that the medical officers' office be placed nearer the dispensary. The estimate is £39,750, calculated at 5d. per foot;—rather a low figure.

"Simplicity" (Messrs. Young and Hall), the second premiated design, shown by a neatly-prepared set of plans coloured, follows the same general distribution, with four pavilions and end infectious wards. In the central administration block there is an entrance-hall in front, and the medical officers' apartments on the left side. The planning of the main block is, like that of "Experience," simple and satisfactory; two passages at right angles to the main one giving access to the kitchen and dispensary in the centre, and the nurses' rooms, mess-rooms, and stores on each side. The laundry,

&c., form a separate block in the rear. The kitchen, dispensary, and stores of the administrative block are only one story in height, and are top-lighted and ventilated, round which above are the bedrooms for nurses, &c. The laundry has also top-light and ventilation. The end entrance for patients is rather an objectionable arrangement.

Examining the ward arrangement, we find a very similar plan to the last—a small ward-scullery and a staircase are placed on the sides of entrances from main corridor, and a separation ward on the front side of corridor. The wards are each 94ft. by 24ft., each provides for 30 beds, which are placed in couples. At the south angles are lateral bath-rooms and w.c.'s isolated; the itch and venereal wards are placed at the extreme ends of corridor. The latter is arched with glazed openings, the blocks are three-story, and are treated in a plain style; the exterior to the administration block is rather flat and commonplace. A cart-way to the administration block is provided at the back. The estimate is £40,923.

"M.D." is a well-drawn set of plans having in composition much that is common to the two designs just described. The pavilions are placed so as to leave good spaces for light and ventilation between; and the kitchen block in the centre is shown top-lighted and ventilated; the laundry range is placed behind, isolated, and the medical offices and nurses' dormitories occupy a long narrow block in front, separated from the corridor and parallel thereto, to which it is connected by a short passage. The wards are of good proportion, but not communicable on the upper floors; the stairs are made to project on the front side of the corridor, and are made telling external features in place of the day-rooms of the plan described. These staircases in the elevation are lighted by lofty pointed windows. The separation wards are not so conveniently placed as in the former. The elevations are designed in a plain brick Gothic style with high roofs. The cost estimated is £23,500, a sum certainly below the mark.

"Plan" has also the same arrangement of wards connected by a front corridor; the administration is in the centre, and forms a long transverse block traversed by a middle corridor. Each ward of the pavilion has a kitchen and stairs on one side and an isolating ward on the other side of entrance with angle latrines, and in the centre of each ward the conveniences connected by a short isolating lobby are planned as towers placed diagonally. The end of administration block presents a rather meagre elevation to the road, and the elevations are rather commonplace. There are good points in the plan, the author of which estimates its cost at £34,000.

"South Aspect," a set of neatly-drawn plans in colour, presents the usual disposition of blocks with the infectious wards at one end; the chief difference is the broken corridor, which is recessed in front of the administration block—a plan open to the objection that it does not allow of a straight line of communication. The central administration block has a middle corridor, on one side of which are the kitchen and mess-room, with the laundry department forming a long cross range at the back, but connected. The day-rooms and isolation wards are placed on one side of the main pavilion and partly fill up the space; they have access from the corridor. The ward staircase and kitchen are in the usual position, and the conveniences project at one of the angles of ward, which is planned to hold 31 beds. We do not see the advantage of taking a roadway to the mortuary out of the area of land. The elevations are not equal in point of merit, the features have a stereotyped appearance despite the symmetrical balance and the architectural recession of the centre. The estimate is £37,517.

"Quod Petis Hic Est," the design of local architects, has many good features, based upon the Herbert hospital. Unlike the other competitors, the authors have connected the pavilions by a corridor near the south boundary, by which means a good garden is obtained between each pair of blocks, besides a yard on the south side of corridor. The plan shows the isolation wards at the south end of wards, and convalescents can thus enjoy a good aspect. The wards provide for 628 patients. The details of the administrative department have been carefully worked out, and indicate a practical acquaintance with infirmary buildings. In the centre, after passing the medical superintendent's offices, a roadway gives access to the steward's and assistant medical officers' rooms on each side, near which is the receiving ward. At the end of this roadway is a tower carried up for a water-tank to work hydraulic lift, and right and left are the main connecting corridors. By the arrangement all new applicants can be quickly examined and sent into any particular ward. The laundry is placed behind the ward pavilions have a distance of 60ft. between, and a wide garden is obtained between the centre administrative block and the pavilions. The infectious wards are at the ends. The estimate is £55,000, and room for two additional pavilions is indicated.

"Hôtel Dieu" is a plan which has been favourably considered; the general principle of the corridor and pavilions has been followed. The matron's, steward's, medical officers' rooms are well placed in the centre, in connection with the front corridor, and occupy a long front building between the two centre pavilions and in front of corridors. The mess-rooms are behind, and the kitchen is in the centre, with the laundry department attached in the rear. In the wards, the separation-rooms are placed in front of corridors, and the day-room between entrance and ward proper, occupying, in fact, a part of the pavilion. Each ward provides for 20 beds, and there is a space of 75ft. between the pavilions; it has a foul-linen shoot at the end, with well-arranged lavatories and bath-rooms. The basement plan shows coal-stores under all the blocks, an expensive and unnecessary provision. The elevations are drawn in a Renaissance style; the centre block is marked by a tower, with high concave roof, and these features are repeated at the ends, and at the pavilions.

"Experience" in Oblong, is a clever arrangement. The administration block faces the Fulham-road, and a roadway on the south side is shown, giving access to the several pavilions, which are connected by a corridor also on this side. Both infectious wards are placed at the east end, separated by a wall from the other blocks. The day-rooms are on one side of wards, the nurses' room with inspection window, the scullery, bath-room, and w.c.'s forming a corresponding projection on the other side. Good provision is made for separation of cases, the foul linen is separated from the main wards, and the kitchen offices are only one story high. On the other hand, the pavilions look rather crowded together, there is a distance of 50ft. between them. The elevation is rather hackneyed, but the author by this arrangement has considerably reduced the cost by avoiding a long frontage towards Margrave-road. The estimate is £39,835.

"The House of the Poor and the Sick" is a coloured plan, showing the pavilions placed lengthwise of the land with a centre administrative department, the infectious wards being at the end. The plan is hung too high to admit of inspection, but from a general glance some ingenuity is seen to be evinced in the planning.

"Apropos" is the motto of a well-drawn set of plans; the pavilions have circular angle towers or latrines in the rear; the

front elevation is neat, the Classical treatment of the centre block and the pavilion ends being made features. Here the infectious wards are objectionably placed behind the centre administration block, but the general planning and details of the wards and official apartments are meritorious.

"Experience" departs from the beaten track; the wards or pavilions have return end wings, and are connected by a central corridor to a middle administration block, the infectious wards being at the ends. We doubt the desirability of right-angle wards, as the spaces enclosed would be comparatively shut out from sunlight. The isolation wards and kitchens are cleverly arranged at the intersection of the corridor.

"Desideratum" is a well-considered plan in its main features. We rather object to the position of the day-room, which is placed between each pair of pavilions, and is entered separately from the corridor; also the medical superintendent's house at the back of the administration block. In other respects it follows the generally accepted arrangement. The stores for bedding are placed under the isolation wards, which project in front of the main corridor. There is a useful balcony shown for invalids' use between the circular turrets of bath-rooms, and w.c.'s at the south end of each ward.

"Economy" has a long row of administration offices in the centre, the wards appear to be generally well proportioned and provided, and the medical superintendent's residence is in the front part of the administration building, and in a good position. The elevation is drawn with Queen Anne features. "Sanitas" arranges the wards on a different plan to that generally adopted. Each block contains two wards. The beds are ranged on each side of partitions in a wide ward, on a principle followed in some of the Union infirmaries. A centre corridor connects the two blocks, one for each sex, with the central offices. The isolation wards and kitchens are well disposed. The elevation is in a Gothic style, rather meagrely treated. "Beacon" has a symmetrically and generally well-disposed arrangement; the treatment is Gothic, and the elevation is good. We may also mention "Spes" in star, showing six pavilions and a complicated set of offices; "Sic Omnes," a rather ill-digested plan, with the isolation wards at the further ends of each block, an undesirable position. "Albion," "To Be, or Not to Be," "Samaritan," "Fit," and "Observance," "L'Esperance," "Home of Plenty," "Fortuna Sequator," are designs, which have not met the requirements so fully as those we have described, though their authors have spared no pains. We are sorry more room was not given to the exhibition of these sets of designs, which comprise, on the whole, a large number of detail drawings, many of which are hung so high as to make examination difficult or quite impossible. The competition shows a large amount of talent, and the labour expended in some of the designs is considerable. It is satisfactory to find the board have acted in strict accordance with the referee's selection.

THE BRIGHTON HEALTH CONGRESS AND EXHIBITION.

THE Domestic and Scientific Exhibition now open at the Royal Pavilion, Brighton, is a collection of a somewhat miscellaneous character, in which the local manufacturers and shopkeepers are largely represented. The domestic and sanitary exhibits are numerous, and of a generally interesting kind, and include many appliances by well-known firms. In the Corn Exchange, a hall having an old and unique timber roof of an elliptical form, we meet with the names of several well-known manu-

facturers. One of the first compartments we come to is occupied by S. Hannington and Sons, of Brighton, and is furnished in an artistic manner, with a suite of drawing-room furniture in rosewood and satin. The chimney-piece and cabinet are designed in a quiet Louis XVI. taste, and the colouring of walls and upholstery is in pleasing harmony. Russell R. Perry, of Brighton, has been successful also in the choice of his fabrics. The "Lincrusta-Walton" decorations deservedly attract notice for their design and colour. In addition to a few select samples of wall-decorations in Jacobean and the Adams styles, we have pleasure in noticing a new application of this material as panels for doors, cabinet furniture, and wall-linings. These hand-painted panels of the material can be fitted to any size of panel, and are very effective as well as inexpensive and durable. The silk-imitation tapestries in paper are another novelty introduced by this firm, and some of them represent rich embroidery patterns on a subdued satin ground. Specimens of parquetry, by Eberhard, laid in his patent composition glue, are on view, and the facility with which the parquet can be laid on brick or stone and cement floors claims attention. Passing Sendall and Son's (Brighton) very cleverly imitated woods and marbles, we note a show of dado and wall-papers manufactured by Woolmans and Co., of London, remarking especially some embossed, light leather-papers, in good patterns and tints; also the embossed flock papers, a speciality of this firm. All the papers are free from arsenic. Further on we see a handsome stand filled with Doulton and Co.'s Lambeth faience, consisting of vases and plaques; some beautiful specimens of Doulton ware, *pâte-sur-pâte*, impasto, tiles, decorations, &c. Art needlework is represented by a few stalls of local artists. W. Kemp exhibits a few examples of altar frontals, stoles, and other ecclesiastical embroidery; Maria Hatch some specimens of *appliqué*.

We give a glance at Howard and Sons' (Berners-street) parquetry flooring. Bishop and Son, Marylebone-road, show at the end of hall a two-manual chancel organ of pitch-pine, the pipes being designed by C. H. Nisbett, and the upper part or works being made to project considerably over the key portion. Mr. W. Watt, of Grafton-street, W., exhibits some art furniture; C. Feldwick and Sons, Brighton, have a unique, dark mahogany Chippendale cabinet, with a pagoda top, for china, particularly worth notice. In the class of Decorative art, we make notes of various stalls in which painted china is shown, and various local lady exhibitors (39 to 56) are chiefly represented. We notice a few terra-cotta plaques decorated with apple blossom and other flowers, a painted Lincrusta screen (43). The Art Tile, China, and Glass-painting Co., of Finsbury-pavement, are exhibitors of specimens of stained and painted glass. The Albissima Paint Co., Lime-street, E.C., has a conspicuous stand, which forms a canopy structure at one end of the hall, and is, in itself, high testimony of the purity and opacity of the white which is manufactured by the company. Their sanitary paint has all the advantages of the ordinary white-lead, but devoid of its poisonous qualities; it has a good covering power, and for the painting of ships and decorative purposes generally is well adapted. The specimens show its capabilities for covering and mixing with pigments; and the tubes which are prepared for artists are an excellent substitute for the whites generally used.

The architectural drawings in ink and colour occupy one compartment of the Corn Exchange, and are almost entirely those of works of local architects. The remark we made respecting the charge made by the

Committee for wall space in this department has been fully borne out by the result, and a larger collection of drawings by good men would have been forthcoming in all probability if architects had been placed on a different footing, and their works invited. Mr. T. W. Cutler, F.R.I.B.A., shows an exterior in ink of a tile-hung and timber house with a corner bay. Mr. Edmund E. Scott (Scott and Hyde, architects, of Brighton), contributes a sepia drawing of some quietly-handled Gothic schools for Baroness Burdett-Coutts in Rochester-row, also an ink drawing of a house to be built in Sussex, having a picturesque and simple gable treatment, with a tower, the upper part of the house being tile-hung. The water-colour interior of St. James's Church, Brighton, showing brick and stone arcading, is cleverly executed. We also note a classroom, Cliftonville, shown by an ink drawing by Holford, Clayton, and Black, architects, of Brighton, and perspective view of shops at Redhill, well drawn in ink, with a gallery above the shops. Mr. T. W. Cutler exhibits an ink perspective and plan of a memorial cottage hospital, at Eastbourne, with details of the ward fireplace, hollow walls, and ventilating flues; drawings of a cottage and studio in Berkshire, interior of billiard-room, &c. Mr. W. Emerson has a view of St. Mary's Church, St. James-street, illustrated by us, and an interior view in colour; besides an effective water-colour drawing of an Indian college at Allahabad University. Mr. John G. Gibbons, of Brighton, sends a drawing of school of art on the Grand Parade; and Messrs. Lainson and Sons, an ink view of the Alexandra Hospital, Brighton—a building of Renaissance design, besides a drawing of the Reading Town-hall, which we have given, and of premises at the corner of West-street. Mr. Somers Clarke, jun., has a large sepia interior view of St. Martin's Church, Brighton, and the pulpit and canopy in the same church. Mr. Rowland Plumbé, F.R.I.B.A., is represented by several ink drawings: among the chief we notice a church at Woodford Green, drawn in ink; an interior of a billiard-room, Kilburn; a house at Surbiton, Gothic half-timbered; a hall and theatre, Hampton-wick, showing a timber roof; and a board-school at Walton-on-Thames, simple in grouping. Mr. J. Pitt Bayley, of London, is an exhibitor of several designs for churches.

The other exhibits in the Corn Exchange comprise various food-products, beverages in the form of mineral and aerated waters, pancreatine, peptonised milk, &c. The sanitary and domestic appliances located in the iron annexe are comprehensive in their variety. We notice amongst the leading appliances in this department the "adjustable desk" manufactured by Colman and Glendinning, and shown by the North of England School Furnishing Co., Darlington, besides various improved chairs, art tables, and school desks, complying with hygienic principles. The "euthermic gas-heating stove," shown by E. G. Benford, Castle-square, we have already favourably spoken of; also the ventilating gas-bracket, gas-burners, &c., all of which are the inventions of Dr. Bond. The patent pyrogen, for raising fires quickly, is an ingenious appliance. Hill's patent bars for kitcheners are noteworthy; and we must not pass by the walnut chimney-pieces, showing the smoke-consuming and slow-combustion grate of Fred. Edwards and Son, Marlborough-street, London, the construction of which we have lately described in referring to the Smoke-Prevention Exhibition at Kensington. Davis and Co., Camberwell-road, have on view one of their economical gas-stoves, the "Metropolitan" gas kitchener; and in this branch we notice several local firms: C. Green (178), Packham and Co.—the latter of whom have a large kitchen-range handsomely fitted with blue tiles, and a new

assortment of Ritchie's heating-stoves, &c. T. Walter and Co., of Southwark, have a useful display of heating and sanitary appliances. J. H. Gardener, West Brighton, is a large exhibitor of chimney-pieces and ironmongery; Hindmarsh and Co. have a large show of ranges, baths, grates; and Reed and Sons (183) some good smoke-consuming stoves, lavatories, &c.

Charles Drake and Co. (189), Battersea Park, whose concrete specialities we have often referred to, exhibit, among other things, a patent mosaic marble bath, pavements, table top, and chimney-piece. The jointless pavement shows the capabilities of this material. The slab-faced concrete wall, the fireproof tread and riser, and floors are well worth the attention of architects and others. F. H. Tuxford, Brighton, shows a model of house drainage and a new basin and trap combined, also an improved O-lead trap, intended to make repair more easy. In the same class of objects must be mentioned the sanitary exhibits of John Coley Bromfield, of Brighton. The "Sanitary carbon" samples are interesting, and the silicate oxide substitute for lead-paint deserves mention. Mr. Alfred Bedborough, architect, Abingdon-street, is the exhibitor of a patent "Imperial" window for ventilation, in which the difficulties and dangers attending the ordinary sash-window are obviated. The Imperial window has top and bottom sashes, but the top sash and frame are made 12in. more in height, the frame or casing running up above the window soffit. By this increased length the sash can be lowered to allow for ventilation, the space between the two insuring a vertical current of air. The upper 12in. is divided into smaller panes. Another special point to notice is a method of grooving the outside lining of the sash frame, by which means draught and dust are excluded. One of the models shows how an ordinary sash window may be made to revolve on centres for cleaning, and the cost, we are informed, is only about 16s. a window.

The "Eureka Concrete" Company send a concrete culvert or sewer of large section, made of their concrete; also samples of paving and flooring, lintels, the "Gas detector," invert blocks, and moulded steps of excellent manufacture, showing great hardness and strength. Hayward Bros., Queen Victoria-street (188), have a window fitted up to show their patent semi-prismatic pavement lights, and the result of the trial will convince the most sceptical of the value of these light concentrators and directors, already favourably known to the profession. The specimens of coal-hole plates for ventilation and the foothold given in these are great improvements upon the old plates, which have caused many serious accidents. H. Sharp Jones and Co., Poole, Dorset, exhibit large tubes made in their "rock concrete," and the roofing tiles and Wright's indestructible fixing blocks to substitute for wood bricks in fixing joinery, are worth the attention of architects. Uriah Clark, Sussex, has a variety of terra-cotta ridge-tiles, finials, and other ornamental accessories, and we also notice R. and H. Norman's red facing bricks (187). R. Adams's safety-sliding windows, with flexible brass tongues hung on centres, the spring-door check, and other appliances for opening and adjusting windows and fanlights, are well worth examination.

We must notice briefly the "Imperial stone" exhibits of Hodges, Butler and Dale, East Greenwich. This silicated stone is made into sewers, paving, steps, coping, edgings, sewer-inverts, and every form of detail used in building and sanitary works. The enamelled bath made of this stone is interesting as showing the general use of the material. A few other objects in this part claim our notice. Kaye's patent indestructible locks and furniture; Hanson and

Co.'s self-acting engine for chemical precipitation processes; drawings of the Artisans', Labourers', and General Dwellings Company for houses of several classes, designed by Mr. Rowland Plumbé, and the plans and drawings exhibited by the Improved Industrial Dwellings Company (247).

Referring to some of the chief sanitary appliances, we must notice the large stand of Messrs. Doulton, in which are a large display of that firm's closets. The valve-closet, with stoneware trap, and the vacuum waste preventer, and "wash-out" closet, and the trapless closet, are certainly effective sanitary apparatus, and we note the automatic flush tank, for drains, non-concussive valves, radiating tile stoves, &c.

F. G. Underhay (238) has a collection of urinals, lavatories, &c. The automatic urinal basin, which siphons out at every fill, is a clever and cleanly form of apparatus, and the basin-valve exhibited has the merit of quickly discharging. We also glance at the admirable automatic electric speaking-tubes and appliances shown by G. Jennings, the improved copper bath and tip-up basins, slop-sinks, and an excellent and simple automatic cistern for flushing, shown by D. T. Bostel (236). Maguire's safety-joint drain and flushing tank are worthy of attention. R. Boyle and Sons (219) have a large stand of their well-known and tested air-pump ventilators. Among the improvements made by this firm we note especially a new chimney-cowl to prevent draught, a railway-carriage ventilator, and an inlet for heated air consisting of a small coil of copper pipe heated by a gas-jet at the inlet end of tube. Messrs. Kite and Co. are also exhibitors of their exhaust ventilators for roofs and smoke-curing chimney caps to which we lately referred; and Banner Bros., of Billiter-square, have a number of interesting models illustrating their system of sanitation applied to houses and public buildings, the chief merits of which we have discussed before in these pages. The Birmingham Sanitary Association exhibit Pott's Edinburgh air-chambered sewer-trap, and Emanuel and Sons a siphon waste preventer and improved closet-regulator.

Among the heating appliances we must call attention to the Treasure stove in operation, manufactured by T. J. Constantine, which we described a week or two since, Bardon and Perkins' steam cooking-apparatus, and the visitor, finishing his perambulation of the iron annexe, will not fail to be interested in the iron hospital fitted up by J. C. Humphreys (254), with models of hospital beds and patients, nor the range of iron buildings which have been erected for the exhibition annexe.

The other departments of the exhibition in the Royal Pavilion comprise a valuable loan collection, chiefly from the South Kensington Museum, objects from the Indian Museum, and several coloured drawings, all especially interesting. We must also notice the electric apparatus, post-office telegraphs, &c. The Health Congress was opened on Tuesday evening by the President, Dr. B. W. Richardson, who delivered an inaugural address in the dome, in which he dwelt chiefly on the physical and hygienic training of children. The health of towns, including sanitary legislation, has been discussed under section A, over which Mr. Edwin Chadwick, C.B., presided. Reform in slaughter-houses, by H. F. Lester, B.A., and discussions on the subject; and various papers and discussions on cheap foods, preservation of food by cold, bread reform, formed the subjects of the sectional meeting yesterday (Thursday). In the discussions, Dr. C. Drysdale, Mr. Lightfoot, Mr. Winter Blythe, medical officer of health, Marylebone, took part. Section C. opens to-day, and will include an opening address by Dr. A. Carpenter, after which domestic sanitation, filtration, smoke prevention, &c., are to be discussed, including

a paper by Robert Edis, Esq., F.S.A., on "Sanitation in Decoration."

ROYAL ACADEMY DISTRIBUTION.

ON Saturday, Dec. 10th, being the one hundred and thirteenth anniversary of the foundation of the Royal Academy, the distribution of medals and prizes took place in the large gallery before a numerous assembly. There was more than usual interest this year in the proceedings, not only because of its being what is known as a "Gold-medal year," when the rewards are of greater value, and the ceremony is enhanced by the reading of the President's address, but in consequence of the great increase in the number of prizes, and their value. We referred to this some time ago when giving a description of the new laws and regulations of the Academy. The Gold Medal and Travelling Studentship for each of the sections have been thrown together, and the latter augmented to £200, and between £300 and £400 more money is given in prizes. There were over two hundred competitors for the forty-two prizes offered, three or four of the latter, however, not being awarded. The President, Sir Frederick Leighton, on taking the chair, stated that, as he would deliver a speech, according to the usual custom, after the distribution, he would confine himself to a few remarks on the standard of the competitive work, which, he was glad to say, was above the average, particularly in the paintings submitted for the historical painting, and the paintings from the life. In some cases, he said, the members of the Academy had not thought the works up to the proper standard; and, therefore, they had withheld the rewards. But it must not be thought, on that account, that they were destitute of merit.

The following is a list of the awards, and the successful competitors:—

Gold Medal and Travelling Studentship of £200, tenable for one year, for an historical painting, subject, "The Messengers Coming to Job" (cf. Job I.), Samuel Mellon Fisher. Five competitors.

Turner Gold Medal and a scholarship of £50, tenable for one year, for a landscape painting, subject,

"Light thickens, and the crow
Makes wing to the rooky wood;
Good things of day begin to droop and drowse,"
M. J. H. 2.

Bryan Hook, the second son, we believe, of the Academy.

Travelling Studentship of £200, open to gold medal student only. One competitor. Not awarded.

The Grosvenor Prize of £50, for a landscape painting in oil, subject, "Ashby Lane." Five competitors. Prize, Marzani Hickson.

Painting of a Figure from the Life. Twelve competitors. 1st medal, Horace B. Fisher; 2nd medal, George Bull.

Painting of a Head from the Life. Nineteen competitors. 1st medal, James E. Bieun; 2nd medal, Bernard Evans Wood.

Copy of Oil Painting. Seven competitors. Silver medal, J. E. Bieun.

Silver Medal for Copy of a Landscape. Three competitors. Not awarded.

Silver Medal and £25 for Cartoon of Draped Figure. Not awarded.

Amateur Prizes for a Design in Monochrome for a Figure Subject. Twenty-two competitors. Prize of £30, W. Grafton-Bagen; of £10 to J. L. Davis.

Design in Water-colour for the Decoration of a Portion of a Public Building. Subject, "An Allegorical Illustration of Painting." Two competitors. Prize of £10 to H. M. Paget.

Drawing of Figure from Life. Twenty-nine competitors. 1st medal, Bernard Evans Wood; 2nd medal, A. W. Hayes.

Set of six Drawings from the Life. Twelve competitors. 1st prize of £50, Thomas C. Benham; 2nd prize of £25, William Carter; and prize of £15, W. M. Loudoun; 4th prize of £10, W. Grafton-Bagen.

Drawing of Head from the Life. Thirty-four competitors. 1st medal to Horace B. Fisher; 2nd medal, W. Grafton-Bagen.

Design of a Statue or Group. Seven competitors. 1st prize of £50, John Noyes; 2nd medal not awarded.

Design of a Statue or Group executed within the Year with a Medal. £10 prize to Theodor John Noyes.

Perspective Model (Architects). No competition.

Gold Medal and £25 for a Line Engraving. No competition.

Gold Medal and Travelling Studentship of £200 for a competition in sculpture. Subject, "David Wrestling with the Angel." Four competitors. Prize, Oscar A. Rees.

Medal for a Round. Five competitors. 1st prize of £25, J. Wade; 2nd prize of £10, A. G. Atkinson.

Design for a Medal in Plaster. Subject, "Hercules Slaying the Stymphalian Birds." On the reverse a statue of Hygeia. One competitor. Silver medal. Susan Ruth Canton.

Model of Figure from Life. Two competitors. 1st medal, Dant J. Wade; 2nd medal not awarded.

Model of a Statue or Group. No competition for the medal or £10 premium.

Gold Medal and Travelling Studentship of £200, for a Design in Architecture. Subject, "A Casino or Club for an Inland Watering-Place." Five competitors. Prize, James Howard Ince.

Measured Architectural Drawings. Subject, "Stone Church, Kent." Four competitors. 1st medal, W. Bassett Smith; 2nd medal, Thos. C. Yates.

For the Best Design executed in the Upper School. Prize of £25 to W. R. Lethaby. Four competitors.

For the Best Design executed in the Lower School. Two competitors. Claude Pemberton Leach.

Perspective Model (Architects). No competition.

Commencing our description with those competitive works in which our readers would be most interested, the subject for the Gold Medal and Travelling Studentship was "a casino or club for an inland watering-place," the principal accommodation to consist of a large concert-hall, a small theatre, dining-room, café, reading-room, card-room, and other offices, with arcades and balconies, and a garden or court in front 100ft. in depth; the main building to measure about 250ft. by 200ft., with garden or tennis-courts on the other three sides. The design to which the Gold Medal and Travelling Studentship was awarded, bearing the motto "Kismet," is by Mr. J. Howard Ince. He places the concert-hall on the ground-floor, facing the gardens, the theatre at the back forming the right wing, and the dining-room opposite; between the two is an open court attached to the café. The position of the concert-hall is not quite happily chosen, because he restricts the prospect of the garden to the frequenters of that hall, who may stroll from thence to the arcade or galleries above, which he provides. Concerts being generally given in the evening, its especial value is lost; and the dining-room and café, which should have been placed on this side, are the chief losers. It has, however, possibly suggested a feature which is the prettiest part in the design, thoroughly in harmony with the destination of the building, and good in style—viz., the open court of the café, with a pavilion in the centre for musicians. Mr. Ince is the only one who provides a covered front for carriages—an obvious necessity in a climate like ours for those attending the concerts, balls, and theatrical entertainments. Unfortunately, there is only one such carriage porch, so that if a concert or ball and theatrical performance happened to take place at the same time there would be sudden confusion. The access from thence to the concert-room is difficult, and the use of the news-rooms as an ante or cloak-room to the concert-hall quite unfeasible.

The perspective and elevations are of Late Gothic character, the carriage porch and tower being picturesquely grouped at one end. In this design, as in most of the others, the first object which the competitors seemed to have striven for is *picturesqueness*, and this has been arrived at only by utter disregard of the requirements of the plan or character and suitability in the elevations; in fact, Sir Frederick Leighton, in his opening address, remarked that the competitors did not seem to have tried to suggest the destination of the building by the details or design of their architecture. Mr. Ince's design looks more like a middle-class school or college library, and it is only in his open café that he has caught the spirit of his subject. The drawings are beautifully executed, and we congratulate Mr. Ince on his success, especially as we remember he came in second in the Gold Medal competition two years ago.

The design sent in under the motto "Mirth" is also Gothic, freer perhaps and more florid in design, but still without any special character belonging to a casino. The author places his chief entrance on the garden side, the reading-room on the right,

with the theatre in the rear, the dining-room on the left with the café in the rear. The principal staircase is beyond the vestibule, and leads to concert-room on the first floor over dining-room and café. There is a special staircase for the theatre. The section shows billiard-room and card-rooms on an upper floor, so that, as may be imagined, the building is an extremely lofty one. What might have been useful space in the vestibule is occupied by the thick walls of a useless tower, which rises some 200ft. from the ground—a fine and conspicuous object in itself, but out of character with the building, and a very expensive luxury for the few people who would care to ascend it. The front is picturesquely grouped, but wanting in repose; the concert-room is much over-lit, so that if there had been only one window on the narrow side, and a little more plain wall surface with characteristic decorative sculpture, the design would have gained. The upper portion of the central part is much better in this respect; though, again, we require something to suggest the destination of the building—figures and decorative sculpture, such as, for instance, a precedent might have been found for in the Musicians' House at Rheims. The same remark we have made relative to the fenestration of the concert-hall applies to the right wing: there are too many windows. The drawings are extremely artistic in their execution, and show considerable freedom and ease in design.

"Per Lapsus in Ardua." With the exception of the large corridor in the centre of the building, which is badly lighted and comparatively useless, the plan of the design submitted under this motto has many good points. The café, news-room and reading-room all face the garden, with an open arcade running in front of them. The entrance is in the centre at the back, with vestibule and staircase leading to the concert-room, which is placed on the first floor, and forms the principal feature of the elevation, so that, at once, a certain character is given to the building. It is rather difficult to determine the precise style: the two gables on the extreme right and left wings belong to the period of the First French Renaissance, the windows of the concert-hall remind us somewhat of St. James's Hall. There is a distinct attempt, however, to suggest the destination of the building by the style adopted; but more acquaintance with it, and much more study, would be required to make the result quite satisfactory.

"Celeriter" does not seem to accord with the programme. A large concert-hall and small theatre was asked for; whereas the reverse has been provided by the author of this design. The motto seems too indicative of the want of time required for the study of the design, which has no special character, and is not characterised by the careful drawing to be found in his fellow competitors' works.

"Backalun." The author of this design is the only one who has frankly adopted the Classic style, with many of the deceptions generally ascribed to the style, not however inherent to it, or necessary for its conception. The masking of the concert-hall, which ought to have formed the central feature as in the set marked "Per Lapsus in Ardua," has reduced the design to commonplace, which is not relieved by the clever draughtsmanship and the good drawing of the figure and decorative sculpture. The entrance hall and staircase are placed in the eastern part, and serve for both concert-hall and theatre, a mistake we have already pointed out in the prize design in the event of there being entertainments in both at the same time. The elevations show a want of study of scale. Thus the ground-story arcade seems to be drawn to a scale of 16ft. to the inch, the first floor to a scale of 8ft. to the inch, the

upper story of towers on the extreme right and left to a scale of 6ft. to the inch, the centre portion on the same floor being of the small scale again. The whole design is suggestive of being the work of a student who has hitherto strictly designed in the Gothic style, and who adopts Classic as being more in harmony with the subject. It is but fair to state that he shows considerable ability in his new style, and the sculpture and ornament and the decoration of the sections are well designed and admirably drawn.

The £25 premium awarded to students of the upper school, for the best design executed within the walls of the Academy, was carried off by Mr. W. R. Lethaby (the Soane Medalist, R.I.B.A., of two years ago), for a design for a "Bishop's Tomb." There were four competitors only, as the particulars of the prize were not announced till May, in consequence of the alteration of the Academy rules. This, and the £10 premium, awarded to students of the lower school for a similar subject, are new prizes, and will, doubtless, in future, excite the keenest contest, because they are rewards for work done in the ordinary curriculum of the school, and place architectural students on the same footing as painters and sculptors. Mr. C. B. Leach carried off the £10 prize with a design also for a "Bishop's Tomb." The subjects are given by the visitors, and are the same for both the upper and lower school of students.

The subject given for the Measured Drawing Models was Stone Church, Kent, a plan, three sections, and one sheet of details being asked for. Mr. W. Bassett Smith carried off the 1st medal, and Mr. Thomas Yates the 2nd. There was no competition for the Perspective Model this year in either school.

For the Gold Medal and Travelling Studentship of £200, offered for the best historical painting, the subject being "The Messengers Coming to Job," Cf. Job I., Mr. S. M. Fisher carried off the prize with a painting above the average, well conceived, and powerfully painted. Mr. Fisher has caught the spirit of Eastern life in the dark, sombre room, lit up only by the light admitted through the doorway, the curtain being partially raised by the messengers coming to announce great tidings of disaster. Job himself, on the right, is sitting on a couch, with his face filled with dismay and agony, as much for his servants' misfortunes as for his own sad fate; his wife stands behind partially supporting him, with her face turning round towards the door, in apparent bewilderment at the series of troubles suddenly come upon them; whilst at Job's feet in the foreground is one of the servants, half-dead with fear. The accessories are all carefully studied, and the painting well merits the encomiums passed on it by the President. The painting with the number 4 on it has a well-conceived figure of Job standing in front of his tent, but the other figures are poor, and have no action or meaning. For the Turner Gold Medal there were two or three formidable rivals to Mr. Hook, but there is more sentiment and power in his work. The distribution of the medals and prizes was followed by the address of the President, Sir Frederick Leighton.

PROF. RICHMOND ON SCIENCE AND ART.

THE eighteenth annual distribution of prizes to the pupils at the Devises Government School of Science and Art took place on Tuesday week. Prof. W. B. Richmond delivered an address, in the course of which he said:—An accumulation of interest (if I may use that term) has gone on year by year in England, on this subject of art; but, let us all remember that mere education is not all that is wanting. It is

not the mere fact of learning to draw correctly and accurately that will ever make an artist, any more than it is the fact that a musician will be enabled to invent music by learning the notes of the piano. The whole mind must be elevated and stimulated by a desire for that which is noblest and most beautiful before that mind can appreciate it. (Cheers.) The facilities of modern education are in all respects great, both for good and for evil. Literature abounds in both; but the duty of every young artist, or of anyone studying art, is first to abhor and abjure all literature which tends to degrade or disgrace his mind, and adhere strictly and firmly only to that which will elevate it and bring it into the realms of poetic and noble thought. Further than this, there is an education of the eye which may take place in most of our daily surroundings, and this we must not neglect. And then the subject of taste. If I make use of the word taste, you will ask me what I mean by it? You may say there is no standard of taste; taste is an individual peculiarity. No; taste may be summed up simply in one word, congruity: anything is in perfectly good taste which is perfectly fitted for its purpose. If we take furniture, for example: a most abominable fashion prevailed not many years ago wherein our chairs and tables were made with inconvenient knobs, so that where we sat we were pricked, and where we would rest we were abominably annoyed. Now, we have all heard of a school called the *Esthetic School*; that school has desired that things should be fitted for their purposes; that chairs should be sitable upon, and that sofas should have a degree of comfort; that you should not find in the centre of the table a knob, and that your dinner should not be destroyed by agonies of pain. On the other hand, on the practical side, you will see that the simple forms to which furniture has been reduced are most admirable and suitable patterns for the objects of every-day use. There are many here probably who propose to make themselves into artists some day hence. You all know of the cultivation of the eye and the cultivation of the hand; that both must be very much practised. But the mind and sympathies must be cultivated also. Now I would advise any young man here, who proposes to succeed in his profession, never on any plea whatever to be without a pencil and a book. In the great days of art in Italy, when art was at its prime, when it was the handmaid of religion, when, I may say, it was the conductor of morals, the great men of Italy, those who rose to the highest fame, passed their days and their nights in constant study and work. One of the greatest of these, and that because he was as much a scientific man as an artist, was Leonardo da Vinci; so much did he love art that he followed criminals in their confinement in order to watch the varying workings of conscience upon their features. He used to invite peasants and make them laugh by relating extraordinary stories, and so catch the expressions of their faces, and afterwards draw them from memory. You will see that it was necessary for him, in order to portray these varying emotions, vastly to exercise his memory, and I recommend to all of you to adopt the same plan: never omit making a note of any impressive scene in your notebook on any chance whatever; if you see a face which strikes you, draw it; if you see a piece of scenery which impresses you, make a note of it; omit nothing; keep your pencil in your hand, and you will become an artist (cheers). Leonardo da Vinci was the painter who painted the "Last Supper," who painted some of the finest portraits in the world, who foresaw much modern science, who was the precursor of Newton and Galileo in scientific works. Science and art in all the greatest ages of the world have gone together. There is no more absurd sentimental nonsense than the creed, extremely fashionable some twenty or thirty years ago, which held that science and art must be for ever severed. We have had no great art without the assistance of science. With art alone, however true it may have been, until it has had science come to its aid, it has not arrived at its fullness and ripeness. In the earlier part of my remarks I ventured to tell you that education is not everything. There must be inherent in the mind of him who would be an artist a strong desire to express something through the language of art that he cannot express in the language of litera-

ture or music. Nearly 700 years ago, in Tuscany, in a quaint little town I visited myself, a little shepherd boy, the son of a poor peasant, kept his sheep. These sheep, his only charge, and the charge that he loved best, the charge nearest to his heart, he drew upon a flat crag of rock with a little bit of burnt stick which he got from his father's hearth. There the boy dreamt in his imagination and endeavoured to learn; this in a sense was his academy. The boy that I speak of was Giotto de Bondoni. Italy had just at that moment got from Greece, or rather from Constantinople, many great painters who had come in order to adorn St. Mark's at Venice. That being finished, the great artists sprang themselves over Italy and instructed the Tuscan painters. One of these, Cimabue, had already made a great name in art, and passing through the country where young Giotto lived, Cimabue saw the boy making what we must suppose to have been accurate drawings of his sheep, and saw, through all the foibles of the boy's art, that there was an instinctive love of what he was doing. Hand in hand they went to the father's hovel, and the great painter, then almost a prince in Italy, asked permission to take the little shepherd boy and make a painter of him. From the humblest little boy that you can imagine, this Giotto became the friend of the great genius of Italy, the poet Dante. This he became, not from any definite education, but from his love of art, his will and perseverance, and his determination to tread down whatever barrier might be between him and his love. In his youth he drew those humble sheep; afterwards, as he became a man, he travelled from city to city adorning their churches. Thus he became a prince in art, and remained a princely humble soul until the day he died. Now, this is an instance of what perseverance and a true instinct will do to help a man on. We may come down to far later times, and find exactly the same thing. Turner, our great English painter, was a barber's son, lived on the banks of the Thames, and spent the early part of his days amongst shipping; yet that man, despite all the disadvantages of his early training (for he never really learnt the English language properly), became one of the greatest painters that the world has ever seen. I will give you another instance of what a man may do. Scarcely ten years ago died one of the greatest, perhaps the greatest, of all the French painters, Jean Francois Millet. He was a peasant's son, and was educated entirely by his grandmother, who was a pious worthy woman, and who educated him entirely upon the Psalms of David and the ancient books of the Bible. The fervent love that this man had in his heart and the love of labour which inspired his healthy soul by his observation of the workpeople constantly around him, made him what he became—eminently the painter of peasants. No one has ever painted the real peasant in the perfect similitude of toil and its dignity as he has done. In none of his work is there the smallest essence of caricature. It is throughout exquisitely noble, and in every touch it proclaims the dignity of toil. Throughout his life of hardship—such as I hope no one in this room has ever known or will know—so near starvation that his proud soul had once to demand bread of a friend to support his seven children,—this great man still worked on through it all, still living in the little village in which he was born, and having no desire to go to the great city, whither had he chosen to go and to give way to the French taste, he might have made his thousands a year. Happily in the latter years of his life some consolation came and he got a name for his pictures. I will just give you one anecdote with regard to Millet which will prove the power of regarding things not from an educational point of view. Wandering in the fields one evening he saw two peasants; a woman put down her wheelbarrow and a man took off his hat and put down his hoe, whilst over the flat plains of Normandy came the sound of the evening bells. This scene he determined to paint. He did it in silence, alone, and from memory of the impression that had been conveyed to him. A friend came one day and said, "Turn that picture and let me see what you have done." He did so. "What is your impression?" said Millet. "My impression is that you have painted sound." This shows how, if a man has a firm determination to do a thing, he can do it. This is how Millet

did it. On certain evenings only could he hear the sound of the bells coming from the village. He said, "Only on those evenings could I paint." I could not realise my dream unless the atmosphere were perfectly consonant with my idea, and I could feel the sound travelling over the plain." I must not, however, detain you longer with anecdote, but say something about the largeness of the boundaries of art. It has been a common modern fallacy to suppose that because a man can do one thing, therefore he can do nothing else. It does not at all follow that because a man is an admirable painter that he shall not be able to make and model a mass of iron to serve a beautiful purpose as a gate. All this displacement of art has tended to its decay. The blacksmith, or the carver of capitals for churches, may be as great an artist, if he chooses, as the most dignified painter who ever adorned the walls of a church, but his being an artist depends upon two things—his absolute sincerity of workmanship and his absolute sincerity of design. There must be no work scamped; no design made without a reason for its fulfilment. Albert Dürer, while he was designing the most beautiful imagery of the life and death of our Saviour, was at the same time making designs in other branches of art. Holbein, when he was employed by Henry VIII. in painting the portraits of his wives, was likewise employed in designing of a different nature. Do not think, because any of you may be following what is considered a lower branch of art, that, therefore, you are not holding the dignity of artists. What your dignity as an artist depends upon is simply this. That you do your work as well as you possibly can, and that you have a reason for all that you do. Now probably many, if not all of you, have been to Venice. As you approach that wonderful Basilica, you are simply struck with amazement at the gold and blue and purple and the fairy-like appearance of the whole. If you approach it as I have done, with a scaffolding put up to enable you to examine it in detail, you find there is not a foot of workmanship that is not painted, not only with the minutest care and the greatest love, but with deep and infinite invention of the workmen. Remember, in the days of Italy it was not as it is now; architects did not in those days give full and entire drawings for every detail of their work; that was left to the workman, who being an honest man did his best, and this is the kind of art that we want to get back into this country. What we want to get back into England is that individual axiom of each human being's mind—leaving a trace upon the building that he touches. And this is only done by an infinite love of his art, and that is only got by industry. We all know that in the progress of work, if we can only pass over those first few moments, or hours sometimes, of idleness, how there is an accretion of pleasure, how the grappling with one difficulty after another makes the fight a perfect idol to our souls, and how after difficult struggling we get a most infinite satisfaction. It is so in the whole conduct of our lives: there is no pleasure got out of anything except by struggling. He who puts down his pencil at the first effort can neither be considered to be a good man nor an artist; he who succeeds is the man who through all difficulties breaks down, with the weight of his perseverance, every strong barrier that evil or good fortune may set up before him, and he is the man who will and may become as great as any of the old artists of Italy. Now, gentlemen, in conclusion I must give you a few words as regards the study of art. With reference to the works that I see here I am bound to say that on all occasions I like to be honest, and although I differ somewhat from the manner in which some of the works are executed, I do see considerable strength and vigour in nearly everything here. I am very glad indeed to be able to congratulate those ladies and gentlemen on the drawings from life; because very much as we must all appreciate the value of drawing from a still object, still (I did not mean to make a pun, it is always a dead thing; there is a want of life in it. You may have the most beautiful casts in the world, but there is not the same vital interest in copying from them as from the human face, and I would advise all those who are going to devote themselves even to the study of art as a pastime, to draw as much as possible from nature. At the same time I quite agree with what has been said, that you ought to have some room where you can have casts and objects

of study; but I am bound to say, rather than draw from these I would advise an analysis of them—a minute analysis—in conjunction with the study of the human form. I have passed through a great deal of that kind of work in my life. I have seen others go through it. I have known many and many a man who was able to make an admirable drawing from an antique statue, but as soon as he attempted to draw from the life he was entirely at sea. All the strength of expression is in movement, and if you cannot express that, you really have learnt very little indeed. You may have learnt to put a nose into a face or an eye into its proper place, but not to convey to these any human expression. I would advise with all my heart that you draw from Nature on every possible occasion; draw your friends under any influences; draw them when they are not looking, and draw them with some definite expression. Use your memory, above all, to do that: do not think that it is necessary always to have a thing stuck up in front of you; but try to get the impression of it in your mind, and you will find as time goes on that your memory will have acquired such precision that you will be able to compare that which you have been doing from memory, and without the copy before you. I would also recommend that you should model. It is a most simple operation. You should use wax, and if you will attend to what I say for two minutes you will be able to follow it. If you want to make a model in wax, buy a pound of beeswax, add oil, and put it into a hot caldron. If you wish to colour it, add vermilion. Mix this up together, and you have a material with which you may model almost anything. This plan was used by the early Italian sculptors for either small or middle-sized works. My reason for advising you to use wax is on account more especially of those students who have not very much time to spare at once. Wax is not fragile, and does not require any wetting like clay, but it may be easily softened at any time by the mere warmth of the hand, so that a person may do a little bit at a time, at his leisure. One word more and I have done, and that is, ladies and gentlemen, I must very much congratulate you upon your master. It has been at once my pleasure and my duty to deliver a great many addresses to different Schools of Art in England and Scotland, to see a great many productions, but I am bound to say that I have seen none that excel in careful workmanship that exhibition which I have now behind me. There is apparent a remarkable neatness in the work, and I think a great deal of neatness, because neatness and preciseness have much to do with the charms of art. Now this neatness could not have been got unless you had the advantage of studying under a trained and capable master. In conclusion, I wish you every success, and I hope that those of you who intend to become painters may remember on your deathbeds the happy days you have spent at the Devizes School of Science and Art.

SIR F. LEIGHTON ON ART.*

WHEN at our last biennial gathering I addressed you from this place it was my endeavour to indicate to you, with what consciousness so wide a subject permitted, a solution to certain doubts and perplexities concerning the position of art in the modern world which, as I said, are apt in these days to assail the minds of students who think as well as work. I sought to show you, in answer to these doubts, that we have no cause for misgiving in regard to the continued vitality of the arts we follow, inasmuch as they have their root in deep needs and undying instincts in our common nature; and I exhorted you to work on in unwavering faith that the day is not at hand when the expression of æsthetic emotion through the forms of art shall fail for lack of answering echo in the hearts of men. There is, however, a grave question connected with the imitative arts of painting and sculpture to which on that occasion I only passingly alluded and to which I purpose to devote a few words this evening; a question on which widely divergent opinions stand opposed one to the other and are upheld with equal tenacity—namely, the question "What is the relation in which Art stands to Morals and to

Religion?" The solution of this question has a twofold bearing on the young artist who is about to submit his work to the ordeal of publicity—a direct and an indirect bearing. On the one hand, the answer to it which he frames for himself will determine the direction into which he will incline to bend his energies; but he will, on the other, be hardly less powerfully affected by the view which prevails in regard to it in the general mind—that is to say, in the intellectual atmosphere which he breathes and by which he is, though he be unconscious of it, largely moulded; for on the conception entertained of the aims and ends of art must depend the mode in which its achievements are judged, and it is evident that a mistaken view of those aims and ends must taint the appreciation of the qualities exhibited in the production of a work of art, and tend to the subversion of all sound criticism as well as to the bewilderment of those young artists whose native instincts are not sufficiently imperative to carry them unwaveringly along their path. And the problem of the relation of art to ethics is one which assumes in this country exceptional prominence from the mental and moral peculiarities of our race. There is, I suppose, no country in the world, unless it be the sister-land beyond the Atlantic, in which the religious sense has exercised an influence so definite and so controlling as it has in our own on the development of the intellectual as well as of the ethical tone of the nation. In the moral order this sense has added incalculably to the strength and dignity of the national character; in the intellectual order its overmastering influence has too often tended to cramp and impede that full and equal play of the intelligence without which our nature cannot yield its fullest harvest or bear its finest fruit. There is, therefore, no country in which the task of unraveling the complex question of the true relation of morality and religion to art is one of greater delicacy. Now, what are the doctrines between which the perplexed student finds himself tossed hither and thither on a sea of controversy? On the one side it is asserted that the first duty of all artistic production is the inculcation of a moral lesson, if not, indeed, of a Christian truth, and that the worth and dignity of a work of art are to be gauged by the degree in which it performs this duty; unless it preach, as from pulpit, the cardinal doctrines of the Faith, or declare—whether by unambiguous symbolism, or by definite embodied example—the loftiness of virtue and the deadliness of sin—unless a very gospel made more eloquent by form and colour cry aloud to us from the canvas or from the marble—then, we are told, the artist has laboured in vain, for his work fails in the fulfilment of the highest function of art. With this contention connects itself naturally, if not necessarily, this other—that as a man is mirrored in his work, so the noblest work can be and has in fact been produced only by the most pious and God-fearing men, of the moral level of whose nature it is indeed the test and, as it were, the tidemark. These views, of which, whatever their intrinsic and final value, the moral elevation is very attractive to certain natures, and which have been supported, if not substantiated, by impressive illustrations, have found many advocates, and have been proclaimed with the passionate eloquence of an overmastering conviction. And they have been pushed to strange lengths; some men, carried away by an unrelenting logic working on an ascetic temperament, have been impelled to assert that the application of art to any save a definite religious end is little less than an act of moral depravity; and a great and nobly gifted artist, Friedrich von Overbeck, has not hesitated to declare his opinion that when Raphael painted his famous Galatea in the Farnesian the Lord had abandoned him. A further, and the strangest development of this frame of mind, one with which I have myself, in my youth, come in contact in Germany, is that which sees in the excessive love of colour an almost culpable indulgence of the senses. Such views, indeed, are not likely to find favour or acceptance in the country of Gainsborough and Sir Joshua Reynolds; they are, nevertheless, interesting as showing to what extremes the doctrine of the dependence of art on religion may and sometimes does lead its followers. In opposition to this doctrine it is maintained, on the other hand, that the function of art, as such, whatever may be its incidental operation and whatever it may include in the broad verge of

* Address of the President of the R.A. to the Students, delivered Dec. 10th.

its sphere of action and appeal, is absolutely unconnected with ethics, and that its distinct and special province is to satisfy certain cravings and excite certain emotions in our nature to which it has alone access; and that without art not a few of our keenest and deepest capabilities of emotion would lie unaroused and barren within us. The corollary generally attached to this proposition is this—that, as artistic production springs from æsthetic and not from ethic impulses within the artist, so the character of that production is independent of his moral attitude and unaffected by it. These two theories, which stand arrayed one against the other, are in appearance so consistent in themselves, their respective propositions seem to flow so naturally one from the other, that the student who sees them distinctly formulated is tempted to fling himself without further question into the arms of one or of the other, accepting it unreservedly and in all its parts. My task to-night is to give you reason, so far as the limits of our time may allow it, to doubt the wisdom of such a course, and to ask you rather to believe that, while art is indeed in its own nature wholly in dependent of morality, and while the loftiest moral purport can add no jet or tittle to the merits of the work of art, as such, there is nevertheless no error deeper or more deadly—and I use the words in no rhetorical sense, but in their plain and sober meaning—than to deny that the moral complexion, the *ethos*, of the artist does in truth tinge every work of his hand, and fashion, in silence but with the certainty of fate, the course and current of his whole career. Let us look more closely into these assertions. The theory which, for convenience, we may call the didactic theory is founded on *à priori* reasoning and is supported by reference to facts. It is in effect postulated, somewhat arbitrarily, by its advocates, that every higher expression of our emotional nature must, in order to merit the favour of mankind, aim directly at moral edification, and that this moral edification is to be achieved only by the inculcation of moral lessons; and it is further asserted by them that this has been, in fact, the character and tendency of all the greatest art the world has seen. There can be no doubt that the evidence which is marshalled in support of this view seems at first sight formidable and even overwhelming. Modern painting—using the word modern in the wider sense and to distinguish it from that of the ancient world—was reared, we are bid remember, on the lap of Christianity, and received its loftiest themes from the Church of it was, as we are constantly reminded, the faithful handmaid; and, accordingly, from the hour of its dawn to the high noon of its strength a continuous host of divinely endowed artists is shown to us, testifying in unnumbered masterpieces to the glory of the Almighty and of his Saints. We see them handing down undimmed, from generation to generation, the lamp of their steadfast faith, and from the harmonious concert of their works, as from a vast consenting choir, does not a solemn anthem seem to roll across the centuries, crying from a thousand throats, “Hosannah! Hosannah in the Highest”? With the decline of faith, on the other hand, we are taught to connect that downward course of art, which begins to manifest itself towards the close of the 16th century; and in the absence of any religious afflatus in the great Dutch and Flemish masters of the 17th century, we are invited to see cause—even though one of them be called Rembrandt and another Rubens—for placing them in a rank lower than the foremost. Nay, more, turning to the ancient world, the greater loftiness of Greek sculpture in the Periclean than in the succeeding ages is attributed to the primitive piety which prevailed up to that period, which breathes throughout the pages of the great historian of Halicarnassus, and burns on the lips of the Titan Æschylus. Time would fail me to-night to test minutely the value of the evidence which I have here summarily indicated. I will limit myself to the consideration of two or three points which suggest themselves on a closer examination of this array of facts, or, rather, of assertions. It can be argued, in the first place, that they do not comprise the whole body of evidence to which we must look if we would form an impartial conception, and take a comprehensive view of the question; secondly, that the evidence adduced is not, even where it seems strongest, so accurately corroborative of the theory as is contended, and as may, at the

first glance, seem; and thirdly, that through the whole contention lurks the fallacy of mistaking a co-efficent for a—nay for the—primary cause. As a striking instance of evidence that must be either omitted by the upholders of the didactic theory or admitted by them to be hostile to their contention, Spanish art will at once suggest itself to you. There is, probably, in the history of the world, no such illustration as that afforded to us by Catholic Spain of the absolute, irresistible, all-embracing supremacy of religious faith as a controlling influence in a national life, whether public or private; and assuredly the lurid fervour of that faith had not waned in the days of Spanish greatness in the field of art. That the Church should exert her influence in that field also, and more dictatorially even than elsewhere, was a matter of course, and accordingly we find in the Iberian Peninsula a school of religious painters of an ascetic type, men of stern piety, and noteworthy if not great—a Morales, for instance, who earned for himself the surname “El Divino,” a Juanes, a Luis de Vargas, who wrought in the intervals of fasting, of prayer, and of self-flagellation, and lived in the constant contemplation of death and of the grave. Yet who will seriously claim for these men the same level of artistic excellence with that which is held by the great painters of the 17th century—by a Murillo, whose religious works have, with few exceptions, so little of real religious inspiration, or a Velasquez, the most mundane of painters and Shakespearean almost in the width of his mental objectivity! Again, we need not linger on the sweeping disparagement of the later Dutch and Flemish masters which is logically involved in the didactic theory and which carries with it the exclusion from the highest places of that supreme painter who revealed to the world the poetry of twilight and all the magic mystery of gloom, Rembrandt of the Rhine. Let us consider, rather, for a few moments, the more specious argument drawn from the growth of painting in Italy; and let us first once aim call to mind the position assumed in the didactic theory; it is that, the moral edification of men being the highest duty of art, those productions of art will take the highest rank which teach, with sincerity and of a definite purpose, the greatest number of moral truths, and that the painter who, the artistic gift being, of course, postulated, aims most constantly at the inculcation of these truths will produce the greatest works. You will at once feel that these assumptions, if accepted without reservation, sap at the roots of all free criticism, practically substituting for it a foregone conclusion. A critic who approaches a work of art under their influence will instinctively gauge it in accordance with them, however inclined he may be in the abstract to weigh it with a more scientific impartiality. We must be careful, therefore, in testing this doctrine by the light of facts, to bear in mind, in weighing these facts, the general verdict of enlightened opinion ripened and confirmed by time. Now if, on a review of Italian art from its rise to its zenith, we ask ourselves which works have by the consent of the vast majority of the intelligent been pronounced the most mature and perfect, we shall not find that verdict harmonising with one which should be built up on the axioms of the didactic theory; we shall, on the contrary, find that the evolution of art in Italy, an evolution singularly organic and continuous, bears no ratio, unless it be an inverse ratio, to the religious life and development in the midst of which it ran its course. It is a matter of notoriety that with the more general spread of classic literature throughout Italy in the 15th century, partly through the Italian Humanists, and partly by the agency of Greek refugees fleeing westward before the conquering hordes of Mahomet II., a disintegrating effect was pronounced on the religious beliefs of that country. For more than a century already a seething restlessness had obtained possession of the minds of men; nature was fast rising within them in rebellion against the ascetic teaching of the Church; and when to minds so prepared the revelation was suddenly offered of a literature fearless in speculation and broadly based on the equal development of all the human faculties, a literature, furthermore, of which the Latin branch breathed, in every line, of that distant national greatness to a sense of which in the previous century the friend of Petrarch, Cola di Rienzi, had sought not vainly to kindle and inflame his

countrymen, a revulsion long prepared was operated among the Italian people, and from one end of the land to the other a thrill, as of a newly-awakened life, ran through them, stirring within them as the sap stirs within the wintry trees under the first mild sweet breath of Spring. But not ancient literature alone roused them to a new consciousness and a fieri-er emulation; fragments of antique statuary few, as yet, but sufficient, were exhumed under their wondering eyes, and behold, the frame of man, that tenement of clay which they had been taught till now to regard as a thing to be mortified and held in contempt, suddenly arose before them in a new-born dignity, transformed by an ideal, their shame no longer, but their pride. So, under the influence of this awakening, this Renaissance, as we call it, art, like letters, put on a new physiognomy; with the vindication of human nature and the newly-accepted view of life as a thing wherein to rejoice, the forms in which life reveals itself became a source of absorbing interest and a worthy subject of study for their beauty's sake. The young scientific spirit which at the same time flamed up in a very passion of enthusiasm came powerfully to the aid of the artist. The study of anatomy emerged from its hiding-places, and was practised in the open day; perspective was eagerly studied, and exercised on the minds of artists a fascination which, in our day, seems strange enough, obtruding its problems every now and then in their works in the most unexpected and naively far-fetched ways. A more healthful east of beauty was by degrees developed, and we thus see art gradually expanding and rising to a fuller dignity and a loftier level through causes wholly foreign to and not coincident with religious growth. In fact, with the rising tide of the humanistic and scientific spirit, the religious spirit was not gaining in strength and fervour. On the contrary, the powerful revulsion of feeling of which we have just noted the effects in the world of the intellect and of the imagination operated also, as might have been expected, on the beliefs of the cultivated masses, and loosened the hold on them of that religious teaching which men could not dissociate in their minds from the intellectual thralldom in which the Church had hitherto sought to hold them. The cause of morality undoubtedly suffered with that of doctrinal religion, and those who value most highly the priceless boon conferred on the world by Italy in the 15th century cannot but recognise with sorrow that it came alloyed with much dross and touched with much taint of corruption. So low was the moral tone of large number of the humanists that we recall with a sense of relief as well as of gratitude the names of such men, for instance, as Vittorino da Feltre, Guarino, the countryman of Catullus, Giannozzo Manetti, Pomponio Leto, or Pico della Mirandola, in whom wisdom and learning went hand in hand with every Christian virtue. And if it be not true that Italian art owed its highest unfolding to the impulse of religion and the purifying atmosphere of faith, neither is it true that its decadence was the result of the waning of faith and religion to which I have just alluded. Nor was it coincident with it in point of time. Nay, that malarious moral taint which hung about the footsteps of the Renaissance in the day of its complete ascendancy, and polluted so much of its literature, is not traceable, and then in a far less degree, till a century later in the plastic arts; so purifying, I had almost said so anti-septic, are those arts in their very nature and in their influences. Indeed, the causes of the downward tendency of art towards the close of the 16th century must be sought less in the failing of the religious faith among artists than in the excessive and too exclusive faith in mere science. Artists had now drunk deeply of the springs of knowledge, and were intoxicated in the strength of this rich new vintage; they had investigated the wondrous mechanism of the human frame with a scientific thoroughness never till then brought to bear upon it; they had explored the science of composition and measured the expressional resources of abstract form; but they too often forgot that the province of art is to speak to the emotional sense, not to make vain exhibition of acquired knowledge, and that work which reveals in the workman no impulse warmer or higher than vanity or a thirst for display will for ever fail to move

the hearts of men. Accordingly, we see the gradual supersession of sentiment by scientific pedantry marks faithfully the decline in sterling artistic nobility. Correggio, who, indeed, still rides on the crest of this great wave of art, combines, no doubt, a true artistic passion with the most consummate knowledge, but we seem conscious in him already of the last moment of perilous poise; in the Caracci and their school pedantry too often triumphs; in Tiepolo, the last of the Venetians, the acrobat lurks everywhere in the man of genius. I have in the foregoing remarks on Italian art turned my attention to painting exclusively. I have done so because just as sculpture is, in an emphatic manner, the characteristic expression of the Greeks, so painting was pre-eminently the art of the Italians, and because, further, the upholders of the didactic theory lean habitually more on the painting of Italy than on her sculpture. Nevertheless, the growth of that art on Italian soil, fed as it was from the same sources, fostered by the same influences, and breathing the same intellectual and moral air, followed the same course as painting, and though it culminated in the hands of a man as sternly religious as his great spiritual predecessor, Dante, in the main the plastic art rose on the same pinions, flew with the same flight, and fell at last stifled in the same lethal fumes as did her sister, Painting. One word concerning Greece before leaving this part of our subject, since Greece, too, is, as I said, not infrequently quoted in support of the views I am combating to-night. We are tempted, when the bearing of religion on Greek art is pressed upon us, to ask which religion is here alluded to; for in Greece, as elsewhere in the heathen world, there was a religion of the few, the purer and the more abstract, and the religion of the many, the more tangible and the less pure; the faith in one Supreme God, great among all gods, free from sin, and wholly unlike men, or the faith in that joyous fellowship of gods and goddesses, loving and hating, scheming and boasting, founders of dynasties on the earth, whom the Greek race, if it borrowed the first conception of them from far-off ancestors in a dimly-remembered East, had finally moulded, as was their nature, after their own living likeness and image. Of the former, however strong the impress with which it has stamped the poetry of Greece, it would be difficult to show its direct influence on the plastic arts. It seems to me to be far-fetched in the extreme to trace any definite ethical purpose or high religious character, even in those sculptures, the noblest of all known to us and unapproached as yet in their lonely greatness, which have come down to us under the name of Phidias. Of the popular religion of Greece, it would, perhaps, be safer to say that it owed much to art, than that art was strongly influenced by it. The gods, as they were conceived by the masses, were in the main the embodiment of that exuberant sense of life and that over-mastering love of beauty which was the distinctive privilege of their race no less than the life-breath of their hearts. In sum, then, we may, I think, say that, as far as we have seen, a cursory glance at a few of the points adduced in evidence for the didactic theory does not seem to justify the use made of them, and rather shows us art, not, in truth, undisturbed by the moral characteristic of those who practice it, but withal growing its own growth as a distinct organism with its own principles of life and fed by conditions in which intellectual, moral, and physical causes each play their appointed part. But if the illustrations by which it is sought to buttress this theory do not in fact uphold it, let us see how it stands with the doctrine itself viewed on its own intrinsic merits. Now, the reasoning on which the didactic theory is built up would seem to be this—the moral sense is the highest attribute and the distinctive appanage of man; its strengthening must, therefore, be man's noblest duty; and the dignity of all human intellectual achievements must be according to the degree in which this end is primarily and professedly subserved by it. But here a difficulty at once presents, for the consistent application of these views involves, among other consequences, one in all ways new, I venture to think, see the end of the whole theory: it involves the debarment of an art closely akin in its ways to those we follow, like them a labour common to all races, like them from time immemorial a channel of purest emotion,

an art divine, if a divine art there be—the art of music. The dignity of music has, indeed, strange though it may seem, not remained unchallenged. Such heresies may, however, safely be left to their own foolishness. It is given to the supreme few who occupy the solitary mountain tops of fame to be able to express, without incurring the charge of vanity, their high consciousness of the value to the world of the gifts they bestow upon it. One of these few was Beethoven, and his proud words are there to show us in what esteem he, at least, held the power of the art on which he has risen to immortality:—"He to whom my music reveals its whole significance is lifted up"—these are his words—"is lifted up above all the sorrow of the world." And assuredly the art which has borne up and daily bears up in oblivious ecstasy so many weary souls, which has lulled and cheered, if only for a moment, so many aching hearts, and which in its endless plasticity has a response for every mood of the imagination and a voice for every phase of feeling, is rooted too deeply in the general love and reverence to fear the onslaughts of any logic-ridden crotchetermonger. Yet, let me ask, what definite moral truth is taught by it, with all its universality? What ethical proposition can it convey? What teaching or exhortation is in its voice? None; absolutely none. Meanwhile we may safely affirm that a doctrine which should lead in its logical application to the exclusion of this art from the first rank among the intellectual agents which raise mankind is tainted with grave fallacies. What, then, are these fallacies? They are, I think, the following:—First, the assumption that the pursuit of moral edification can alone confer a claim to the respect of men; secondly, the assumption that moral edification can attach only to direct moral teaching; and, thirdly, the assumption that any mode of expression by which appeal is made to the emotional faculty and the imagination can be exercising its highest office except in the application and development of its own distinctive resources, and in seeking to convey those emotions of which it is the proper and especial vehicle. And this last fallacy lies at the root of the matter. Now, the language of art is not the appointed vehicle of ethical truths; of these, as of all knowledge as distinct from emotion, though not necessarily separated from it, the obvious and only fitted vehicle is speech, written or spoken—words, the symbols of ideas. The simplest-spoken homily, if sincere in spirit and lofty in tone, will have more direct didactic efficacy than all the works of all the most pious painters and sculptors from Giotto to Michael Angelo, more than the Passion Music of Bach, more than a requiem by Cherubini, more than an oratorio of Handel. It is not, then, it cannot be, the foremost duty of art to seek to embody that which it cannot adequately present, and to enter into a competition in which it is doomed to inevitable defeat. On the other hand, there is a field in which art has no rival. We have within us the faculty for a range of emotions of vast compass, of exquisite subtlety, and of irresistible force, to which art, and art alone, among human forms of expression has a key. These, then, and no others, are the chords which it is her appointed duty to strike; and form, colour, and the contrasts of light and shade are the agents through which it is given to her to set them in motion. Her duty is, therefore, to awaken those sensations, directly emotional and indirectly intellectual, which can be communicated only through the sense of sight, to the delight of which she has primarily to minister. And the dignity of these sensations lies in this, that they are inseparably connected by association of idea with a range of perceptions and feelings of infinite variety and scope. They come fraught with dim, complex memories of all the ever-shifting spectacle of inanimate creation and of the more deeply stirring phenomena of life, of the storm and the lull, the splendour and the darkness of the outer world, of the changeful and transitory lives of men. Nay, so closely overlaid is the simple æsthetic sensation with elements of ethical or intellectual emotion by these constant and manifold accretions of associated ideas, that it is difficult to conceive of it independently of this precious overgrowth. I cannot here enter at any length on this most interesting subject, but a moment's reflection will furnish you with illustrations of it. You will find, for instance, that, through this operation of association, lines and forms and combinations of lines and forms, colours and

combinations of colours, have acquired a distinct expressional significance, and, so to speak, an *ethos* of their own, and will convey, in the one province, notions of strength, of repose, of solidity, of flowing motion, and of life; in the other, sensations of joy or of sadness, of heat or of cold, of languor or of health. It is this intensification of the simple æsthetic sensation through ethical and intellectual suggestiveness that gives to the arts of architecture, sculpture, and painting so powerful, so deep, and so mysterious a hold on the imagination. And, here, also we find the answer to the second of those fallacies to which I just now alluded—to wit, that moral edification can attach only to direct moral teaching. The most sensitively religious mind may indeed rest satisfied in the consciousness that it is not on the wings of abstract thought alone that we rise to the highest moods of contemplation or to the most chastened moral temper, and assuredly arts which have for their chief task to reveal the inmost springs of beauty in the created world, to unfold all the pomp of the teeming earth, and all the pageant of those heavens of which we are told that they declare the glory of God, are not the least eloquent witnesses to the might and to the majesty of the mysterious and eternal Fountain of all good things. We should thus find ourselves abundantly armed, were it needful to be so armed, to meet those who affirm that to convey moral edification can alone give the highest status to an intellectual pursuit. But we have no need of defence against a fallacy so palpable, a fallacy of which the adoption contains the disparagement of every form of pure science with all its marvellous achievements—achievements more marvellous than the dreams of fancy, and in their results unspeakably beneficent. On the absurdity of such an attitude it is needless to dwell. In fact, the nature of man is a complex organism in which are many and various germs of growth, and only in the full and balanced development of these several elements can that organism achieve in this world its perfect maturity. To art belongs the development of one group of these rich and fruitful germs—a sufficient, and, surely, no ignoble task. Much would, indeed, remain to be said in further elucidation of this part of our subject, but the limits of my time warn me to draw to a close. It remains to me to say, in conclusion, a few words on the bearing of the ethical tone of the artist on his work and on his career. At the beginning of this address I drew your attention to the fact that of those who claim for art a separate and independent sphere—a claim which we have just seen to be well founded and unassailable—many tend further to assert that, therefore, artistic production receives no colour from the moral temper of the producer. This I called a dangerous error, and affirmed, on the contrary, that the man is stamped on his work, and his moral growth or lessening faithfully reflected in the sum of his labours. I believe this to be a cardinal truth, the disregard of which may bear fatal fruits in an artist's life, and I have no warmer wish than to stir in you and leave with you, if it may be, to-night some sense of the grave importance of its bearing upon each and all of us. The more closely you consider this subject, the more clearly will you feel, for instance, the mischief to us as artists which must infallibly attend a tolerant indulgence within ourselves of certain moral weaknesses and failings to which nature is too often prone. Of these failings some are palpably ignoble, and, in the long run, debasing; others are not on the surface so evidently mischievous. Among such as are palpably ignoble I will instance the greed for gain. I believe no evil to be more insidious, none more unerring in its operation than this sordid appetite. Its poisonous taint creeps into the moral system; numbs by degrees all finer sense; dulls all high vision; is fatal to all lofty effort. No worse snare lies across our path. Another such deadening taint is the vulgar thirst for noisy success, the haughtiness of vanity for immediate satisfaction; of this the outcome is a deliberate sacrifice of the abiding appreciation of the intelligent for the transitory and noisy clamour of the unintelligent and shallow, with the fatally sure result of a paralysis of the sense of self-respect, a lowering of standard, and, in the end, an impotent disinclination for every sustained and serious effort. Other failings there are of which, as I said, the bearing is not so immediately evident, but of which the dangers are scarcely less. As one instance of

these, I will quote the indulgence in a narrow, unsympathising spirit, a spirit ever awake to carp and to cavil—feeding its self-complacency on the disparagement of others. This spirit stunts and shrivels those who yield to it, and by blinding them more and more to the work and beauty that are in the work which is not their own, deprives them of the priceless stimulus of a noble emulation. Let me urge you to avoid this pitfall also, and rather to keep alive within you a generous temper, ever keen to see the good wherever it may be found, finding and fastening on it as by instinct in the least promising surroundings, even as a divining-rod strikes on the hidden spring under a parched and weary wilderness of sand; for of this temper you will gather the fruits tenfold in the work of your own hands. And now, before closing, let me recapitulate the points on which, in this rapid and too summary glance at the bearing of ethics on art, we seem to have established our position. We have laid down as an unassailable axiom that the special function of a mode of expression is to convey those ideas, emotions, or impressions of which it is the fittest vehicle, and we have recognised that the proper vehicle of purely ethical ideas is speech. Art, on the other hand, we said, being the proper and only channel for impressions of another order—namely, æsthetic impressions, cannot have for its highest duty the conveying of ethic truths. We saw, further, that though the impressions which it is the exclusive privilege, and therefore the proper function, of art to convey are primarily æsthetic, they are very complex in their nature, and receive an incalculable accession of strength through the operation of associated ideas; and again, we saw that these complex impressions in which intellectual and ethical elements are thus added to the fundamental æsthetic sensation, having, like those stirred in us by music, the power to raise us to the highest regions of poetic emotion, deserve to rank among the noblest delights of men. And, lastly, we have seen that, while the inculcation of moral and religious truths must be admitted not to be the object of art, as much, nor moral edification its appointed task, it is not therefore true, as some would have us believe, that the artist's work is uninfluenced by his moral tone, but rather that the influence of that tone is, in fact, upon it, and controls it from the first touch of the brush or chisel to the last. And once again, I say I would fain stamp this vital fact deeply in your minds. Believe me, whatever of dignity, whatever of strength we have within us will dignify and will make strong the labours of our hands; whatever littleness degrades our spirit will lessen them and drag them down. Whatever noble fire is in our hearts will burn also in our work, whatever purity is ours will chasten and exalt it; for as we are, so our work is, and what we sow in our lives, that, beyond a doubt, we shall reap for good or for ill in the strengthening or defacing of whatever gifts have fallen to our lot.

At the close of the President's address on Saturday last, the students assembled in the Antique school, and presented Mr. Pickersgill with three handsome silver salvers, and the following address signed by over 100 students:—"Sir,—We, the past and present students of the Royal Academy of Arts, desire most respectfully to offer this testimonial to you as a mark of our full appreciation of your valuable teaching, and the unvarying kindness that you have always shown to us as students of the schools during the time you have so worthily held the office of keeper. We sincerely trust you may long remain amongst us, and we rest assured that both we and those that follow will alike reap the benefits of your valuable counsel and advice." Sir Fred. Leighton, the President, and other members of the Royal Academy attended the presentation.

BARNACLES.

AT the third ordinary meeting of the Architectural Association, held on Friday evening, Mr. Cole A. Adams read a paper entitled "Barnacles." The President, Mr. Aston Webb, occupied the chair. The author said that amongst the many definitions of the title of his paper set forth in dictionaries, he should take that of the shellfish often found adhering to ships' bottoms, and utilise it as a vehicle for a talk with his fellow members on some subjects

which, although not novel, were ever of value and importance. Amongst the other good qualities of the crustacean referred to (continued the lecturer) he pre-eminently has one which should commend itself to our serious attention. No matter what subject he attacks, he invariably goes to the bottom of it with a persistency and method which are highly to be commended. This necessity for going to the bottom of any subject the student takes up is apparent, provided the study is one worth the labour. If so, this barnacle faculty of sticking to it cannot be too highly commended. Prof. Roger Smith insisted on this very strongly in his remarks made at the last meeting of the Association on the subject of the compulsory architectural examination. It is such a temptation at the present time, with so much passing before our notice, only to dip into a subject, to look up the particular matter we are in need of, to skim books, and, if working for an examination, to cram into the stomach of the brain more than it can possibly digest. No profession, perhaps, includes in its many ramifications such an enormous number of subjects as ours. Almost every day brings to the man in practice, and, in a lesser degree, to the assistant and pupil, fresh difficulties to be met, fresh topics to be looked up, fresh problems to be worked out. Now it is decoration; now a peep into some sewer difficulty; now the valuation of a house; now the designing of one. The architect is called on by Mr. A. to find out why the damp will come through a certain wall and at no other part of the house; by Mr. B., as to whether he can raise his house without involving himself in a lawsuit with Mr. C.; is choosing wallpapers with Mr. D., and the next hour discussing the most recent sanitary appliances with Mr. E. Then there are endless interviews with Mr. F. as to the exact position of this, that, and the other. This variety in the practice of a general practitioner is not without its charm, even though it has its worries, and among them that complex instrument of torture, the builder's account. Now if we follow the barnacle habit of getting at the bottom of each difficulty, the gain will be enormous. The result of study of this kind is most salutary, as we accustom ourselves thereby to habits of thoughtfulness, to weigh first the answer before it is given, not to accept what can be proved without some demonstration. This mode of working must be prepared for early, and happy is the student who falls into hands capable of guiding his studies. Though the difficulties that face him are greater than those that formerly existed, the advantages in some degree keep pace, as knowledge is brought almost to his door. The battle is year by year becoming a harder one, so many barnacles having the same aim, but the secret of success in the race is with the hare than with the tortoise. Cultivate therefore the habit of dealing with one subject at a time; it will give a breadth and power to the mind which will stand you in good stead. The difficulties which beset the modern architect who aspires to hold a high position in his profession are Herculean. In those ages when the art was a living one, and it was natural to build in one style, with all the life and surroundings in harmony with it, the task of designing must have been an easier one, comparatively speaking. Doubtless there were new schools of thought, variety of design, but it ran in the same direction, was academical, governed by fixed laws and principles? Now, what chaos reigns, what confusion of styles! The student looking abroad is bewildered, and has to put on "barnacles" to assist his mental vision. Sorrowfully he looks back over nigh half a century when men saw, that Gothic was fair to look upon, and notes how with enthusiasm the study of it was taken up, and the appetite for it "grew with what it fed on." Men were then terribly in earnest in their efforts. He may smile at much that was done, but he cannot but love those who are gone and respect those disciples who have through good and through evil report followed their beloved art. The battle of the styles was fought on a bloodless field, and all the belligerents have claimed the victory. Now this great Gothic wave has spent itself, has done its appointed work, and a restless nineteenth century craves for other food. But a few years back he would have been a bold man who dared to lift his voice in this room and say that, after all, there was much to admire in Wren's churches, and that a student might do worse than study Luigi Jones's work

at Whitehall. We have grown wiser now, and in art very liberal. Of faith there is but little, and scarcely any enthusiasm. We must regret that a certain indifference has sprung up, and that men are pandering to bad taste, and working in a No-style in which belief is wanting. Architecture has caught a kind of scarlet fever, and has entered upon a phase of its history which may be called the Rubbed-and-Red-brick era. For ecclesiastical work, Gothic still claims the larger share; and we possess new buildings which show an extraordinary advance upon what was done a few years back in their greater breadth and freedom from fussiness. The details of cathedrals are not stuck on parish churches; large plain surfaces are left to tell their own tale—to suggest repose, to heighten features and detail. Simplicity of plan and parts, and a greater knowledge of designs, as they appear on paper and in execution, characterise much that we see rising around us. In the prevalent red-brick styles there is much that is lovable; and when its features are kept within bounds, great piquancy of effect, as well as dignity, may be gained—although where the sketch-book is utilised without a definite purpose the result is confusion. In the hands of its greatest master the popular style has much one cannot help liking, spite of oneself; but what are its principles? In too many cases it is but a continuation of senseless features—of wide openings covered with a flat arch so thin that it could not hold itself up alone, and itself carried by a concealed iron girder, painted to resemble wood-work; memorial tablet detail; porches stopped off at the bed-mould of the cornice—these and other eccentricities commonly seen are barnacles that eat into the very life of architecture, and bring it and its practices into ridicule. Is this work that will make the student honest or truthful in what he does? Will its study enable him to "design with beauty, build with truth"? No. But what is the young barnacle to lay hold of? Something he must stick to, or sink. One great lesson to be learnt from barnacles is that unity is strength. By himself your barnacle is a very insignificant creature; but he is a member of a body bound together by very strict ideas of unionism; and so powerful is combination, that it can impede the progress of the largest ship. This pattern of consistency of action is not one to be followed in resisting legitimate progress; and even in relation to the barnacles, it is suicidal, as they are hacked off the vessel's sides before long. But without carrying the figure to extremes, we see that singly the barnacle is powerless; combined with his fellows, he is strength—a principle too much ignored by architects generally, but well exemplified in the Association. Again, conceit in the young is a parasitical barnacle, which gathers quickly to itself other barnacles, and gnaws into the vitals and hinders the progress of the man. No better mode of clearing these is to be found than in measuring one's strength with that of others in the classes. It would seem to be the tendency of modern times to subdivide labour, and more and more we see that specialism is spreading. In all other professions we note this sub-division of labour, and there are signs, not to be disregarded, in our own. Church restoration and church building are for the most part in the hands of comparatively few men; this is more notably the case when the church to be restored or built is in the hands of a committee, and many a mau, probably every bit as competent, is set on one side because Mr. Somebody else has been fortunate enough to be better known as a church restorer or builder. Again, in school, workhouse, and hospital building, in sanitary engineering, alas! here as a profession we have ourselves to blame. Much that would come to us, we have as a body turned from as beneath our serious notice. This work and much else has drifted into other channels, and is no longer thought by the public to belong to the profession of architects. Does it not, therefore, behoove us to look well into this matter, and if specialism is to be the modern order of things for a young man to consider carefully where his particular bent may lie, and then to turn his special attention in that direction, after carefully weighing his future prospects, if he has any, of getting work? To do this, there can be no doubt that a general study of his profession will be the wisest course to pursue; but, with a definite aim before him,

he will cultivate more assiduously that particular study which will fit him for the place he desires to succeed in, and, taking a leaf out of the book of the young barnacle, will devote his energies to getting a firm grip of it, going beneath the surface and making himself master of the situation. Specialism of all kinds has a tendency to become cramping to the intellect, and tyrannical in its effects; on the other hand, in the liberal and mechanical arts, we find and must recognise that men whose whole time and energies are devoted to special branches, in painting and sculpture, or the making of particular machines or articles of manufacture, attain a precision and accuracy which are very remarkable, and seemingly only attainable by such a system. In medicine and surgery, we see essentially this system of specialism; and in our sister profession of engineering we have its members devoting themselves to separate and distinct subjects, and obtaining in each the most marvellous results. But architecture, which is as old as the hills, is more conservative. Most of us hitherto in practice have laid ourselves open for each and every thing that might come in the way. But our masters, the public, are becoming more critical; art education is telling its tale, and clients look about for themselves, look with discriminating eye before they decide upon whom they will employ, and often choose the man who has given special evidence of his capacity to meet the requirements which they need. Do we not ourselves use this discretion? Formerly we went to the general medical practitioner for every ailment, but now if it is within our means we go to the man whose reputation lies in healing the eye, the liver, the lungs, the brain, rheumatism, gout, and the many other ailments flesh is heir to; and then in surgery how many are the divisions? Certainly here the system seems to work well; certain it is that the public think so too. No jealousy exists in the profession, and science is undoubtedly advanced by the powers of the mind being devoted to the mastering of one subject. Engineering, too, as we have noticed, includes branches too numerous to mention. It would seem, then, only natural in the order of things, that in our own profession we shall see the same barnacle action taking place. If with the spread of knowledge, of science, and of art we are to hold our place before the world, it must be as men proficient in what we undertake. So numerous now are the various works that the architect is thought to include in his work, and be master of, that it is simply impossible in the time at his disposal that he can be a proficient in all of them. Work of every kind and description connected with architecture is daily being filched from us, and men and companies are started for doing that which would be better done by architects, who, trained in youth to the profession, elected a particular branch or branches to practise in. Our work is frequently done by men who have only a slight acquaintance with the art and science of architecture, and professional architects too often get the blame. If, instead of this, special branches were taken up by men educated as architects on a broader basis, I think we should see much the same result as exists in the medical and other professions, and we should have a class of specialists who could be called in in consultation by their professional brethren as necessity arose. The advantages to be gained by this system would seem to be this. The profession of architecture would stand better in the eyes of the public by the proficiency of men in its various branches; work connected with building, &c., instead of drifting into other quarters, and being done by men who have little or no knowledge of architecture, would be kept in the profession and be looked upon as belonging to it. A slight acquaintance with the work of outside specialists is enough to show how hideous they can make the work they touch, and how in their desire to make their own work successful, they disregard all considerations of art. But already the public is alarmed at the expense of sanitary reform initiated more particularly by these specialists, and the accounts we hear of the cost involved are sometimes startling. Now we have this matter a good deal in our own hands, and much else, such as warming, ventilation, &c. A general knowledge, at all events, of principles and practice, is essential to every practitioner; but if we had more men like those who read papers and spoke upon the subject of sanitation,

&c., last session, we should be able in any difficulty, with the consent of our clients, or on our own behalf, as the case might be, to call in one of these gentlemen to advise. Now, there would be nothing *infra dig.* in such a course, for it is done in other professions. A feeling of *esprit de corps* would animate the consulting and consulted architect, and the advice would be given with a knowledge of the whole case and all its difficulties, both working in the same interests for the benefit of the client. Again, in special matters of construction, design, decoration, and what not, the same system could be adopted more than it is now, to the great gain of the profession and the public. And the esteem of the former would be increased, if our employers found that we contained in our ranks all the elements for meeting whatever question arose without going to outsiders for information, and involving them in large extra expenses thereby.

There are barnacles and barnacles. Some spend their lives at home, others are great travellers, but beyond sustaining the life that is in them, apparently gain little advantages from this mode of spending their lives. So there are students and students. Some, from necessity or inclination, stay at home, and some are fortunate enough to be able to travel and visit many countries. The pursuit of the beautiful is a necessary study for all who aspire to the highest qualifications of an architect, to be, before and above all else, an *artist*; but, to make use of his studies, he should not only be a sketcher of what will look pretty in his sketch-book, but should observe the object upon which his attention is turned, and try and discover in it what was the motive of the man who executed the work, the materials of which it is composed, the colour which charms, and how this pleasurable effect of colour is produced, whether solely from the kindly hand of time or intentionally. Then the plan,—generally one of the most important factors,—the mode of construction, the height from the ground and from where viewed and intended to be viewed. Now, all this necessarily takes a long time, and nineteenth-century rush so pervades our modern system that few will take this trouble. To pursue such a course of study will not fill the sketch-book, and is too irksome. We often place too much importance upon the sketch-book as a show-book. I remember, some years ago, when seeking employment, showing my sketches to a very distinguished architect. He was kind enough to compliment me upon them, but added, "I should better like to see them loaded with figures." There is no doubt of the wisdom of such a course. Your drawings will not look pretty, but you will have facts to correct fancies, and I think no one who adopts this course regrets it. You see some pretty little piece of architecture, sketch it, gloat over it, and show it to your friends as something very choice. Years after you wish to refer to it; then, may be, your recollection of its plan, situation, and construction, the materials of which it was composed, are gone from you. Now, had all this been noted down and measured, the system, though laborious, would have impressed it upon your mind, and your drawing would have been of greater use. So great is the importance of such a course of study known to be by those qualified to judge, that the prizes for sketching old work are mainly based upon the principles enumerated. A favourite maxim of the late Mr. William Burgess was "Sketch and measure, measure and sketch." The neglect of this thorough way of sketching is the cause of a great deal of weak and senseless detail in modern building. The rambling method will leave the student a travelled barnacle, with little real professional gain. The habit of thoughtfully working out one subject, and mastering it, is worth a bookful of "bits"; it conduces to an increase of reasoning power by going to the root of the matter, which, when we are at work upon designs for our own buildings, gives method and reason for what is produced. It is an absolute necessity in early years to pursue this system, as by it experience is gained, the student learns to discriminate and to jot down all the salient points of his study, and to economise labour upon it, but only after many years of toil and a peculiar faculty which some possess above others for grasping the essential, and showing only what is absolutely necessary to express this to yourself and others. Mr. E.W. Godwin's method

of sketching old work may be quoted and pointed to as illustrating my meaning. Another useful way of making foreign travel of real use is the habit of keeping a concise and careful diary. It is, of course, rather irksome, but of the great advantage of so doing there can be little doubt. This occupation teaches a student to express his thoughts and ideas intelligibly, practising him in composition, and gives a habit of observation and a facility of expression which in after years will be of enormous advantage in writing reports for committees, papers to be read before such bodies as ours, and, may be, books to be published. Work to be done on the spot, whether sketching or writing, is conducive to habits of accuracy, and is of a value hardly possible to exaggerate. Let us now consider "barnacles" in their nature of parasites, of which they are a species. The practice of architecture is not free from parasitical growth, and its progress is often impeded by it. In our day one great danger has arisen from the excessive prominence given to draughtsmanship and perspective drawing. The art of photo-lithography, whereby the actual handwork of the artist can be reproduced in fac-simile, has been an immense gain; its cheapness offers great advantages, and men have not been slow to seize them. The development of pen-and-ink drawings has largely fostered the production, and we have in our profession some exceedingly clever masters of the art. The professional journals have almost universally adopted photo-lithography for their illustrations. Most men like to see their works in print, and the facilities now offered for achieving this are so numerous, the demand so great, that it is not surprising that a large supply has followed. Now, valuable and useful as all this is, it is to be feared—and you will remember that Prof. Kerr warned us against the danger—that young men, seeing the ease with which they can get their works thus copied, devote the greater part of their time to making pretty drawings, and obtaining excellence in the mechanical and artistic use of the pen, and this, to the exclusion of more useful studies in the art and science of their profession. To be a good draughtsman is to possess a power which will stand the student in good stead; but if it tempts him to make pretty sketches and designs, elevations and details, which will not work, are not constructive, or are not the outcome of that primary necessity of all good architecture—a well and carefully-considered plan—then such work is not true architecture, but a parasite. We are too apt, so critical have we become nowadays in this matter of draughtsmanship, to lay too much stress upon the drawing and too little upon the design as a whole; and there has sprung up a class of specialists who undertake this class of work, and who can design elevations by the yard and make impossible perspectives, and if by chance we see works so represented carried into execution, we hardly recognise them. Useful, too, as perspective drawing is, the same tendency to exaggerate its use and to deceive is very noticeable.

One of the greatest encouragements to showy drawings has been the competition system. The man who goes in to win a competition knows perfectly well that his chances of success generally lie in producing a fine set of drawings. It is not, therefore, much wonder that this should beget a race of draughtsman-architects who know how to tickle the fancies of the Dogberries and their companions by designs for buildings which cannot possibly be executed for the money as designed, and which, if chosen, have to go through the mill and be ground down and thinned. The competition system, as too generally practised, has favoured the barnacle growth to an alarming extent, and the good ship Architecture has been much hindered in her course in consequence. Happily much of this evil has been remedied, and it is, fortunately, becoming the custom to call in a professional assessor to advise committees. Many of us are looking forward with some interest to see what the Council of the R.I.B.A. are going to do in the matter of the memorial presented to them last year, followed by the report of the committee specially formed for the purpose of formulating a scheme for the better conduct of competitions. The matter is one of serious importance to the profession, and the barnacle cohesion given to the memorial was a proof of the interest taken in the matter, and how keenly

men felt the injustice of the system as generally carried out. If the appointment of a professional assessor is the *sine qua non* of all respectable architects consenting to join in a public competition, the death-blow will be given to the profession and e-ling of paper architects. No one in his senses is sanguine enough to suppose that the appointment of a professional assessor is the panacea for all the evils of the system, but fair-play is a jewel, and every man who knows his work and loves uprightness will feel that in the hands of a man of honour and skill, his design will be judged, as far as fallible human nature can judge, on its fair merits. Barnacles, you have observed, attach themselves to an object on the underside of it: are, in fact, out of sight, so that one does not notice them. If you will take the trouble to look you find them, or you may "nose them" if their habitation has become stranded high and dry. This habit of the barnacles brings me to another part of my subject to which they must serve as an illustration. Foundations, timbering, drainage, sanitary appliances and water-pipes, bell-wires, &c., are out of sight, often below the surface, and veritably it may be said of many an unsavoury smell, "You shall nose him as you go up the stairs into the lobby." I would impress upon students the positive necessity of making themselves acquainted with the subject of sanitation. It is too much the fashion among enthusiastic young architects to ignore this branch of their work. Well, at first sight it is unavowry, dull and dry, and perhaps much of it is nasty. It is not a light art; but as you must come down from the sky and lower the tilt of your æsthetic nose, the neglect of the study, and mastering of its rudiments at least, will beget a growth of barnacles which will assuredly impede your progress to the shores of success. A few years back, and most men left all this seemingly unpleasant work to the builder or clerk of the works. Science, with her powerful barnacles on, has peeped into the hidden mysteries of health and impediments to health, has found out causes against which medicine is powerless, and has discovered that they arise, almost invariably, from neglect of nature's laws, and that the seeds of disease and death are frequently to be found sown in the house we live in. The note of alarm has been raised, daylight has flooded in upon the hidden horrors, and they have been revealed in all their bare hideousness. We know now that death has been taken into the home, and sewer-gas is responsible for much misery and disease. We know this now, and it is simply criminal in any of us who are called upon to design buildings if we neglect the warning. Make yourselves masters of your arts; but, neglect this, leave it to others to do in a kind of haphazard way, and you will most assuredly find that the opportunities of displaying your designing powers will be limited to paper and to your own offices. "Be sure you see to the drains," is over and over again the remark that you are met with by your clients. You will come across men thoroughly up in the principles of modern sanitation. You will, at the outset of a job, be asked what you advise; how you propose dealing with this problem, this or that soil, this or that system. If you answer, "My dear sir, you surely don't expect me to go into such matters; that matter is for the clerk of the works or the builder"; you will fall a great many degrees in the opinion of your clients; you will harm the profession to which you are proud to belong; you will give cause for the remarks one so often has thrown in one's face, that architects are impracticable people, and do not know their work. This and much else has drifted from the profession, because we have hitherto too much neglected it, and a race of sanitary engineers has sprung up to do it instead. To ignore this class of work is so very foolish. Suppose a young architect, just established in practice. He must not expect to be building mansions all at once: he is called in for some small alterations, say some revision of the drainage system is needed. If he can undertake this, and achieve success in it with careful thought and still more careful superintendence, he will win the confidence of his employer, and add to his chances of procuring more work. Now, supposing he allows his ideas of the fine arts being the exclusive rôle of the architect to prevail, and that his soul is not to be worried by such "unconsidered trifles" as drains; the

probabilities are, he will disgust his employer, who will politely but firmly get rid of him on the first opportunity, and thus a chance of success, a step upon the ladder, has been lost. Clients are right in making us careful; the lives of those nearest and dearest to them may lie in our hands, and they will not be clean, if through carelessness and wilful neglect of what is now patent to any engineer, we neglect the warning and go on blindly disregarding all the lessons of the past. A paper treating of impediments to the progress of architecture would hardly be complete without some allusion to that great feature of modern times, speculative building. Here, barnacles of every kind and degree congregate, and, unchecked, hinder and impede all true progress. Naturalists tell us that the young barnacle is cyclopean, and makes use of his one eye to find a resting-place, and, pouncing down upon the first favourable one, there establishes himself. And then quickly and with wondrous growth and fertility shall houses gather all around him, until he has covered every available space with his progeny. Is not the speculative builder similar somewhat in his habits? His one idea is gain; he fixes his eye steadily upon some favourable spot, attaches himself to it with a firm grip, and then quickly covers the land with his creations, gathers to himself a whole host of other barnacles, until we no longer recognise the site he has covered. A parasite of the parasites is speculative building as too generally practised. It would be most unfair to gibbet thus all speculative builders. I only allude to the disreputable class of speculative builders who prey upon an ignorant public. They are not alone blameworthy. Feeding upon them in their turn are the owners of the land they settle upon, who exact terms which are a premium upon dishonesty. Then, again, there are lawyers, and, it is to be feared, surveyors too, of a certain class, who fasten upon the unfortunate builders and suck them nearly dry. And, lastly, a greedy public, who grind them down to the lowest farthing. Architects in their professional capacity can do little to remedy the evil. They are seldom consulted, beyond occasionally supplying plans, and except in the better class of speculative building, never are called in to superintend the carrying out of them.

At the close of the paper a short discussion ensued on the points of specialist architects, the new order of competitions, and other points raised in the paper, in which the Chairman, Messrs. Harcastle, Vacher, and James Smith took part, and a vote of thanks was passed to the lecturer.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.

AT the annual opening meeting, held in the Society's rooms at 7, Westminster Chambers, Victoria-street, an address was delivered by Mr. Arthur T. Walmisley, Assoc. Mem. Inst. C.E., the president for the ensuing session. After alluding to the steady progress made by the Society since its establishment in 1856, and its value to the younger members of the profession, Mr. Walmisley observed that the problems with which engineers had now to deal were so varied, and the competition so keen, that a vast field of knowledge had to be covered by their professional education. He believed that the want of employment, complained of by so many, was in the majority of cases due more to their own incompetency than to the overcrowding of the profession, and to enable us to compete with foreign rivals it was necessary to avail ourselves of every opportunity to keep our knowledge up to the day. Ample facilities existed in our scientific societies and collegiate institutions to obtain the necessary education, and he hoped the time was not far distant when an educational test would be established, upon the basis of which the engineering profession would for the future be constituted. As things were, any one might call himself a civil engineer, while to be a solicitor or a doctor it was necessary to pass through the usual examination. The Institute of British Architects and the Institute of Surveyors were about to establish such tests of proficiency, and he hoped that the Institution of Civil Engineers which contained among its members the representatives of all branches of constructive science, would soon rescue the profession from its present state of undefined profi-

ciency by establishing an examining board with power to grant such diplomas or certificates as would be recognised in the profession as a proof that the holder has attained to a certain standard in his knowledge. The Civil and Mechanical Engineers' Society was in no way opposed to the Institution of Civil Engineers, nor had they any idea of rivalry with the Society of Engineers, but they met together as a social society to review the past, consider the future, and to assist each other professionally in every way.

Referring to the progress of modern engineering, which he mainly attributed to the competition between the various railways and steamship companies, Mr. Walmisley said that the increased size of our newest ocean steamers had necessitated the construction of new docks, or the enlargement of the existing ones, at nearly all our seaports—as, for instance, at Leith, Liverpool, Hartlepool, Swansea, Penzance, Cardiff, Folkestone, Milford, Hull, and other places, while London herself had now under consideration great additions to her dock system. After describing the advantages of the new Victoria Docks and the proposed Dagenham Dock, Mr. Walmisley alluded to the scheme promoted by the East and West India Dock Company for the construction of deep-water docks at Tilbury. It was intended to give due prominence to the provision of ample quay area by the construction of jetties, and to have branch lines running along the same connected with the London and Tilbury railway system, which would enable goods to be conveyed by rail to and from any of our commercial centres by means of the great trunk lines of the kingdom with which the Tilbury system is connected. The plan also included the construction of two graving docks, each of the length of 900 feet, which would be capable of sub-division as might be required to dock long and short vessels together, separated by means of transverse caissons sliding in grooves.

At Barrow a floating dock was being built in iron, which would be capable of accommodating vessels of 2,300 tons burden. The peculiarity of this dock would be the possibility of dividing it, if necessary, into two equal parts, each with its own separate engines and pumping machines capable of docking the other half, and of depositing a vessel high and dry on a stage for the purpose of cleaning and repair. He considered the Naval and Submarine Engineering Exhibition, to be held next April at the Agricultural Hall, and which he was pleased to see well supported, would be productive of much good, and that the Electric Light Exhibition, to be held at the Crystal Palace this month, would not only show what had been done towards perfecting this light, but would lead to further achievements in electrical science. The Smoke Abatement Exhibition, held at the Albert Hall, showed what had been done in the science of economy towards obtaining a maximum of heat with a minimum of fuel. All this tended to show that engineers were intimately concerned with all the great improvements of the day. Civilisation was a very difficult word to define, but included all that engineers had done. When we heard that such-and-such an undertaking did not pay to work, it was the duty of the engineer to step in and devise such appliances that with careful working a fair profit might be counted upon in executing the same.

It was to the engineer that the public looked, more than to anyone else, to suggest suitable undertakings for investment.

A vote of thanks was unanimously accorded by the Society to the President for his address, and seven new members were proposed for election.

The parish-church of Bergh Ayton, Norfolk, was reopened on St. Andrew's Day, after restoration. Two unsightly galleries have been removed from the transepts, and the nave has been refloored and provided with new benches, pulpit, and reading-desk, all of oak. A brass altar desk and corona of the same metal have also been placed in the chancel. A new window, filled with cathedral glass, has been opened out in the south transept. The contractor was Mr. Morris, of Ditchingham, near Bungay.

The distribution of prizes and certificates to the students in the Maesteg science and art classes took place in the new town-hall on Wednesday week. The report showed that during the year 29 Queen's prizes, five honour certificates, and 83 certificates were gained, maintaining the high average of the past five years.

CONTENTS.

The Falmouth Union Infirmary Competition	779
The Brighton Health Congress and Exhibition	780
Royal Academy Distribution	782
Prof. Richmond on Science and Art	783
Sir F. Leighton on Art	784
Barnacles	787
Civil and Mechanical Engineers' Society	789
Our Lithographic Illustrations	790
"Building News" Designing Club	803
Lectures on Architecture delivered at the Royal Academy	804
The Brighton Health Congress	804
A New Scaffold Crane	805
Chips	805
Building Intelligence	805
Competitions	806
Architectural and Archaeological Societies	807
To Correspondents	807
Correspondence	807
Intercommunication	809
Legal Intelligence	811
Water Supply and Sanitary Matters	811
Our Office Table	811
Meetings for the Ensuing Week	812
Tenders	812

ILLUSTRATIONS.

DOMESTIC STAINED GLASS.—ST. WILFRID'S CHAPEL, AND THE MAGDALEN CHAPEL AND ALTAR IN THE ORATORY, SOUTH KENSINGTON.—RESIDENCE AT BLACKHEATH.—CHANCEL ALCH, LINCOLN ABBEY CHURCH.

OUR LITHOGRAPHIC ILLUSTRATIONS.

DOMESTIC STAINED GLASS, DE VERE GARDENS, KENSINGTON.

A DESIGN shown on paper as a drawing, but seen in execution as a transparency, requires a little consideration of the difference between the action of reflected and transmitted light upon it. In the first case, breadth and repose are required, but in the second, unless coloured glass is employed to a great extent (which is not the case in the present instance), one of the essential conditions to insure a good result, is that the white glass should be entirely covered with equal and regularly painted detail, to soften the glare and harden. The foregoing remarks are intended to apply only to grisaille consisting of ornament, and not to figure-work, for which coloured glass should be used, as the conditions of equality and regularity of design are not in that case possible. A grisaille composed entirely of white, or more correctly of colourless, glass, although it may be rich and velvety from the detail applied, has a vibrating and restless appearance. The introduction of coloured glass, in the form of occasional bands, or other forms, will remedy this defect, and the painted ornament on these bands has the effect of checking the radiation of one colour over another (very considerable in the case of blue) and of giving increased richness to the tints themselves. The windows that form the subject of the present illustration have, with others, been executed for Sir Daniel Cooper's house at De Vere Gardens, Kensington. The panels, with fruit, flowers, and musical instruments, are in "warm white" rolled glass; the design, stained yellow in parts, is on a semi-transparent dark ground, from which a pattern is taken off, before firing, with a pointed style. The narrow borders are in white, mixed with colours, principally ruby, flesh-red, yellow, and olive-green. The geometrical patterns in squares, shown by rather fine lines, are clear glass, outlined with fine brown lines on a ground of white mat, which gives an opalescent effect, contrasting well with the transparency of the rest of the glass. The landscape in the opening in centre circular-headed window is leaded up in coloured glass, the rest of the window being treated similarly to the others described. Nos. 1 and 2: Library, centre, and one of the side lights. The Leads in the centres are in execution as Shakespeare and Chaucer—although shown as two female heads on the drawing. No. 3: Back drawing-room, centre light, the window having three lights (the two side lights are not shown). The heads of "Poetry" and "Music." No. 4: One of the staircase windows. No. 5: Lobby between stairs. No. 6: Lower half of entrance-hall window (top half not shown).—W. H.

THE ORATORY, BRIGHTON.—ST. WILFRID'S CHAPEL. By the kind permission of the Fathers of the Oratory, we are enabled to give our readers an

interior view of St. Wilfrid's Chapel, which is now being erected under the direction of Mr. Herbert A. Gribble, on the vacant plot of ground at the north-east corner of their new church, and connected with it by an opening from the transept. In length it measures over 60 feet, interior dimensions, and in width, at the centre, over 30 feet. It has a small cupola at the top, carried by four monolithic columns in Breccia Scavazza, standing on marble pedestals. This chapel will eventually be adorned with a series of fresco and mosaic panels, illustrating important events connected with the early English Saints. The panels in the cupola will probably be devoted to the saint to whom the chapel is dedicated, while the four pendentives may contain portraits of St. Edward the Confessor, St. Edmund the Martyr, St. Etheldreda, &c. And on the walls and ceiling will be depicted such subjects as the introduction of Christianity into England by St. Augustine, the martyrdom of the Sts. Thomas A'Becket, Edmund, and Alban; the offering of the Crosier to St. Cuthbert by the King of Northumbria, the Confession of St. Theodore, and others similar ecclesiastical subjects. The remaining portion of the walls will be embellished with painted grotesques similar to those of the Vatican loggia by Raphael and Julio Romano. The chapel contains two confessionals, arranged as seen in the view, an Italian marble altar, and a small organ gallery, and through the medium of the sliding door this apartment can be cut off when desired from the body of the church, for special services, &c. Mr. George Shaw, of Westminster, is the contractor for the works, the quantities being supplied by Messrs. W. H. Smith and J. Lee and Son, surveyors.

THE MAGDALEN ALTAR.

AMONG the many altars necessary for the new Oratory Church, this one occupies not the least important position, being situated in one of the central side-chapels, which is surmounted with a copola and top-lighted, and dedicated to St. Mary Magdalen. It is 30 feet square and 50 feet high to the sill of the lantern, and is provided with two large recesses for confessionals and a corresponding number of niches for colossal statues; the illustration shows the proposed method of treating the background with plaster and mosaic panels, portraying incidents in the life of the Saint. The altar, with its accessories, will be executed in Plymouth marble, as follows:—Commencing at the floor-line with black, the dies of the lower pedestals in a sample resembling that known as "St. Anne's." The dies of the upper pedestals will be of green, with red and grey panels, while the capping and base mouldings will be in yellow—a marble very little known and somewhat scarce; it is rich in tone and slightly brecciated with small pieces of grey limestone, which impart a very agreeable and interesting effect. The four large columns, which are about 11 feet in length, will be in breccia spar of a semi-transparent nature, having a variety of reddish hues and other tints. This is the first occasion that this stone has been used for purposes of columns, as it is necessary that the quarry should yield blocks of large dimensions, which it promises now to do most favourably. The caps and bases are in Carara (seconds), and the superstructure in an arrangement of the samples already mentioned. The centre picture of the saint, prostrate at the feet of the Cross, will be in Venetian mosaic. The altar-front will be fitted with a large plate glass panel with a brass frame, inclosing a sarcophagus containing the ashes of St. Euphrasie. The contract for the marble-work only is at present settled, and is being executed by Messrs. Goad and Co., Plymouth. The plastering, the floor, the altar-rails, and the mosaic still remain for future consideration.

RESIDENCE AT BLACKHEATH.

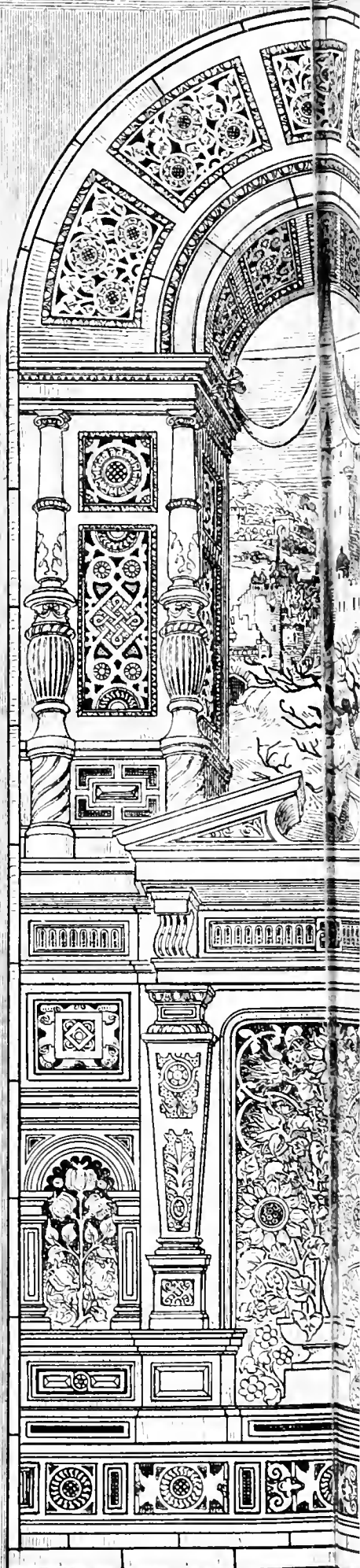
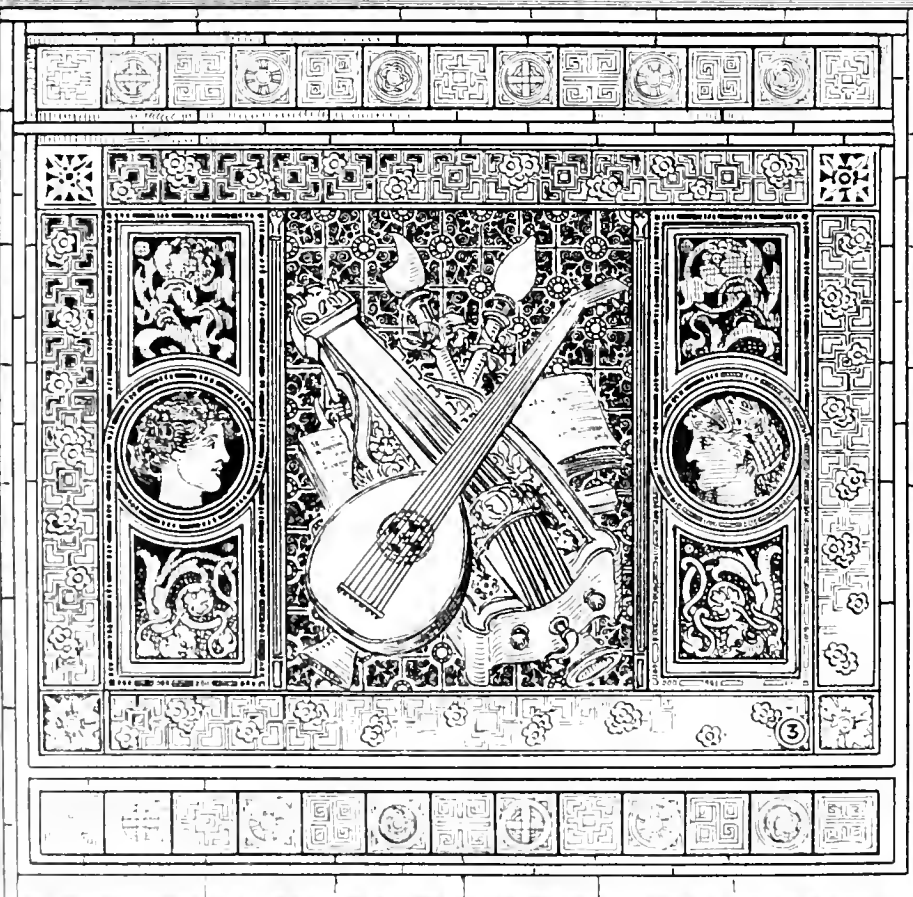
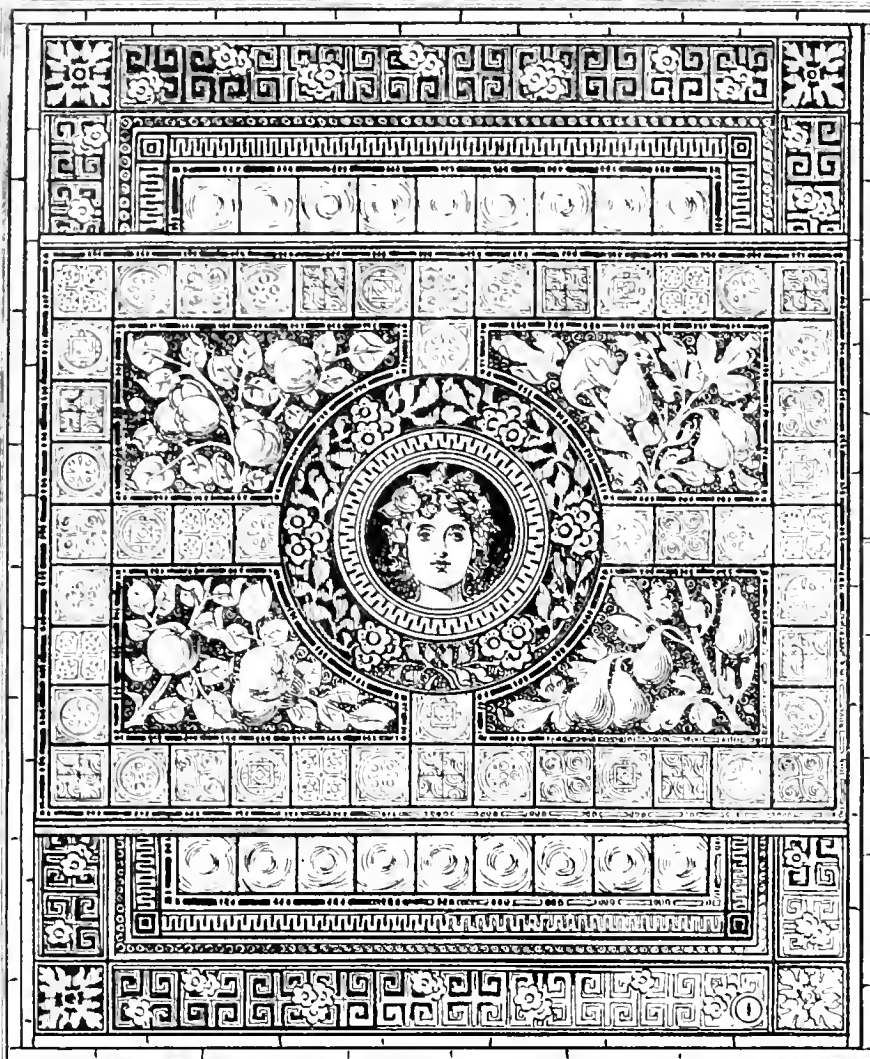
THIS house, which has been recently erected for Mr. J. F. Green, of Blackwall, is situated on a portion of the estate of the late Mr. J. Penn. The walls are of red brick, with red and black tile hangings, and the roofs are covered with dark tiles, parts of the exterior being in half-timbered work. The principal staircase as well as the whole of the internal wood-work of the dining, drawing-rooms and library, is executed in American walnut wood, the ceilings being carried out in the same material with panels in low relief. The windows are glazed with lead lighting throughout, with ornamental glazing

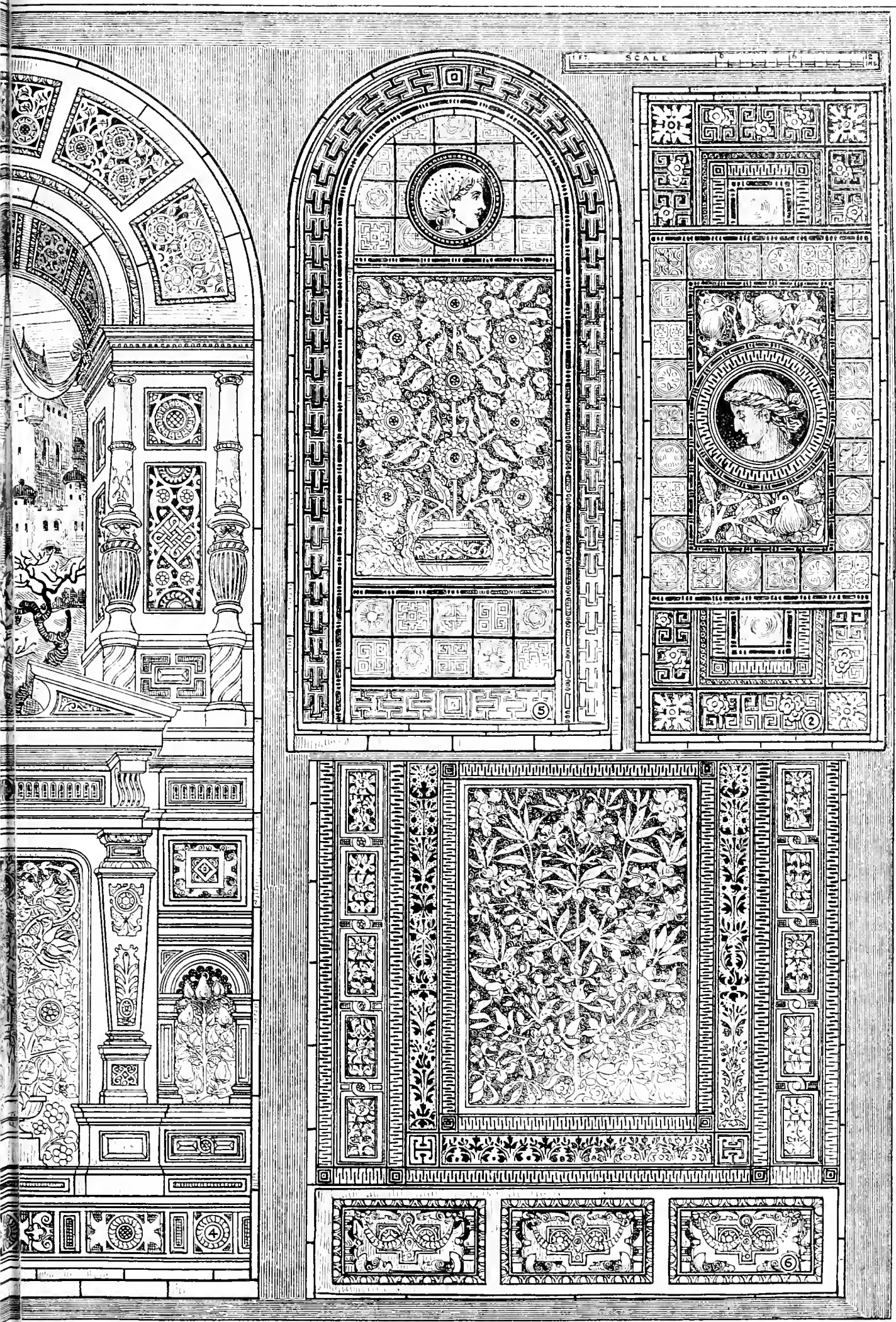
in the upper part of the drawing-room lights. The entrance-hall is laid with parquet. One special feature of the design is the position of the kitchen, which has no rooms over, and the flue from which (with a large ventilating flue adjoining) is boldly carried up in the front. The works were carried out by Mr. Havill, builder, of Lee, from the designs of Mr. W. J. Green, architect, of London. Our illustration is taken from a drawing by Mr. G. R. Julian, which was exhibited at this year's Royal Academy Exhibition.

LINCOLN ABBEY.

LINCOLN ABBEY is situated in Kirkeudbrightshire, about a mile from the town of Dumfries, the capital of the neighbouring county, and on the opposite bank of the Nith, which divides the two shores. Like a great many religious houses, its site has been well chosen amid pleasant scenery; it stands at the junction of the Cluden with the Nith, and it is from the smaller stream that the name is derived, Lincluden meaning the pool of the Cluden. The original buildings were erected about the middle of the twelfth century by Uchtred, Lord of Galloway, as a Benedictine convent. About the close of the fourteenth century the convent was suppressed by Archibald the Grim, Earl of Douglas, on account of the misconduct of the nuns. The church was erected, other additions were made, and the buildings transformed into a college, and by the name of the "Auld College" the ruins are frequently spoken of in the neighbourhood. The college, with its lands, belongs now to the Maxwell family, one of whom, in defiance of law, caused Mass to be celebrated within its walls for the last time in 1585, shortly after the Reformation. I do not know how many agencies may have contributed to the ruin of the buildings, but certainly the hand of man has been the most active instrument of destruction. Of the church nothing remains but the walls of the chancel, south transept, and about three windows in the south wall of the nave. For a long period it has suffered much from the wanton mischief of visitors, the opportunity afforded by the carved work for acquiring excellence in all the niceties of stone-throwing having been widely taken advantage of. A few years ago an iron gate was fixed to close the entrance to the chancel, but to the juvenile and mischievous portion of the visitors this obstacle only formed an excuse for clambering over the rood-screen in order to gain admission to the interior, sometimes that the more imaginative of them might pursue a vain search for a mysterious subterranean passage, which, according to one of Miss Jane Porter's novels, passed under the river and connected the abbey with the castle of Dumfries. This fiction, so attractive to youthful explorers, referred not to the present church, but to that which preceded it. Within the present year the ruins have received more attention, and excavations have been undertaken with a view of clearing away the rubbish and fallen masonry and revealing the extent of the buildings. The mouldings and details of the church are bold and massive; the sedilia, the piscina, and the beautiful mural tomb are, however, marked by more minute and elaborate ornamentation. The tomb, which in the illustration is visible through the entrance, was erected about 1440 for Lady Margaret Douglas, a princess of Scotland, and the daughter-in-law of the Grim Earl to whom the abbey owed its transformation. I have some sketches and measured drawings of the tomb, which I may one day forward to you. In almost every instance the hood-moulds of the windows are terminated with shields carved with the arms of families who have been connected with the college, the bloody heart and three mullets of the Douglas being frequently quartered with others. The heavy cornice over the chancel entrance has been decorated with two rows of carving, the upper representing cherubs in the act of adoration, and the lower showing various scenes from the life of Christ. The significance of the latter could be dimly recognised a few years ago. No woodwork remains. The walls have been built with the red sandstone of the district.—W. CANNING.

Plans for a new town-hall are to be prepared by Mr. G. S. Bridgman, of Torquay, and it is hoped that the building will be erected with as little delay as possible.





From Photographs taken by James Auerman, 6, Queen Square W.C.

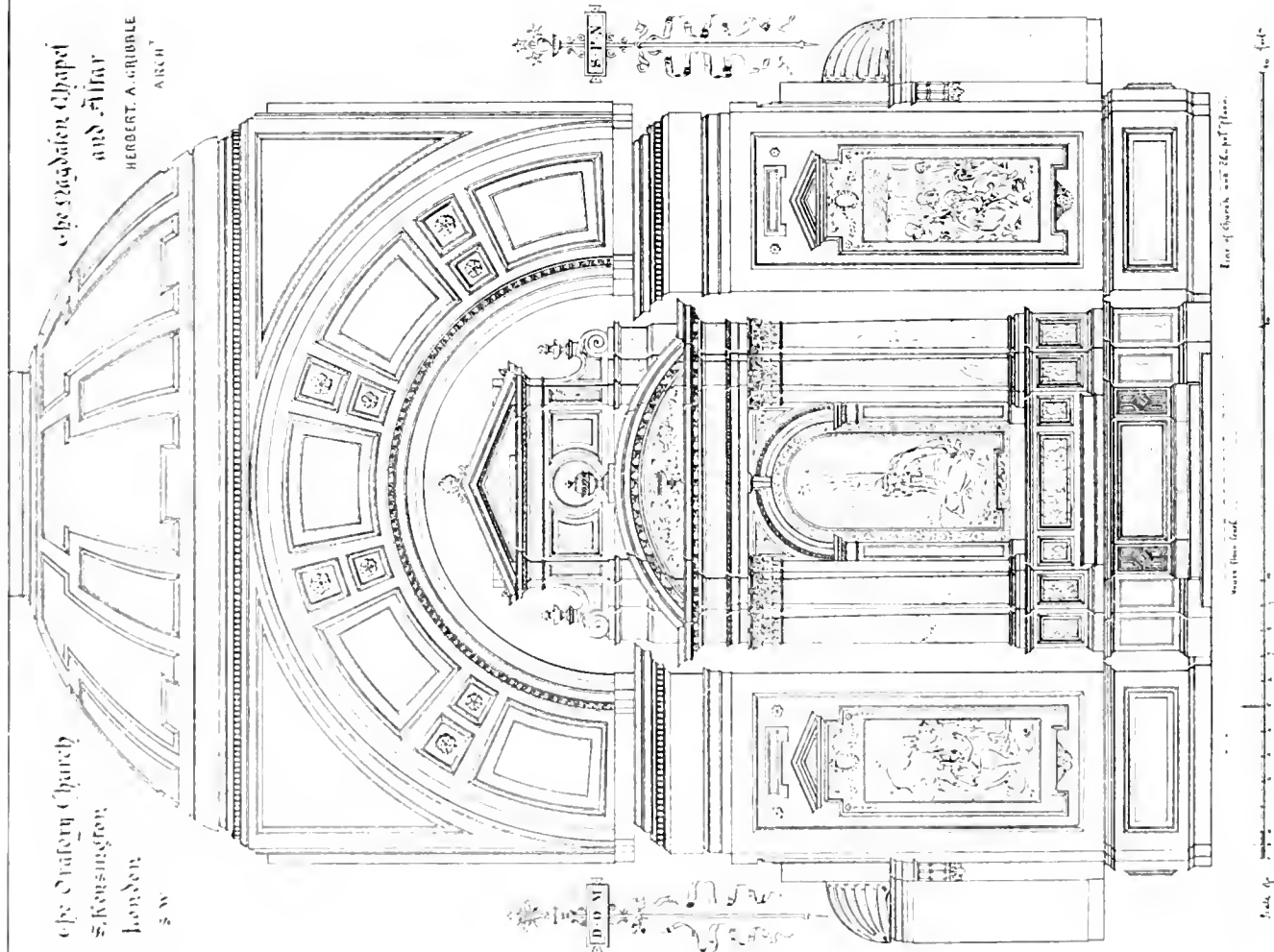
de: Ciferari (jurid)

$\pi_1(K) \cong \pi_1(M)$

 $\frac{1}{2}$

besonderen Chapel
und -flair

HERBERT A. GRUBBLE
ARCHT



Line of Church and Chapel Floor.

!-ala q

— — — — —

33

THE TAIL OF THE PARTY

α	β	γ	δ	ϵ	ζ	η	θ	ι	κ	λ	μ	ν	ξ	\omicron	π	ρ	σ	τ	υ	ϕ	χ	ψ	ω
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23
 24
 25
 26
 27
 28
 29
 30
 31
 32
 33
 34
 35
 36
 37
 38
 39
 40
 41
 42
 43
 44
 45
 46
 47
 48
 49
 50
 51
 52
 53
 54
 55
 56
 57
 58
 59
 60
 61
 62
 63
 64
 65
 66
 67
 68
 69
 70
 71
 72
 73
 74
 75
 76
 77
 78
 79
 80
 81
 82
 83
 84
 85
 86
 87
 88
 89
 90
 91
 92
 93
 94
 95
 96
 97
 98
 99
 100
 101
 102
 103
 104
 105
 106
 107
 108
 109
 110
 111
 112
 113
 114
 115
 116
 117
 118
 119
 120
 121
 122
 123
 124
 125
 126
 127
 128
 129
 130
 131
 132
 133
 134
 135
 136
 137
 138
 139
 140
 141
 142
 143
 144
 145
 146
 147
 148
 149
 150
 151
 152
 153
 154
 155
 156
 157
 158
 159
 160
 161
 162
 163
 164
 165
 166
 167
 168
 169
 170
 171
 172
 173
 174
 175
 176
 177
 178
 179
 180
 181
 182
 183
 184
 185
 186
 187
 188
 189
 190
 191
 192
 193
 194
 195
 196
 197
 198
 199
 200
 201
 202
 203
 204
 205
 206
 207
 208
 209
 210
 211
 212
 213
 214
 215
 216
 217
 218
 219
 220
 221
 222
 223
 224
 225
 226
 227
 228
 229
 230
 231
 232
 233
 234
 235
 236
 237
 238
 239
 240
 241
 242
 243
 244
 245
 246
 247
 248
 249
 250
 251
 252
 253
 254
 255
 256
 257
 258
 259
 260
 261
 262
 263
 264
 265
 266
 267
 268
 269
 270
 271
 272
 273
 274
 275
 276
 277
 278
 279
 280
 281
 282
 283
 284
 285
 286
 287
 288
 289
 290
 291
 292
 293
 294
 295
 296
 297
 298
 299
 300
 301
 302
 303
 304
 305
 306
 307
 308
 309
 310
 311
 312
 313
 314
 315
 316
 317
 318
 319
 320
 321
 322
 323
 324
 325
 326
 327
 328
 329
 330
 331
 332
 333
 334
 335
 336
 337
 338
 339
 340
 341
 342
 343
 344
 345
 346
 347
 348
 349
 350
 351
 352
 353
 354
 355
 356
 357
 358
 359
 360
 361
 362
 363
 364
 365
 366
 367
 368
 369
 370
 371
 372
 373
 374
 375
 376
 377
 378
 379
 380
 381
 382
 383
 384
 385
 386
 387
 388
 389
 390
 391
 392
 393
 394
 395
 396
 397
 398
 399
 400
 401
 402
 403
 404
 405
 406
 407
 408
 409
 410
 411
 412
 413
 414
 415
 416
 417
 418
 419
 420
 421
 422
 423
 424
 425
 426
 427
 428
 429
 430
 431
 432
 433
 434
 435
 436
 437
 438
 439
 440
 441
 442
 443
 444
 445
 446
 447
 448
 449
 450
 451
 452
 453
 454
 455
 456
 457
 458
 459
 460
 461
 462
 463
 464
 465
 466
 467
 468
 469
 470
 471
 472
 473
 474
 475
 476
 477
 478
 479
 480
 481
 482
 483
 484
 485
 486
 487
 488
 489
 490
 491
 492
 493
 494
 495
 496
 497
 498
 499
 500
 501
 502
 503
 504
 505
 506
 507
 508
 509
 510
 511
 512
 513
 514
 515
 516
 517
 518
 519
 520
 521
 522
 523
 524
 525
 526
 527
 5

P **E** **R** **I** **T**

299 P. 116, 117

22142

1

100

[illegible]

2017

10

100

1997

1

2

0000000000

1

SECTION THRO. CRANTZ.

1000

100

100

Robert G. Smith, Secy.
10 11th March 1891.



Lindisfarne Abbey Church
W. Carrington del.



ST. WILFRIDS CHAPEL THE ORATORY · S. KENSINGTON HERBERT · A · GRIBBLE · ARCHT



"BUILDING NEWS" DESIGNING CLUB.

DESIGNS FOR MODEL COTTAGES.

WE have received so large a number of designs for this subject that it will not be possible for us to examine every one of them or with the care we should have given. Owing to this we have divided the number into groups, and shall confine ourselves to the first and second of these as nearly as possible in the order of merit. (1) "Beta" has produced a simple block of cottages under one steep roof. The plan is nearly an exact square, with the fireplaces arranged in the centre, and the entrances at the sides; there is a small hall, 7ft. by 6ft. 6in., partly occupied by a stairs with winders, opening from which is the living-room on the front side, 15ft. by 11ft., with a scullery opposite the entrance, 12ft. 6in. by 8ft., separately entered, which is not necessary. There is a ladder in the recess formed by the hall and stairs, and a back-door to a small yard, in which the earth-closet, coals, and ashes are grouped together. There is a good front bedroom with cupboards, and two smaller bedrooms behind. The simply-treated tile roof, and the windows are shown in an unpretending and cottage-like manner. (2) "Self Help" is also simply and artistically treated, though of rather more expensive character, owing to the gables and centre gutter and the extra valleys of the roofing. The entrances are also at the sides, a small lobby projection, which is carried through, giving access to a living-room, 14ft. by 12ft., in front, with small square bay; leading out of which at the back is a kitchen, with sink, &c., while along the side, behind the lobby, is a small pantry, a fuel-closet and an e.c., the last having the door on the outside. The author thus obtains all his offices under the same roof. Upstairs are three bedrooms, the back ones being each 10ft. 6in. by 9ft., and the front one 12ft. 6in. by 11ft. 9in. A linen-closet is shown on the landing. The plan is compact, and the area covered small. The elevations are in brick, tile-hung above, with timbering in the gables; these are half-hipped, and the details are in a plain Old English Vernacular style, the chimneys being brought together and pleasingly grouped above the roof. The mullion and transom windows are characteristic. (3) "Ignotus" is a neat pair of gabled cottages in a plain Gothic style, brick below and tile-hung above, with timbering in the gables. In the plan, the author has a side-recessed lobby entrance, the inner wall of which forms one side of an angle or fireplace in the front room, in which is a seat. The living-room is 14ft. by 10ft., and a cupboard is obtained below the stairs, which latter is made to ascend from the scullery. It would have been better reversed. There is a store, the fuel and closet being outside. The bedroom plan is economically arranged, and the upper walls are of stud-work, tile-hung, with timber-work to gables. The details of gable, windows, and interior wood-work are in good taste and well drawn, and the cost is put down at £380 per pair. (4) "Ben." This is a neat pair of brick and tile-hung cottages, plainly treated externally: the entrances are at the ends in front; there is a little recessed lobby to each, entering a living-room of good size, with a small projecting scullery behind, and a small yard with offices. The pantry is obtained under the stairs, which ascend from the front room behind the entrance. The bedrooms are narrow and are all small. Details are suitable. (5) "Melton" is also very compact in its arrangement, and the two cottages form a square block roofed in one. The entrances in front, at each end, have small lobbies, and each gives access to a living-room, 12ft. by 12ft., with a scullery, pantry, and coals, and tool-closet behind, very economically planned. There is one good bedroom, and two small ones. The stairs are closely arranged in a small compass, lighted, but rather cramped. The detailed elevation and section are boldly drawn in a suitable cottage style without unnecessary ornament, and the whole is intended to be of brick and stucco. (6) Cross in Circle, is a neatly-designed elevation, exceedingly quiet, and unobtrusive in its features; the cottages are under a span roof, with tile-hung gable dormers over the upper windows, and brickwork to the lower story. The plan is simply contrived. A corner lobby leads into a living-room 15ft. by 13ft., with a scullery behind, out of which at the side the stair ascends. A fuel-cupboard and a pantry

are shown beneath; the upper plan is spoilt by the narrow bedrooms in front. The details are neatly drawn in a good style. (7) As usual, "Nemo," whose work we are glad to see again, has sent in a clean and neat set of drawings. The cottages are rather more expensive in character than we intended. The entrances at the sides form projections in the plan. The lobby is rather large, with a stairs leading to the bedrooms above, all of good size. The pantry, fuel-store and e.c. are obtained in the side projection, all under the same roof, and easily reached from scullery. The latter is entered from the lobby, and there is no door from living-room to it—a plan which may do for a small villa, but is not desirable in a country labourer's cottage. The plans are neatly figured and drawn, and the details are designed in a domestic Gothic style, mainly in brick. The gables in front would have been better simplified. (8) "Try" in Shield shows a different arrangement of cottages: the entrances are not on the same front, but in opposite sides, a plan which would be difficult to adopt in some sites. The elevations are in a simple brick-and-tile Domestic style, and a single-span roof is shown over the pair. The separation of living-room from scullery by the centre lobby entrance is not economical, as it entails labour in preparing the food and in cleaning. The detail of porch is effective. (9) In "Pupil J." we have an old hand again. The grouping of the gables and the placing of the pent-roof doorways, one in front and the other in the side, are good points in this plan, but the stairs in the side gable lobby appears hardly to have headway under the roof. The living-rooms and sculleries, with pantry and coals under stairs, and the bedrooms, are suitably planned and of good size, and the area covered is small. The elevations are proposed to be of grey brick, relieved by quoins, strings, and arches of red pressed brick; the casements to be of cast or wrought-iron, and the workwork painted of a dark green. Details are plain and suitable. The estimate is worked out at 5d., equal £408. (10) "Ars Longa" is another economical plan: the cottages are comprised in a rectangle with all the offices under the roof. There is to each a small recessed lobby entrance and side stairs, access to which is from the living-room, a rather small scullery behind with large coal-store, and e.c., a compact bedroom plan, with the flues all collected together into one centre stack. The roof is not satisfactory, and the ventilating gable-ends and valleys are costly. In other respects the author has produced an appropriate design; the walls are shown hollow, with plaster in upper story. All rooms are proposed to be ventilated by flues formed in walls with outlet and inlet (11). "Folle Farine"—This is a neatly drawn Gothic design, with rubble walls and flag slating for roof, well adapted for a stone district, though the author shows an alternative elevation for brick, rough-cast, and weather tiling for a brick locality. One of the entrances is in the front, and the other on the side; the left-hand arrangement is preferable, and less expensive; the side lobby has too much of the villa character about it. The sketch is pleasing with the slight corbelling out of upper windows. (12) "Edmund" is a front of red brick and weather tiling, quiet in treatment and inexpensive, but the porches placed together in the centre is not desirable; the stairs look cramped, and the upper arrangement does not give one good bedroom. The yard behind the living-room and the scullery rather spoils the scullery and offices, which appear crowded. Economy of area has been aimed at. "Fidelis" (Sigma) is sensibly treated. The entrance lobby and stairs in front are compact; but the former would better have started from the living-room, as being less open to dishonest people and vagrants. The elevations in plaster and brick are plain and suitable. "K." shows side porches, and also access to stairs from outer lobby—undesirable points. The coals would have been best placed within doors. In other respects the plan has merit. "Junior" is appropriate in elevation; but the stairs would be dark at the top, as no window is shown. The lean-to porch is not a desirable feature, and the breaks in the plan and roof are objectionable and costly, particularly the centre gutter. "Hugh" is a compact block, but the stairs face the entrance, which is not desirable. The offices are compactly planned, and the elevations are suitable and modestly

designed in brick and tile. The author shows cavity walls and well-adapted window details. "V." in Circle is neat in the drawing; but the elevation is of a too pretentious character, more adapted for a small villa. The central open porch is not a judicious plan, and is likely to become a source of mischief with gossiping tenants. The stairs look rather cramped, and the chimneys on the outer walls entail cost. The overlapping bedroom is rather open to objection; the doors of living-room and scullery would also have been more comfortable if not placed in so direct a line. "Deva" is a simply-designed block of rubble, with side gables and oak timbering—a rather curious mixture. The stair and lobby arrangement is somewhat awkward, and the scullery has no access from living-room. The offices are not neatly planned; the coals are awkward to get at. "Veritas Vincit" has a compact economical plan: the stairs project, but ascend from the living-room; the pantry and coals are well placed at the side of scullery, and the e.c. and dust outside. The upper landing is in a small bedroom. In external design it is less happy, and the upper windows are depressed by the eaves of roof, which might have been avoided by dormer gables. "In Hoc Signo" is spoilt by the centre entrance; the bedrooms are small, and the centre projecting windows and roofing are not good. "C." in Circle has angle entrances with brackets, rather weak in appearance; the stairs are placed in side projections, and the general planning and design have merits. Some good points also strike us in "D. T." in Circle, but the separate doorways and middle gutter are not desirable features; "Iota" is too ornate; the timbering is heavy, the stairs on one side have little headway, and are badly lighted, despite good points. "E.B." has a bedroom on the ground-floor and a living-room divided by the stairs, which is poorly lighted. The yard and offices, which from side wings are small, and the upper windows are depressed by the projecting eaves of roof. Why such deep brackets to the eaves?

We have received a number of designs having arrangements often based on economical principles, and worked out with considerable knowledge of the requirements of cottage building, but the external treatment of which fall short of our standard. Of these the authors must be content if we point to defects. "Old England" is spoilt by awkward hipping of roof; "Spes," expensive middle gutter; "S.D." in Circle, rooms not intercommunicable, fireplaces in bad position, and expensive in timbering; "Fiat," too villa-like and wasteful, offices in centre, costly porches; "Triangle in Circle," economical plan spoilt by centre windows, which misrepresent the requirements; "Hall," compact in plan, but commonplace in elevation; "L." in Circle, extravagantly ornate in elevation; "Will," appropriate in elevation but harder too large; "Economy," compact, but pantry and outer offices awkward; "Bycullah," neat in elevation, separate doors from hall unnecessary; "H. D.," snug arrangement, but rather bald in elevation; "Mustapha," expensive entrances, and pantries not in convenient positions; "One of Them," open to the same objection, harder too large; "Adventure" is closely planned, but is cut up by bay-windows and gables. We name also "Spur and Win," "Student M.," "Justice for Scotland," "Benachie," "Sam Slick," "Opus," "Economy" (2), "Finem Respiece," "Dum Spiro Spero," "Toledo," "Dado," "Simple-Minded," "To be, or Not to Be," "Random Shots," &c. "K. E. S. W.," "Hal," "Norman," "Yarra Yarra," "Oliver Twist," among these who have fairly interpreted the requirements in general design, but who have not been so happy in working out the details. A large number of designs aim too much at display, and in plan have rather taken the small villa or cottage one as their model. We may enumerate "Good Luck to Your Fishing," "Sleights," "H." in Circle, "Hubert," "Exegi," "Oaks," "De Grey," "Ernest," "Merit," "To Be, or Not to Be" (2), "Rollo," "Gobo," "Truth," (well drawn), "Darby and Joan," "Gable End," "Hal" (2), "Sine Qua Non," "Francis," "Damian," many of which exhibit meritorious plans, though others show a want of simplicity in the arrangement, or a multiplicity of breaks on the plan, which lead to complications in the roofing, and the use of unnecessary valleys and gutters. For a labourer's cottage the

simpler the roof is the better. These designs chiefly fail in the elevations, and some of the designs show an extravagant display of ornamental timber framing, gables, and barge-boards.

Another group of designs fall short of the requirements in both plan and design, and it is impossible to do more than to name the best of them. Of these, "Trial," "T. Carre," "Nil Desperandum," "Eos," "Nero," "Circle in Square," "Beamstalk," "Sol et Sentum," "Tristram," "Fred," "Pallium," "T. F.," "Circle," "Ambition," "Ars Longa Vita Brevis," "Tom Finch," "Ever Onward," "Gemshorn," "E. D.," "in Circle," "Dum Spiro Spero" (2), "Jek," "West Countryman," "Tempus Fugit," and "Broad Oak" may be mentioned. The other designs received, some showing careful drawing, will be noticed under our correspondence.

SMALL STAIRCASE.

The designs we have received for this subject are hardly up to the mark. An effective plan is by "Quid"; the bottom stairs are made to turn and project into the hall, with a screen to stop the windows opposite drawing-room door. The details of arch and first floor are in keeping, but the drawing is barely finished. "Hugh" sends one of the best drawings, but the plan is not the most effective, and the commencement of stairs might have been improved. The doors are of good design, old English in style, and painted green. "I fain would climb, &c." is an elaborate attempt in Elizabethan of a florid type; the bay-window recess at bottom of stairs, the hat-stand, and kitchen-door are well placed. "Cross in Circle," "Ever Onward," are also appropriately treated. The other designs are too elaborate in detail, or have missed the object we had in view—an architectural treatment of a small villa staircase limited in area.

LECTURES ON ARCHITECTURE DELIVERED AT THE ROYAL ACADEMY.*

THE lectures delivered by the late Professor Barry at the Royal Academy from 1874 to 1880 have been published by Mr. John Murray, and make a portly octavo volume. They have been revised and edited with an introductory memoir by the Rev. Canon Barry, the memoir comprising an account of the life and chief works, public and private, of the author. With the merits and scope of the lectures our readers are not unfamiliar, as they were reported from time to time in our own pages. It is only according them justice to say that they were mainly introductory to the study of architecture, and did not attempt to enter into the theory and practice of the art, as those delivered by the late Sir Digby Wyatt or Sir Gilbert Scott, which have already been published. They sought rather, as the editor says in his preface, to steer clear of architectural technicality and detail, and to deal with architecture chiefly in its relations to other branches of art, and to the requirements and interests of modern life. Viewed in this light, Professor Barry's lectures may possibly be read with some advantage by students preparing to make the profession of architecture their vocation.

The series, as now published, has been arranged by the Rev. Dr. Barry in better order than it was found desirable to deliver them: the first series deals with general principles, and the second with historical examples. Ten lectures are devoted to the consideration of the first subject, and thirteen to the history of the art. Some of the passages, serving only a temporary purpose, have been omitted, and repetition, almost necessary in oral addresses, has been avoided, while we find more coherence has been given to the lectures by the insertion of marginal headings. With regard to the illustrations, they have been confined chiefly to typical plans of well-known buildings, such as that proposed for the House of Commons by the author, plans of Longlat House, Crewe Hall, St. Paul's Cathedral, St. Peter's at Rome, and various other Gothic, Italian, and Renaissance examples, and some of these have been reproduced from Mr. Fergusson's handbook. It is unnecessary to retrace the ground covered by the late Mr. Barry in these lectures or to make any lengthened observations upon them. The author, in his earlier lectures, deals with much justice

on the financial difficulties under which the architect now works. The "nicely-calculated less or more" is one of the conditions which hamper the composition of great works of art, and there have been probably few modern architects who have been able so fully as the author to realise the restrictions imposed by pecuniary and utilitarian considerations. In reading the memoir of his brother prefixed to these lectures, we can understand how thoroughly Mr. Barry's experience, in connection with Government works and in recent competitions, tended to strengthen his convictions on this point. The union of scientific knowledge and artistic ideas, the constructional difficulties in building, the variety of conflicting interests, such as the archaeological, the scientific, and the purely artistic, are made the themes of very useful and sound advice, and Mr. Barry is constant in his enunciation of the many-sidedness of the architect's profession. The fascinations of purely archaeological views of architecture, or those mixed up with questions of religion and ritual, are held up as matters against which the student ought to be on his guard. A just sense of the relation of architecture to Nature and humanity is made the theme of the second lecture, and we find many incidental references to questions of an æsthetical and physical kind. The development of science is prominently introduced in connection with art, and the author, unlike many occupiers of the chair at the Academy, is not remiss in showing the necessity of widening the studies of the architect, and in reconciling the apparent hostility existing between science and engineering with art. The interdependence of the professions of the engineer and architect is forcibly brought forward, and Lecture IV. discusses the double aspect of architecture as a fine art and an art of utility. In another lecture the technical principles of the art are considered, the need of technical study by the architect, the element of size and its effect on the mind, the value of scale, and the author brings forward as examples of it the Coliseum, the Roman baths, the Gothic cathedrals, and the French portals. The principle of apparent as well as real stability, the value of a base-line, the subject of construction, and the use of materials are next discussed. Lecture VI. deals with proportion and ornament, and the next with architecture allied with colour, in which examples are brought forward to show the use of external polychromy in Classic and Italian buildings. Mr. Barry expresses just doubts about the practice of veneering walls with thin slabs of coloured marble—a method which concealed real construction. The difficulties attending the employment of colour in the London atmosphere are not overlooked, and the author boldly admits that unless our urban atmosphere can be purified of smoke, external polychromy is scarcely within the practical sphere of English town architecture when ordinary materials are used. Lectures VIII. and IX. discuss the application of general principles to practice, and the question of competition and its value to the young architect, are considered; though the author observes with truth, the value of an artist's work can only be measured by its sincerity. Restoration and the position of the architect towards it are made the subject of remark, and the author has grasped the philosophy of the matter. One of the most practical and suggestive lectures of this series is the last, on "Town Architecture and Modern Problems." The dwellings of the middle class—on the principle of co-operation or flats—are amongst the topics discussed, and the author asks whether it is not possible to remedy existing evils and still retain the English separate house principle, or to establish economy of service on the co-operative system, and still retain the habits of life dear to the Englishman. Mr. Barry's suggestion for combining separate houses with common offices in town-squares, is clever. The square has a large basement, containing the kitchen, laundry, baths, wash-houses, reading-rooms, gymnasium, stores; above which it is laid out as a garden, and each of the houses surrounding it have the benefit of the central kitchen. The last series take up the historical view of architecture, and the lectures embrace early military architecture; domestic architecture of the 12th, 13th, 14th, and 15th centuries; English Transitional architecture, or Elizabethan, illustrated by several typical examples, English Renaissance, Italian Renaissance, &c.

The introductory memoir will be read with interest, as affording a view of the career of an architect whose connection with important Government undertakings, and large private practice led him into the front rank. The select competitions for the New Law Courts and National Gallery are of course dwelt upon, no less than the anguish and disappointment that they brought to Mr. Barry during the closing years of his short but active life.

THE BRIGHTON HEALTH CONGRESS.

THE Exhibition of Domestic and Sanitary Appliances and Health Congress at the Royal Pavilion Brighton, was opened on Tuesday. The work of the Congress was inaugurated by a meeting in the Dome on Tuesday night, under the presidency of the Mayor of Brighton, when Dr. B. W. Richardson, F.R.S., delivered an address on "The Seed-Time of Health."

The sectional proceedings commenced at eleven o'clock on Wednesday morning in the Dome. The President of Section A., "Health of Towns" (Mr. Edwin Chadwick, C.B.), took the chair, accompanied by the President of the Congress (Dr. Richardson), the Mayor, and other gentlemen.

Mr. Edward Easton, C.E., F.G.S., read a paper on "The Brighton Corporation Water-works." Brighton, he said, was situated in the midst of a considerable extent of chalky country, and possessed an excellent water supply. It had previously been supplied imperfectly from a well sunk near the Lewes-road, but in 1865 a well was sunk at Goldstone Bottom. The number of houses supplied in 1851 did not exceed 7,000; the number now on the rate-books was about 24,000. The area of the district was, as nearly as possible, seven miles from east to west, about five miles from north to south. The plan had been adopted of dividing the district into four zones or services, each fed by its own reservoir, or reservoirs, with its own system of main pipes. All the zones were connected. The town was supplied both on the intermittent and constant system, and Brighton was now in the position of being able to give constant service to one house and intermittent to the house next door in the same street. The pumping power at Lewes-road was between 130,000 and 150,000 gallons an hour, and Goldstone Bottom 150,000 gallons. The total quantity of water pumped during a year was between 1,100 and 1,200 millions of gallons, equal to about 3,200,000 gallons a day.

Mr. Edwin Chadwick delivered the opening address of the Section, "On the Prevention of Epidemics." He set out by describing the various means adopted to stay the great outbreak of cholera in 1848, in which he took a prominent part, and stating the deductions made from observations then taken. The conclusions that had then been arrived at were that to aggregate disease in a large hospital was a source of danger, and that the very best means of preventing the spread of infection was by the adoption of sanitary measures at the places where, in the cycle of epidemics, they were to be expected. He described in a very interesting manner the precautions taken at York, at Merthyr Tydvil, at Mevagissey, and other places, and the gradual decrease of deaths that followed, and he showed that similar precautions taken at St. Petersburg, Malta, and Memphis had produced the same results. At St. Petersburg, for example, the deaths had decreased from 25,000 to 3,000 in the successive decade. Some other equally startling statistics were given by Mr. Chadwick. By the returns of the Local Government Board, he calculated that we had saved in the death-rate, from diseases of infection, a quarter of a million of lives and three million cases of sickness, and putting these at a money value of £5 for a death and £1 for a sickness, over four millions of money had been saved. He came to the following conclusions:—That cases of small-pox, typhus, and of others of the ordinary epidemics, occur in the greatest proportion, on common conditions of foul air, from stagnant putrefaction, from bad house-drainage, from sewers of deposit, from excrement-sodden sites, from filthy street surfaces, from impure water, and from overcrowding in foul houses. That the entire removal of such conditions by complete sanitation and by improved dwellings is the effectual

* Lectures on Architecture, delivered at the Royal Academy, by the late EDWARD M. BARRY, R.A., Professor of Architecture. London: John Murray.

preventive of diseases of those species, and of ordinary as well as of extraordinary epidemic visitations. That where such diseases continue to occur their spread is best prevented by the separation of the unaffected from the affected, by home treatment if possible; if not, by providing small temporary accommodation; in either case obviating the necessity of removing the sick to a distance, and the danger of aggregating epidemic cases in large hospitals, a proceeding liable to augment the death-rates during epidemics. That skillful and complete works of sanitation and the removal of conditions of stagnancy and putrefactive decomposition are the most efficient means of reducing the expenses of excessive sickness and death-rates.

Dr. Mackey read a paper "On the Geology and Climate of Brighton, from a Health Point of View." Taking the last fifteen years, the mean temperature stood at Brighton at 50deg. in the shade; the Greenwich mean for 60 years 49.1deg.; that at Plymouth for 15 years was 51.6deg., and at Eastbourne for a short period, 51deg. Thus it would be seen that the average of Brighton was slightly higher than Greenwich. The popular idea that autumn was the best time for Brighton was perfectly correct. The mean winter night temperature of Brighton was, at least, 4deg. warmer than that of London.

Dr. Fussell, Medical Officer of Health for East Sussex, read a paper "On the Necessity of Recreation Spaces in all Large Towns."

Mr. E. F. Griffith read a paper "On the Escape of Gases from Ventilating Covers in Towns." He pointed out the evils which existed both in defective house-drainage and the construction of many sewers, and said the nuisance caused by smells prevailed even in towns drained within the last 20 years upon the best-known sanitary principles. He attributed this to bad workmanship, remarking that the sewage discharged into the sewers was frequently putrid from remaining in joints, and, therefore, caused smells to rise into the streets.

Mr. E. B. Ellice Clark, Town Surveyor of Hove, read a lengthy paper "On the Administration of the Sanitary Laws;" and, after two other addresses, Mr. H. F. Lester, B.A., closed the day's proceedings with a paper "On a Reform in Slaughter-Houses," dwelling on the need for sweeping away of private slaughter-houses, and urging the necessity for public establishments under perfect inspection, and also the desirability for devising a mode of putting animals to instantaneous death without pain.

In the evening a *soirée* of the Association was held in the Congress Rooms.

Yesterday was devoted to proceedings in connection with Section B, "Food in Relation to National and Domestic Economy." The President, Mr. John Robert Hollond, M.A., M.P., delivered an opening address, and this was followed by others by Dr. C. Daysdale, on "Cheap Food and Longevity"; Mr. Lightfoot, on "Preservation of Food by Cold"; Mr. T. W. Cardan, on "Honey as an Article of Food"; Miss Yates, on "Bread Reform"; Mr. Winter Blyth (Medical Officer of Health for Marylebone), on "Rational Feeding and Eclectic Diets"; Dr. Whittle, on "The Artificial Dieting of Infants"; Mr. H. S. Mitchell, M.A., on "Lessons on Foods and their Preparation for Schools"; Major F. F. Hallett, on "Food-Plant Improvement."

In the evening, an address was delivered by Mr. R. P. B. Taaffe, M.D. (Lond.), C.S.S. (Lond. and Camb.), Medical Officer of Health for Brighton, on "The Propagation of Disease, through Food and Drink."

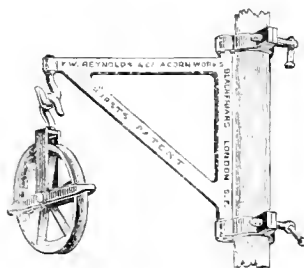
To-day (Friday), Section C. (Domestic Health, including Educational Training) meets under the presidency of Dr. Alfred Carpenter. After the President's opening address, papers will be read by Mr. H. H. Collins, F.R.I.B.A. (Secretary Health Dept. Social Science Association), on "Home Sanitation"; Prof. Fleeming Jenkin on "House Inspection"; Mrs. King on "Health in Relation to Clothing"; Mr. W. H. Hallett, F.L.S., F.S.A., on "Domestic-Softening of water from the Chalk"; Mr. E. Bailey-Denton on "Domestic Filtration"; Mr. C. Cassal, F.C.S., on "Health Lessons in Schools"; Mr. H. Stephens, F.C.S., on "An Aspect of Public Elementary Education in Relation to Health"; Mr. L. B. Tuckerman, M.D. (Cleveland, Ohio, U.S.A.), on "Health in Schools"; Mr. R. Scott Moncrieff, C.E., on "The province of the Physician and the Engineer in the Work of

Sanitation"; Dr. Strong on "Hints on Domestic Sanitation," and Mr. R. W. Edis, F.S.A., "On Sanitation in Decoration."

To-morrow, Saturday, December 17th, the Congress will close with a lecture on "Eyesight," to be delivered in the Dome by Mr. Brudenell Carter, F.R.C.S., at eight o'clock p.m.

A NEW SCAFFOLD CRANE.

MESSRS. F. W. REYNOLDS and Co. are the sole licensees and makers of Hurst's Patent Scaffold Crane, which we illustrate here-



with, which seems a handy labour-saving machine for builders and contractors.

It may be quickly fixed, may be used with any sized pole, and can be used either stationary or swinging by reversing the bottom collar. The difficulty of finding a suitable fixing for a block and fall which interferes considerably with this method of raising building materials to the height required, is obviated by the invention illustrated, as the Patent Scaffold Crane can be fixed to any pole in a few minutes. Should the pole be too small for the collars, these may be secretly fixed by wedges.

These cranes are forged of the best S.C. crown iron, and can be made to any size desired.

CHIPS.

The Metropolitan Board of Works on Friday formally approved a Various Powers Bill to be introduced next session. Its objects are to enable the board to make by-laws regulating the traffic over the bridges and on the embankments, to extend the Tooley-street improvement, to authorise the transfer to the board of Peckham Rye, and the acquirement of lands adjoining Tooting Beck Common. A Bill for the amendment of the Metropolitan Management, Buildings, and Thames River (Prevention of Floods) Acts was also approved, but a clause limiting the height and distance from streets of timber stacks was only agreed to on the casting vote of the chairman. At the same meeting it was resolved to invite six firms to tender for the execution of works to the foundation of Waterloo-bridge, Sir J. Bazilgette recommending this course in preference to inviting open tenders.

The east window of St. Mary's parish-church, Antingham, Norfolk, has just been filled with stained glass. It consists of four lights, which are now occupied with the Nativity, the Crucifixion, the Resurrection, and the Ascension of our Lord. The work was carried out by Messrs. J. and J. King, of St. Andrew's, Norwich.

Amongst the prizes distributed on Friday evening to successful students in the technological examinations of the City and Guilds of London Institute, were a silver medal to C. W. Mesurwell, of Glasgow, in iron and steel manufactures and in oils and colours; and bronze medals to J. W. Clarke, London, and J. J. Rawlings, plumbers' work; and W. E. Dalby, tools and mechanical engineering.

A new schoolroom attached to the Unitarian chapel, Ipswich, was opened on Tuesday week. It measures 51ft. by 22ft., and seats between 200 and 300 people. Mr. Farrow, of Ipswich, supplied the plans, and Mr. Wyatt was the builder.

Two medallion lights have been placed in the east window of St. Matthew's Church, Thorpe Hamlet, Norwich. The work, which has been executed by Messrs. J. and J. King, of Norwich, is of 13th-century character, and represents the parables of the Talents and the Labourers.

Mr. Eynals, of Rochford, Essex, was last week elected surveyor to the highway Board of Malling, Kent.

No. 50, Eastcheap, containing 1,655 superficial feet, was let by auction by Messrs. Philip D. Tuckett & Co., of 101, Old Broad-street, on Wednesday last, on building lease for 80 years, at a ground-rent of £1,200 per annum.

Building Intelligence.

ABINGDON.—St. Nicolas Church, Abingdon, originally founded in the time of William the Conqueror, but subsequently enlarged by Nicolas de Coleham between 1289 and 1307, having fallen into great decay, has been repaired and restored, and was re-opened on the 26th ult. The church consists of a nave and chancel, having a west tower, built partly upon the west wall and partly upon two stone piers or legs standing clear of the walls, similar to the oak posts of some old belfries. The addition of an organ chamber and vestry with warming cells under, have been made. A curious feature of the church is that it stands partly on the arch or bridge over the little river Stort, so that, in fact, the water of the stream runs stealthily and noiselessly under the feet of the worshippers. The nave roof having become very much dilapidated, it has been necessary to entirely renew it. This has been done with English oak, trussed rafters of the same scantling as the old, and there are three oak tie-beams, king posts and braces replacing three old ones, the ends only of which were discovered when the roof was being taken off, for the beams had been ruthlessly cut out in order to plaster the ceiling. The roof is covered with plain red tiles, and an ornamental embattled parapet has been erected on the south side, having carved shields and carved gargoyles. The roof now is believed to be an exact reproduction of the one put on the Church by Nicolas de Coleham nearly 600 years ago. The church has been warmed by two of Musgrave's stoves, placed underneath in air-tight chambers, and air flues specially designed by the architect. The contract was taken by Mr. Edward Williams, of Abingdon, for £1,850, but extra work to the extent of £187 has had to be executed for things which it was not easy to foresee, but none the less necessary in the restoration of an old building so dilapidated as St. Nicolas was. The chancel floor was laid by Mr. W. Godwin, of Lugwardine, near Hereford. The architect was Mr. Edwin Dolby, of Abingdon and London.

BIRMINGHAM.—The Building Committee of the Princess Alice Wesleyan Children's Home and Orphanage, proposed to be built at Birmingham, met last week in London to consider what steps should be taken towards erecting the buildings, the fund having now reached £19,000. A discussion arose as to the choice of architect; some members of the committee thought it would be wise to throw the scheme open for competition, but a much larger number spoke in favour of selecting one tried and able architect, to whom the opinions of the committee might be communicated, and who would modify his plans from time to time in conformity thereto. It was eventually decided by a practically unanimous vote to employ Messrs. Ball and Goddard, of Birmingham, who were architects for the new Wesleyan College at Handsworth, recently illustrated in our pages. The following resolutions were also adopted by the meeting, viz.:—(1) That a central block be constructed for the accommodation of 300 children. (2) That the central block shall include a common laundry, and common dining-hall and cooking apparatus. (3) That designs be prepared for a chapel to seat 600, to be erected hereafter. (4) That sites be chosen for twelve houses, each to accommodate twenty-five children, and that a complete drainage system be framed for the whole. (5) That for the present designs for two houses only be obtained. Messrs. Ball and Goddard have received intimation of their appointment.

CAMDEN-TOWN.—The buildings lately erected at the almshouses belonging to St. Martin's-in-the-Fields, Bayham-street, Camden-town, for the purpose of giving increased accommodation to the inmates, were opened on Thursday, the 8th inst. They consist of sculleries and w.c.s attached to the old buildings, and new buildings at the rear for additional inmates, an infirmary, with nurse's rooms, bath-rooms, &c., and a chapel with nave, apsidal chancel, and vestry. The works have been carried out by Mr. Edmund Toms, under the superintendence of Mr. Henry Jacques, architect. Mr. G. Chinnock was clerk of works.

EXETER.—New quarters for the officers at the Exeter Barracks are being built. They consist of a main building and two wings, and contain

a ground-floor and one story. The length of the frontage is 110 feet—against 100 feet in the old quarters—and the height 40 feet. The entire building is of red brick unrelieved by dressings of any kind, but over the openings there is some slightly ornamental brickwork. The brick of the exterior is from Wellington, and that used in the interior is of local manufacture. The only stone used is the Ham Hill of the window-sills. The quarters are surmounted by a somewhat ungainly three-faced clock tower. The accommodation provided is for ten officers and their servants. Each window is fitted with Clarke, Bunnett & Co.'s patent revolving shutters. The contractors are Messrs. Hubbard and Bevan, of Plymouth, represented by their foreman, Mr. Cole, and the building is being put up under the supervision of its designers—the Royal Engineers Department. The erection of the building for the High School for Girls has been commenced, and the work is to be completed by November of 1882. Various designs were sent in in competition for the school, and the Governors selected the plans of Messrs. Hayward and Son, of Exeter. Tenders were invited, several were received, and there was a great divergence between the figures of the highest and the lowest. The tender accepted was that of Mr. Phillips, of Exeter, at about £6,000. The work has been carried on for about six weeks, and the operations are making satisfactory progress. The structure will consist of a main building and two wings, but eventually there will probably be an addition running back from the centre, so that when completed the school will be something in the shape of the letter D. The school will stand on a terrace, its face will be towards the Cathedral, and the main approach will be by a carriage-way opening from the road from Southernhay. The frontage will be 142 feet, and the height of the school—which will consist of ground and first floors—will be about 41 feet. The building is designed in the Tudor style, and in its construction and arrangement it has a distinctly domestic character. The foundations rest on a bed of concrete. The plinth is of the grey stone from Chudleigh, but above the plinth red brick, with Doubling stone dressings, will be used, the whole being capped by a roof of Staffordshire tiles.

IRECHESTER.—The ancient Church of St. Catherine, at Irechester, with its beautiful spire, which stands on so eminent a site that it acts as a landmark for many miles, is about to be restored. The interior of the building has long been in a condition unworthy of the purposes of religious worship, and inadequate to the increasing population of the parish. A meeting of the parishioners was held on the 5th inst., when a Building Committee was elected to engage an architect for the execution of the desired restoration and repair. Mr. W. Talbot Brown, A.R.I.B.A., of Wellington, has been appointed architect for the work. Sharnbrook Church, Beds, has recently had its tower and spire restored by the same architect.

KINGTON.—The parish-church of Kington, Worcestershire, built at the end of the thirteenth century, was respected, after restoration, on Tuesday week. The old stone walls have been repaired, and the internal fittings, where decayed, have been renewed in oak. A tasteless modern window has been removed from east end of chancel, and replaced by one of three lights, in harmony with the general style of the building. The tracery of the nave windows has been restored. The tower has been strengthened, and the half-tinted black-and-white turret upon it repaired. An unsightly gallery has been removed; the plastering has been removed from the roof, which have been renewed in moulded ribs and wall plates and carved paterne. The floors have been laid with encaustic tiles, those in the sanctuary by Mr. Godwin, of Lugwardine, near Hereford, and those in the chancel and nave by Messrs. Webb, of Worcester. The architect was Mr. W. Jeffrey Hopkins, of Worcester; and the contractor, Mr. Job Stanley, of Bromsgrove, near Abbeystead. The cost has been £200.

LETTERSTON, Pembrokeshire.—This church was respected by the Archdeacon of St. David's, on the 30th ult., after considerable alterations and improvements. It was badly rebuilt some thirty years back, and nothing could be colder, more comfortless, or of worse architectural character than the interior prior to the execution of the recent works. The roofs have been

boarded and otherwise improved, and encaustic tiles substituted for the damp stone flagging. New open pitch-pine seats have been provided in the nave and stalls in the chancel, with reading-desks, Communion-table, and altar-railing. A commodious vestry has been added, one of Porritt's warm-air apparatuses supplied, and new chancel-arch, windows and doorways throughout substituted. More, however, requires still to be done when funds permit. The work has been carried out by local tradesmen, from the plans and under the superintendence of Mr. E. H. Liugen Barker, of London, Hereford, and Tenby.

MAIDSTONE.—The foundation-stone of a new Wesleyan chapel was laid at Maidstone on Monday. The new chapel will be 60ft. long and 30ft. wide in internal dimensions, with two transepts 11ft. wide by 8ft. deep. In the rear, and communicating, will be a schoolroom 41ft. by 30ft., and an infant class-room 18ft. 9in., by 13ft., can be added to the area of school-room by opening large folding doors. There will also be a class-room 15ft. by 11ft., a ministers' vestry 12ft. by 11ft. The chapel will be 19ft. high on the walls and 33ft. to the ceiling, which will be boarded over about half-way up the slope of roof. The roof-trusses will be of hammer-beam construction. Accommodation will be provided for about 400 persons on the ground-floor, and provision is made for the addition of galleries when required. The ventilation will be by means of upright inlet shafts and a Boyle's patent extractor on the roof. The latter will be inclosed in a graceful turret about 20ft. high above the ridge. The external walls will be of ragstone faced externally with random work and squared angles. The dressings will be of Corsham down and Box-ground stone. The style of the building will be Gothic of Early English type. The architects are Messrs. Ruck, Son, and Smith, and the builder, Mr. Avar, all of Maidstone.

NEWPORT PAGNELL.—The roof being covered in of the new mill now being erected for Mr. C. H. Whitworth, the event was suitably celebrated on Friday last by a supper to the men. The new mill is a plain but substantial brick building of five stories, surmounted with a bold eaves cornice supported by moulded cantilevers, the roof being covered with slates. The dimensions of the mill proper are 53ft. by 35ft., and there are five floors, which are carried by iron columns and girders. Messrs. Usher and Anthony, of St. Paul's-square, Bedford, are the architects, and the works have been carried out under their personal superintendence by the contractor, Mr. Samuel Foster, of Bedford; Mr. Tomlin being the foreman.

WINNSON.—A swimming-bath, for the use of the students at Beaumont College, has just been completed, at a cost of £3,500, from the designs of Messrs. Byrne and Cronbie, architects, of Windsor, and 303, Strand. The bath-house internally is 80ft. long, 40ft. wide, and 25ft. high. The swimming-basin is 66ft. long, 30ft. wide, with a depth at one end of 1ft., increasing to 7ft. at the other end. The basin itself is formed of cement concrete, 3ft. thick sides, and 18in. thick bottom, four parts Thames gravel and one part Portland cement, rendered inside 1½in. thick with Portland cement, and again lined with Cliff's white-glazed bricks and ornamental pattern borders. The internal walls are rendered in Keene's cement with a dado 6ft. high of Mintons' white-glazed tiles, with ornamental borders top and bottom. Messrs. A. L. Oades, of Egham, were the contractors, the general foreman being Mr. Venton.

The death occurred last week of Mr. Stephen Henry Leach, chief engineer to the Thames Conservancy Board, in whose employ he had been forty-one years. The funeral took place at Chiswick, on Thursday, the 8th, and was largely attended by members of the board and their officials, and of the Chiswick improvement commissioners and school board, of which bodies Mr. Leach was chairman.

A new Baptist chapel was opened at Ross, Herefordshire, on Tuesday week. Mr. G. C. Haddon, of Hereford, was the architect, and Mr. J. B. Kemp, of Ross, who took the contract at £2,599, was the builder. The chapel seats 500 persons, including 216 sittings in the gallery.

A new reservoir is about to be built at Pembury for the Tunbridge Wells local board. The contract has been taken by Mr. H. Potter.

COMPETITIONS.

AMSTERDAM.—The Society for the Propagation of Architecture, of Amsterdam, invites all architects to a competition in designs for an Architects' Club. The building should be free on all sides, and should measure 45 by 35 metres (say 150ft. by 116ft.). It should consist of a basement, three stories, and an entresol; the basement comprising, *inter alia*, two kitchens and three cellars; the ground-floor a parlour, two large halls, with several smaller for exhibition of designs and works of art, and of building materials; the first floor two large halls for saucers and for conversation, a refreshment and a reading-room, a library, and rooms to be temporarily let; the second floor a large room and several smaller for draughtsmen, and a store-room. The secretary's apartments should occupy the entresol. For fuller particulars we must refer to the printed programme, which may be had on application (postage paid). Designs should be sent before May 1, 1882, to the Bureau de la Société pour la Propagation de l'Architecture, Wijde Kapelsteeg No. 2, Amsterdam. The usual rules as to sealed envelopes with motto are adopted. The first prize will be the Society's Gold Medal with 500 Dutch florins (say £42); the second prize a silver medal and 300 florins (say £24); the third a bronze medal and 100 florins (say £8). The successful plan will remain the property of the society. The deciding jury will consist of three foreign and four Dutch architects. We have further received from the same society a published invitation to all stamp-engravers to compete in producing a model for a medal, to be awarded by the society to successful competitors each year. The diameter of the medal required is 3in. Besides a model of natural size, one of double size is desired; also drawings and a short description. The price of the matrix should be stated, and will be paid the successful competitor on delivery. The prizes are medals of gold, silver, and bronze. The limiting date is March 1, 1882. The society which offers these prizes was founded in 1842; it publishes a weekly journal and a large periodical work; and among other operations it describes, from time to time, remarkable old buildings, and invites competition annually for three monuments or other architectural constructions.

BAGSHOT CHURCH.—The design submitted by Messrs. Bromilow and Cheers, of Liverpool, for the proposed church in Bagshot Park, for H.R.H. the Duke of Connaught, has been selected in open competition, which took place in December last.

BOLTON.—According to the *Bolton Daily Chronicle*, at a meeting of the Borough Sanitary Committee on the 7th inst., the following proceedings of the Hospital Sub-committee were approved:—"25th Nov. Mr. Marshall Robinson, architect, attended and submitted two tenders for the work required for carrying out his plans for the Borough Hospital. Resolved, —That the Sub-committee are satisfied that his plans can be carried out in accordance with the conditions of competition." Mr. Marshall Robinson was appointed architect for the proposed Borough Fever Hospital, subject to terms to be arranged with him.

A new school-chapel was dedicated on Friday at Wotton, a district of Heavitree, itself a suburb of Exeter. The building is in the Domestic style of Late Gothic architecture, and consists of nave, chancel, vestry, and south-west porch. It is constructed of local red bricks, and the roofs are covered in by warm, coloured tiles. The reredos, constructed entirely out of old oak beams, from an ancient and recently destroyed building in the immediate neighbourhood, stands upon a boldly-moulded super-altar of red Corshill stone, and consists of three compartments, divided by ornamental buttresses. The reredos, and the super-altar upon which it stands, are the work of Mr. Harry Hems, of Exeter. The general contractor was Mr. Comings, of the same city. The architect was Mr. R. Medley Fulford, F.R.I.B.A.

There are in course of erection at Bognor a new church and monastery for the Servite Monks, or the "Servants of Mary." Mr. J. S. Hansom is the architect, and the builder is Mr. G. Huey, of Parkstone. The works now in hand will cost £6,000, and are to be finished by September next. Westwood Ground-stone, from the quarries of Randell and Saunders, of Corsham, is used for all dressings, the walls being of brick.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

BRITISH ARCHÆOLOGICAL ASSOCIATION.—The second meeting of the session was held on Wednesday last, when the chair was taken by Mr. Thos. Morgan, F.S.A. Major Palma di Cesnola exhibited a large collection of ancient Greek glass vessels from his excavations in Cyprus, showing the progress of glass manufacture. The articles were mostly of small size, and beautifully worked with the well-known radiating and wavy patterns, many of which, as was remarked during the discussion which followed, were to be found also in the Venetian glass of mediæval times. Mr. Walter Myers, F.S.A., exhibited a collection of antiquities of Continental origin. Among these were some worked flints acquired at Copenhagen, and many fine and beautiful specimens of Roman fibule and Egyptian bronzes. Mr. C. H. Compton, described some Roman Samian ware from Germany, in every respect similar to what is found in London, affording additional evidence of the fabrication of the articles in the Rhenish provinces. Mr. J. Romilly Allen, exhibited a series of drawings of Transitional Norman iron-work from churches in Shropshire. In the absence of the Rev. Dr. Hooppell, his paper on a supposed Saxon Church in North Gosforth Park was deferred. The ruins are not far from Low Gosforth House. A report was then made by Mr. Loftus Brock, F.S.A., of the uncovering of the remains of Carrow Nunnery, Norwich, by Mr. J. J. Colman, M.P. The site was all but covered at the time of the visit of the Association in 1879, and the extensive excavations undertaken have led to the recovery of the entire ground-plan of the building. It is found to agree with the general arrangements of a Benedictine monastery. The church is cruciform and has had a central tower, the bases of several of the late 11th-century columns remain, and also those of two of the side altars. The chapter-house has been a small apartment, while the day-room has been of considerable extent. A great quantity of elaborately moulded stones and carved capitals have been recovered. The lecturer's remarks were illustrated by a large plan of the remains, prepared by Mr. Alfred G. King, who has superintended the works, and who gave further particulars. A fine series of photographs sent by Mr. Colman were also exhibited. The meeting was brought to a close by a review of the recent congress at Great Malvern, by the chairman.

ROYAL SOCIETY OF ANTIQUARIES.—On Friday evening last the Royal Society of Antiquaries held its third meeting of the present session. Two papers were read—the one by the Rev. Dr. Baron, of Queen's College, Oxford, upon the Church of St. Peter, Manningford Bruce, Wiltshire; and the other by the Rev. Frederick Edward Warren, of St. John's College, Oxford, upon some Anglo-Saxon manumissions in the Leofric Missal. Dr. Baron exhibited ground-plans of Manningford Church, showing its curious apsidal termination, and also of other churches, both English and Continental, by a comparison of which he was led to claim for it a Saxon origin, though he did not ascribe it to an earlier date than the tenth or eleventh century. Dr. Baron also exhibited a curious manuscript on stenography, probably of the date of the reign of James I. Mr. Warren handed round to the members and visitors photographs of several pages of the Leofric Missal, which belonged before the Conquest to the Dean and Chapter of Exeter, but was secured by Sir Thomas Bodley for the Bodleian Library at Oxford, in which it now is.

Since the last meeting of United Grand Lodge, important improvements have been made in the ventilation of the temple, the board-room, the De Grey, the Zeland, and the whole of the rooms in which the various lodges are held. The ventilation improvement works have been carried out by the Sanitary Engineering and Ventilation Company, of Victoria-street, Westminster, who have applied their "Imperial" ventilating tubes and "Imperial" exhaust ventilators, under the direction of Mr. John Gibson, F.R.I.B.A.

At a meeting of the Leeds town council, held last week, it was decided to employ Mr. W. Hoffman Wood, building and quantity surveyor of Leeds, as quantity surveyor for any new buildings erected by the Leeds Corporation.

"To a practical man with a taste for mechanics, and the bumps of constructiveness fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Brightonian*. Price Two pence of all newsmen, or post free 2½d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33s. 50c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL, Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—J. C. and Co.—J. K. and Co.—B. and J.—M. Bros. and Co.—S. L. B.—E. H. S.

S. R. (Probably as good as any: but Lockwood and Co. 7, Stationers' Hall-court, publish one or two; send for catalogue.)—A. BANKS. Possibly Trübner and Co., Ludgate-hill, would take it: if not, try G. Street and Co., 30, Cornhill.)—S. C. (12, Great George-street, S.W.)

"BUILDING NEWS" DESIGNING CLUB.

STUDENT M. (Your suggestion has occurred to us before. We cannot notice in detail every design, but do our best to group them and point out their several defects.)

—VIGNETTE. (Received.)—OAKS. (Your drawing received.)—DOL SPRING SPEAR. (Received.)—TEMPLES FOR A. (The distinguishing letter came too late. The plan is suitable for the purpose. It is not necessary to send a sketch for the country club.)

Correspondence.

PRELIMINARY COMPETITIONS.—GLASGOW MUNICIPAL BUILDINGS.

To the Editor of the BUILDING NEWS.

SIR,—If, as your correspondent, "G. W. B.," anticipates, the assessors "avail themselves of the good points, not only in the selected designs, but in any of the others, and embody them in the final instructions," thereby making them the common property of the selected competitors, their action will be quite inconsistent with the spirit and letter of paragraph 7 of the conditions, which runs thus:—"In order to obviate the possibility of the sketch designs lodged in the Preliminary Competition being made use of by the competitors who may be invited to enter into the final competition," &c., &c. If the various "good points" throughout the designs are to be noted by the assessors, and disclosed by them, in the form of instructions, to the selected competitors, the latter might as well be allowed to see the whole of the sketch designs, and call the "good points" for themselves. Such a proceeding on the part of the assessors would be manifestly unfair. It would operate unduly to the advantage of the less meritorious designs; and, if thoroughly carried out, would

bring the whole of the matured designs to a dead level.

The general lines of the final competition seem clearly defined in paragraph 25 of the conditions, as drawings to a scale of 8ft. to the inch, "in which the author's sketch-design, and no other, shall be fully matured." The restriction I have italicised is quite consistent with the issue of separate conditions for the final competition. These might refer to the amplification of the drawings, to specific information in regard to materials, modes of construction, heating, ventilating, cost, &c., &c. Believing, as I do, that the work of the final competition can thus be little more than an enlargement and amplification of the drawings now before the assessors, I hold that the selection of the best design is, virtually, in the power of the assessors at the present time, inasmuch as compliance with the terms I have quoted will render any substantial variation in the relative merits of the designs in the final competition improbable.

An opportunity thus seeming to present itself for relieving those who might so desire it from toiling through a series of what—if my conclusions are correct—would be purposeless drawings; while, at the same time, their claim to a portion of the sum offered towards expenses might fairly be recognised, led me to trouble you with my views on the subject, and to suggest a mode by which I still believe this desirable end might be accomplished without the slightest injustice being done.

Those who consider that £150, apart from the chance of the prize, would repay them for their labour in the two competitions, will, of course, be indifferent to the points I have raised.—I am, &c., A. B. C.

SIR,—Will you permit me to say a few words upon the above subject? I am desirous of showing that all do not share the opinion of your correspondent, "G. W. B." My own feeling is that these preliminary competitions are a waste of time and a mistake; in any case, however, when we see a correspondent suggesting the scaling in of competition designs to a scale of 40ft. to the inch, I think that the acme of absurdity in that direction has been reached. I was a competitor in the Glasgow competition, and, like several others, found the scale much too small for the elevations and perspective; but try to imagine the designing of a large entrance-doorway in a space half an inch square, which would have to be done on a design to the scale suggested by "G. W. B." If only the various boards, &c., would agree to do without perspectives, the most important of all drawings for showing the superiority of one design over another; secondly, do without elevations; and thirdly, accept plans only to a scale of, say, 50ft. to an inch, no doubt competitors would be plentiful. By the way, I think the Walsall School Board showed good judgment in rejecting the memorial of the Walsall architects. If architects cannot compete decently, and in a manner something like creditable to the profession, let them refrain—they are not compelled to compete.—I am, &c., G. W. S.

DUBLIN MUSEUM AND BIRKENHEAD TOWN HALL COMPETITIONS.

SIR,—I feel it is no use making any remarks upon the conditions for the Dublin competition, or even upon what I deem the unsatisfactory correspondence I had with them upon many points which the conditions either left vague or unmentioned. I remember I received replies, saying, "I had nothing to do with this," or, "they could say nothing of that." Such replies were, doubtless, well framed to get through the committee's business; but there is no need to say they were of no use (or perhaps less) to anyone who was trying to send them a good plan to meet all their requirements and conditions. Now, I must say, I looked to find "the promised architect," a well-known man; and, I may say, I expected it would either be the one who framed the Glasgow conditions, or he who built the South Kensington Museum, both of whom the profession regard as honoured men. I confess I have no intention whatever to raise a doubt of any sort about the ability and thorough worthiness of Mr. McCurdy to have confided in him the responsible post he had, "for I have not previously heard of him, or, if I have, I cannot have been deeply impressed." Now, I for one, think the committee could have stated in the conditions something about the internal

arrangements of the present Natural History Museum; for instance, they might have said whether there were more floors than one, and if so, whether the upper one was a gallery or otherwise, for the communicating block had to be designed to suit all this. And it might have saved an immense amount of time and trouble if they had said whether they preferred galleries in the various rooms or not, for some plans would be (and I know one was) nearly all galleries; whilst others, like my own, would contain almost none. "Virtually, it would greatly depend whether the competitor liked galleries or not, as to whether he had a chance of success." For my part, I think galleries uncomfortable, except very wide, and they have a tendency to be draughty, and in a "fire-proof" building they scarcely seem to apply.

Now, again, the conditions of the Birkenhead Competition are "honourable" ones; and were it not that I am trespassing upon your space too much, I would say a word of praise for them. But it seems to me the "Instructions" should have said something about the following all-important questions:—

1. As to the position of the council-chamber and committee-rooms.
2. As to whether the Mayor's rooms should come to the front or the side.
3. As to whether the large hall is preferred in the front or at the back.

For what competitor can possibly calculate the ideas (which on such matters must certainly be formed) upon all these important points, the missing of one of which may lead to a rejection?

What we want in conditions of competitions is not a prepared plan, but the leading features of the clients' desire—and one would think this was an easy matter for them to give; and yet the whole profession can, and will in their hearts, honour the Birkenhead Council, and the intending competitors will feel some confidence in Mr. Barry.—I am, &c.,

A LATELY DISAPPOINTED ONE.

Dec. 13th.

PROVINCIAL ARCHITECTS AND THE INSTITUTE.

SIR,—Instead of endeavouring to improve the status of the Institute by practical suggestions of utility, Mr. Thomas Drew, after wandering over a large field of querulous exposition, arrives at the conclusion that all would be well if the "name of every fairly competent and qualified practising architect in the three kingdoms held in his locality of practice in honest and honourable repute," were registered under the authority of the R.I.B.A.

Could a suggestion be more vague or unpractical? Imagine the court of inquiry: the, perhaps, incompetent local opinion of, perhaps, local incompetence.

Mr. Drew is scarcely within the region of accuracy in stating that there is a laborious enticement of architects to join the Institute, and having been a member of Council, it comes badly from him to sneer at the front seats occupied by that body.

A fitting commentary, however, on the unwise remarks of Mr. Drew is the fact that out of sixteen candidates, whose nomination having been recently opposed by the Council, were recommended for admission as *Fellows*, eight are from the provinces.—I am, &c.,

WILLIAM WOODWARD.

CLERKS OF WORKS.

SIR,—As a clerk of works of fifteen years' standing, I shall have pleasure in linking my name to the formation of an association, provided that its rudimentary rule-constitution is a professional society, and not a trades-union.

Permit me to further explain by mildly airing a little personal grievance. I applied for the appointment of a large board-school, and fondly trusted that my fifteen years of local credentials would prove unassailable, and was forthwith ingloriously ousted by a working foreman of joiners.

Of course, we must all have our first job somewhere, and against this new addition to our ranks I haven't a word to say, although I confess I was smarting a little as I met him this morning in the High-street, with his hats at his elbows and his breakfast-cup under his arm. Now this novice as a C.W. is, as a joiner, a trade-unionist, and can make a telling and a

sensible speech at a trades-union or any other meeting of genuine working men. I need not remind you that board-schools are paid for with ratepayers' money, and ratepayers' representatives are not always quite perfectly free from a little tinge of party devotion.

Whether our new recruit will continue to hold as a C.W. the same voice in the union as he did as a joiner, is more than I am able to tell you; but I can see how serious complications are likely to arise. Doubtless upon the building he will hold his own, as heretofore, among the workmen, certainly so among the joiners. I am not quite so sure of the plumbers and the masons, for workmen are peculiarly sensitive, not to say zealous, upon these little points. But I give him every credit for sound moral courage, and it is elsewhere that his fortitude may be the more severely tried. His late employer has a chance of becoming his new contractor, and he may feel himself in a very delicate position among his late, and his possibly yet, upon future buildings, masters.

Now the moral I would propound is that "Another Clerk of Works" must not put clerks of works and builders' foremen into the same class together. They are no more one body than are architects and builders.—I am, &c.,

ONE C.W. MORE.

SIR,—I have read with interest the communications in your valued paper by "Clerks of Works," as to the desirability of forming a society, composed of clerks of works and builders' foremen, and others who may be holding responsible situations in the building trade. It will scarcely need to be pointed out the good that would accrue to the trade by more friction one with another. At present theirs is an isolated position, each one doing his particular work for his employer.

I think that competitive examinations on construction might be held, and prizes and certificates awarded to those taking part in them, and proving themselves in the front by their works and deeds.

These examinations might be presided over by architects and builders of repute. The parties holding certificates would then be so much more valued for their skill by the architects and builders with whom they may have to deal; and it would be of great service when, by any unforeseen circumstance, they are obliged to change situations.—I am, &c.,

CHARLES SHORE.

THE SCREENS AT RODMERSHAM CHURCH.

SIR,—Accompanying your capital illustration of the chancel screens at this interesting old Kentish church (Dec. 9), reference, in the descriptive matter, is made to them as "oak screens." It may be passingly instructive to record that, at least, one and that the ancient rood-screen, was not oak at all, but chestnut. The work of restoring these charming screens was entrusted into my hands by Mr. S. Slingsby Stallwood, the architect for the renovation of the church, and after removing the paint and whitewash of successive ages from the existing fragments remaining of the uprights of the chancel screen, it soon became evident that the wood was not oak at all, but 15th-century chestnut.

Most of us are aware of the interest Mr. Thomas Blashill has taken in the subject of "chestnut *versus* oak," and the exhaustive paper he read thereon some time ago is fresh in the minds of many readers. Therein Mr. Blashill testified that in all his researches he never came across any old chestnut—on close examination all that appeared at first so to be turned out, in reality, to be oak.

As no doubt could exist in my mind that the Rodmersham work in question was veritable chestnut, in the interests of science I sent, with Mr. Stallwood's permission, Mr. Blashill a base, and after a careful and anxious investigation, he has reported upon it. Therein he says:—

"I have had the fragments from the Perpendicular rood-screen at Rodmersham Church, Kent, cut and planed. There is no trace of medullary rays visible to the eye, nor is there any sign of any pattern or 'flower' on the surface when it is cut 'on the quarter.' It is, therefore, certainly not oak. I have compared it with some pieces of wood which can be proved to be modern chestnut, and I have

no doubt whatever that this specimen is also chestnut.

"I have, as you know so well, for many years been endeavouring earnestly to find an instance of the use of chestnut in mediæval carpentry, and yours is the first I have seen. It is exceedingly interesting, and leads one to hope that other cases may be found."

Whilst upon this subject, I may add that a number of the old West-country carved coffers are of chestnut. The material has nothing like the lasting powers of oak, however.—I am, &c.,

Exeter.

HARRY HEMS.

TESTING TRAPS.

SIR,—Mr. Davies, in his article upon page 752, which I read with very great interest, says he is not in any way interested in the manufacture of traps, I beg to say that I am in the same position. When I took out provisional protection for my improved siphon-trap, I did so because I was fully assured of its value; but having since had my attention drawn to the ∇ -trap, made by Du Bois, I found it could so easily be altered to answer all the purposes of my patent trap, that I considered it useless to proceed with the patent; the trap can therefore be made by anyone, when they will find that it possesses all the advantages which I claim for it.

Mr. Davies still maintains that he has proved his points by his experiments, and refers to an adjourned meeting held on Monday, 21st November, which I certainly was surprised should have been held without notice having been given to the committee. As Messrs. Pullen have removed their scaffolding, for the present, I suppose the experiments are at an end; but in order that your readers may not come to wrong conclusions, I beg to refer to a few of the mistakes which have been made in connection with them, which are of vital importance, and which I am prepared to prove at any time, either in Margate or London:—

1st. Mr. Davies tried his basin experiments with a plunger, and compared the results with the flushing of a direct-action closet or housemaid's sink. Now why try this kind of closet with a plunger, when in practice there is no such action? The proper test of such a closet is by a pail of water or slops thrown in carelessly.

2nd. Mr. Davies had the foot of his soil-pipe dipping into water. What does that represent? Certainly nothing in general practice. Mr. Davies assured me he had tried both with foot open and closed, and found no difference in the effect. My experience, however, is very different, for I find a very much greater strain upon the trap with foot of soil-pipe open.

3rd. The great amount of drop given between valve of closet and water-line of trap.

Mr. Davies made a great mistake when he thought he was going to settle this important question by a few experiments. Why, he has only just begun. If he will try further, and just alter the length and fall of his branch pieces, he will find many conditions under which his helmet-trap will tremble for its safety unless protected by ventilation.

When I first visited Messrs. Pullen, I was certainly a little puzzled to find them untrap the ∇ so readily, and I told those gentlemen I could not understand why they could untrap it there and I could not do so at Margate—at same time, my eye caught the length of the drop at the valve-closet, and I mentioned this to Messrs. Pullen and Mr. Davies. As I was determined to satisfy myself, I went into some very careful experiments with the same arrangements as those at Messrs. Pullen's, described on page 540, and amongst others I tried the following, which will clearly prove Nos. 2 and 3 of my objections.

I fixed an Underhay's valve-closet, firmly bedded at the seating, into a helmet-trap with 1in. seal and 13in. drop, branch 12in. long with 2in. fall into soil-pipe, 27ft. long and without ventilation; the soil-pipe being open at foot. A pail of water poured into basin, and the handle raised as in ordinary practice, unsealed the trap 5 times out of 6. I then placed at foot of soil-pipe a pail of water, allowing pipe to dip into it 3in. A similar flush would only lower the water-line 1in., and we could not untrap it. We now lowered the closet, and gave a drop of 10in., that being about what it would be in practice. With soil-pipe open at foot, a pail of water, as before, untrapped every time; with soil-pipe closed, a pail almost untrapped it every time.

Now these experiments prove my assertion that the long drop is beneficial to the helmet-trap, as is also the closed soil-pipe at foot.

Mr. Davies, I know, has said in my hearing that he would never fix a ∇ -trap without ventilation if he could help it—but at the experiments on the 19th, it was asserted over and over again that the helmet was quite safe without any ventilation whatever.—I am, &c.,

DANIEL EMPTAGE, S.E.

Margate, December 10.

Intercommunication.

QUESTIONS.

[6821].—**Colour on Parchment.**—If any of your readers can furnish me with any information as to the best means of getting colour to run even on parchment I shall receive it with thanks. I have had several survey plans to endorse on deeds, and the parts to be coloured have puzzled me very much. I have mixed with gall, also tried other little things usual in general work, besides laying on the colour with great care, but of no avail, as it finishes patchy, speckled, and uneven, and if the surface is large, shows every mark of the brush, consequently spoiling the work, as far as neatness and appearance are concerned.—AN OLD SUBSCRIBER.

[6822].—**Making New Pavements.**—To what extent is owner of house property, built about two years, liable for paying in front of house, and how is charge arrived at and made? Is owner also responsible for paving to return flank wall?—H. L.

[6823].—**Width of Roads.**—I have recently removed an old hedge and bank by side of a public road and built a wall in lieu of it, setting it back a few feet. The road surveyor of the district has, however, complained that it is not set back far enough. He requires it set back 15 ft. from crown of road. Has the Highway Board any right to demand this, and if so, under what Act of Parliament; and does the Act apply to a country lane as well as to streets, and if so, cannot my client claim compensation for the strip of land surrendered?—ALPHA.

[6824].—**Floors.**—Will Mr. McLachlan, or some other reader, reply how to calculate the strength of floors? What allowance is made for the ring-bolting, and is anything allowed for the floor-boards in calculating?—ENQUIRER.

[6825].—**Surveyor's Licence.**—Does a surveyor require an appraiser's licence for taking particulars, making inventory, valuing and drawing up claim against an insurance office for damage by fire?—D. A. B.

[6826].—**Heating Apparatus.**—I should be glad of particulars of a system of heating small churches which I have seen used, consisting of a stove sunk under a grating in the floor of the building, and a flue underground leading to a chimney some distance off. Is it known as "Poult's" system, and who supplies it? Is there any limit to length of flue, and how is it checked to admit heat into building from flue? Is there no risk? What is approximate cost?—BETA.

[6827].—**Book on Dilapidations.**—What is the best book (and by whom published) upon "Ecclesiastical Dilapidations"?—S. S.

[6828].—**Granite Pavements.**—I shall be obliged to any of your readers for information as to the qualities of various granite paving-stones, viz., Welsh, Irish, and Cumberland granites, and the Cleve Hill Dials on Ludlow. Which of these kinds would be most desirable on a main road under heavy traffic, with a gradient of 1 in 100; where I wish to employ a stone at moderate cost, but to avoid any having a tendency to wear smooth or become slippery?—PEGASUS.

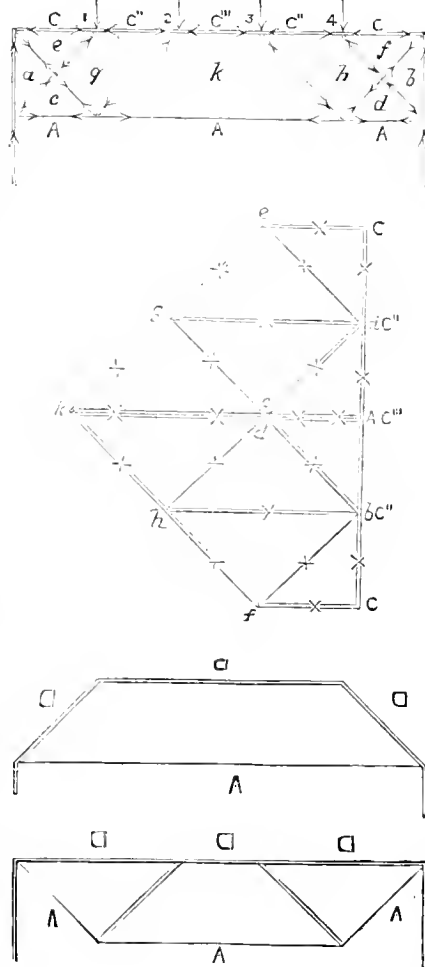
[6829].—**Concrete Roof.**—I have a Portland cement concrete roof, only allowing enough fall to carry off the rain; the thickness is from six to eight inches. In warm weather I am not troubled with damp; but, the colder it is outside, and proportionately warmer inside, the greater is the damp, which then accumulates and drops off. The cement is necessarily somewhat porous, but the action of the damp is greater where least to be expected—where there is the greatest fall, and is strongest of all on some exposed painted ironwork—indicating condensation as a great cause. I mention this for the information and study of savants, but wish to ask a practical question. I propose to paint or oil the exterior surface. The latter plan is well known to preserve stone; but I am doubtful of its effect on cement. Would the cement kill the oil, or the oil deteriorate the cement? I have a fancy for doing this, as it would not change the character of the work materially, and would not look shabby in a short time, and require constant repainting. If oiling would do, I presume linseed oil would be the best, but, whether boiled or not would also be a question. If painted, my idea would be to give two good coats of lead, and two or three of oil. Probably some of your experienced readers may give me and your other readers a wrinkle.—PORTLAND.

REPLIES.

[6825].—**Variation of Compass.**—EASTON.—In my reply, on page 773, for "variation in Morayshire, in 1563, being 20° 30' W.," read "23° 30'."—P. PLAYFAIR.

[6826].—**Girder.**—This would have been answered before; but at first I was too busy over the Glasgow competition, and since then I have been unwell. The girder as it should be is now shown with a diagram of forces, the girder itself is really a compound of two simple trussed girders as shown, hence the reactions of the wall act at each corner of the girder, and in the present case equally at each; if the number of joints receiving the loads were odd in number, the centre joint would have its load divided on the two walls and borne by the two lower corners, which would then have larger reactions than the upper ones. To draw the diagram of forces, first make a horizontal line CC' of such length as will represent the total load borne by the joints 1, 2, 3, and 4 to a scale of so many tons or lbs. to the inch. In the present case assume 5 tons to be carried by the girder at top and equally distributed, this would give one ton to be borne by each of the four joints 1, 2, 3, and 4, and $\frac{1}{2}$ ton direct on each wall, the last exerting no strain on the girder will therefore be no further considered. Assume for the diagram of forces a scale of 1 in. to a ton, the line CC' will then be 2 in. long, and equally divided into four parts representing the loads on the four joints also the reactions of the wall, which are also equally divided into four parts. This line is called the line of external forces. The

load borne by joint 1 is shown by CC' at top of line of external forces, that borne by joint 2 at C'C' just below, by joint 3 at C''C' and by joint 4 at C'''C'. The reaction at the left lower corner of girder is at Aa, at the right lower corner at Bb, at the left upper corner at Cc, and at the right upper corner at C'b. Therefore the polygon of external forces represented by the line CC is in equilibrium, the loads acting downwards throughout its length, and the reactions upwards neutralising each other. From the point a on the line of external forces draw ac parallel to the brace ac of girder, and from the point A on the line of external forces draw Ac parallel to the tie Aa of girder, meeting the last drawn line at the point c. The triangle Aac is the triangle of forces for the left lower corner of girder, Aa tends upwards, being the reaction on the wall, and following round ac supposing the triangle were applied to the girder, would tend towards the joint, the brace ac is therefore in compression, and still following round c, ca tends from the joint, therefore the tie is in tension; and since the forces follow round the triangle in the same direction the joint at left lower corner is in equilibrium. In the same way the triangle bAd is the triangle of forces for the right lower corner of girder, bA being the reaction of the wall tends upwards, Ad tends from the joint, again supposing the triangle of forces to be applied to the joint, ad tends towards the joint, the tie Ad is therefore in tension and the brace db in compression and the joint is in equilibrium as before. From the upper C on the line of external forces draw Ce parallel to the piece Ce of girder, and from the point a on the line of external forces draw ae parallel to the brace ae of girder and meeting the last



drawn line in the point c. The triangle aCc is the triangle of forces for the left upper corner of girder, aC tends upwards being the reaction of the wall, Ce tends towards the joint, and ca from the joint, therefore Ce is in compression and ca in tension. In the same manner cbf is the triangle of forces for the right upper corner and shows cf to be in compression, and fb in tension. From the point e in the diagram of forces draw eg parallel to the brace eg of girder, and from the point c draw cg parallel to the brace cg and meeting the last drawn line at the point g, caeg is the polygon of forces for the left juncture of braces in girder. As the brace ac was shown to be in compression, ca must tend toward the joint, and in the diagram of forces in the opposite direction to its position in the triangle of forces Aac, in the same manner the brace ae being in tension, the line ae must tend from the joint, and again in the opposite direction to its position in the triangle of forces, aCe. Moreover, cae follow round in the same direction, and, continuing this, eg will tend towards the joint, and gc from the joint; therefore, the brace eg is in compression, and the brace gc is in tension. In like manner will be drawn fhd, the polygon of forces for the right juncture of braces. We will now consider the forces in joint 1. The pieces ge and ce have been shown to be in compression, therefore, the forces tend towards the joints, and in the opposite direction they had before, an ICC on the scale of external forces represents the load on joint 1; and the three forces follow round in the same direction. Join C'g, and it will be found to complete the polygon gcC',

the line C'g being parallel with the piece C'g of girder, and showing the force tending toward the joint; therefore, the piece C'g is in compression. In the same manner C'f is the polygon of forces for joint 4, and the piece C'h of girder is shown to be in compression. The pieces Aa and cg of girder were shown to be in tension; they, therefore, tend from the joint, and in the left joint on tie-rod, in the opposite directions to those they had before. From g draw gk parallel to the piece gk of girder, and produce Ac, till it meets the last in k. A c g k A is the polygon of forces for that joint. Following round in the direction Aa, cg, gk will be found to tend toward the joint, and kA from it; therefore, the brace gk is in compression, and the tie kA is in tension. In like manner A d h k A is the polygon of forces for the right joint on tie, and k h will be found to be in compression. Since the pieces k g, g C' are in compression, and, therefore, at the joint 2 act from it, and in opposite directions to those they had before, they follow round in the same direction, as also the load on C' C'. C' C' k completes the polygon for the joint, which reads k g C' C', C' C' k tended towards the joint, therefore the piece C' C' k of girder is in compression. The polygon C' C' h k completes the figure, and is the polygon of forces for joint 3. It will be found that in each triangle or polygon of forces, these all tend in the same direction, which shows that each joint is in equilibrium. It will be also seen in the diagram of forces that there in each line read twice over and in opposite directions, which proves the whole structure also to be in equilibrium. This diagram of forces also shows that in the outer pieces of the girder, or, as they are sometimes termed, the flanges, that the strains increase in a regular ratio from the walls towards the centre, whilst on the other hand the strains on the braces decrease, so that in the centre there are none. If "H. D." will work out a diagram of forces for a lattice girder of at least 9 or 10 bays in length, he will find the above-mentioned increase and decrease of strains much more apparent. "H. D." may think my girder does not bear much similarity to a lattice girder; that, however, arises from the small number of divisions therein—if he adds one more division, the centre load would be borne by two braces, both in compression meeting at the joint, and there would be two lattice divisions on each side, instead of one as in the present case. The case under consideration shows the greatest possible gap in centre; this would occur whenever there is an odd number of divisions. The braces meeting at a joint are always, one in compression and one in tension, except at the centre of a girder when the two which meet at the top would both be in compression, and at the bottom both in tension. If any more braces were added to the girder under consideration it would be found that they would be both in compression and in tension, which is absurd. The strains can be measured off to scale.—HUGH MCLACHLAN.

[6831].—**Old Crosses in Cornwall.**—Recurring to this fascinating subject again, there is a general impression amongst thoughtful men that the old crosses, in very many instances, are of a date far anterior to that of the churches they so often stand near unto. Very probably, when a manor was first traced out, and its boundaries fixed, an open space was cleared for the transaction of business. Such village greens were called, in the Western parts, from an early period, "stows." Hence, in Cornwall, we have Morwenstow, Padstow, Warbstow, Davidstow, Michaelstow, Petrekeastow, Jacobstow, &c., &c. At these public places manor courts were held, sports were celebrated, tithing men met together, and levies were made for public service. Of course, such spots, in such times, were necessarily hallowed by religious rites, the stow blessed with the name of some favourite saint—and as a remembrance of the dedication, a cross would be reared. Possibly, hundreds of years might then elapse ere a church was built, but when it was, it would probably be raised upon that part of the stow where the primitive folk had been accustomed to bury their dead, and close by the venerable emblem of Christianity which had for so long marked the site of public ground. The very word "cross" is not, I believe, of English origin, but comes from the Cornish, Welsh, or Irish! A comprehensive view of a typical Cornish cross occurred in the *Illustrated London News* recently (Nov. 19th). Therein an evening scene in St. Lewan churchyard, near unto the Land's End, is cleverly drawn. Upon a crude, granite stile, some happy rustic lovers sit, whilst a tottering old grandpa, feebly feels his way towards the tomb. Just above the bankside, a genuine Tan cross rears its venerable grey head, and gives immense individuality to the scene. It may be pleasant to record here that the finest cross in all Cornwall has just been unearthed and re-erected by the Rev. W. Willmott, at Quethiock. It seems that, a few months ago, whilst some workmen were engaged in excavating in the southern part of Quethiock churchyard, they came upon the head and base of a handsome old granite cross. Further attention having been directed to some gate-posts, it was found that these actually formed the missing shaft, which had been hammered into two and utilised. The four pieces put together fitted exactly, and formed a perfect four-holed Greek cross. These have been all put up again upon the spot where tradition says the cross formerly stood, i.e., just south of, and about 20 yards from, the church. Its base is circular, and is 4 ft. 6 in. in diam. The head is pierced with four Trefods, symbolical of the Trinity, even as the inclosing ring represents Eternity. The head is 2 ft. 6 in. in diam. The shaft was a monolith, between 10 ft. and 11 ft. high, and beaded at each angle. The entire height of the Quethiock cross is 14 ft., several feet higher than any other in Cornwall. It is not an uncommon thing for the shafts of ancient crosses to be converted into gate-posts. Last year I was commissioned to restore the old cross at Honiton's Clist. "But," said the gentleman interested, "the stem is now doing duty as a post at a farm some miles away, and several times when it has been removed, the story goes that the Devil has fetched it back in the night!" I have some gratification in recording that I have put that old cross up again in such a way that no "devil" will ever be able to shift it anymore in a night, work at it as hard as he will! As a set-off to the happy recovery of the Quethiock cross, I am sorry to say that an old Latin cross which stood outside the south door of St. Kew Church, disappeared three years ago when the building was restored. This cross was certainly there in 1878; it is not there now. It has been whispered that it was actually broken up and used in the rebuilding of the church, but

such a piece of vandalism hardly seems creditable. This, however, I can testify to, and that is that the vicar of St. Keyne actually advertised his church's beautiful old carved oak crosses for sale in the Plymouth newspapers. By a most fortunate chance, the advertisement was seen by Mr. James Peters St. Aubyn, the well-known architect. To save them to the county, Mr. St. Aubyn generously bought the lot, and placed them in the south aisle of St. Ewe Church, where they now are. St. Ewe contains the finest oak-rood-screen in Cornwall. It is grained on both sides, is 15th-century work, and not unlike those of Somerset and Devon. I had the satisfaction of restoring it recently under Mr. St. Aubyn's careful superintendence. The removal of antiquities from one church to another is often open to grave objection. In Bodmin Church, for instance, a number of the roof bosses bear the arms of the families by whom the roof was given. If those bosses were translated to another church they would provokingly falsify the records. Every reader who visits Cornwall should go to St. Keyne, if only to drink at the celebrated well there, for:—

"If the husband of this gifted well,
Shall drink before his wife,
A happy man henceforth is he,
For he shall be master for life
But if the wife should drink of it first,
God help the husband then!"

—HARRY HEMS.

[6742].—**Compressibility of Air in Sewers.**—**MISPRINT.**—The word *above* on the ninth line from bottom should be *half*.—HUGH McLAUGHLIN.

[6760].—**Sp. G. and Crushing Weight of Stones.**—In my opinion Mr. Trickett would have shown himself less of a partisan if he had answered the whole question asked, instead of only on that stone in which he is more immediately interested. On the authority of Prof. Hull, the sp. g. of Red Mansfield stone in dry masses is 2.338, and in particles 2.753; its crushing weight is 5.12 lb. per sq. inch, or between 325 and 329 tons per sq. foot. The Dumfries stone referred to by "Veritas" is probably the same as the Corschill, and a few years ago I heard of the same stone used in the same buildings under both names. The strength of both the Corschill and Red Mansfield stones bears a crushing weight, as compared with the Bath and Portland stones, is very great, the ratio of the four being as follows:—Bath 1, Portland 1.42, Red Mansfield 3.42 and Corschill 5.31, taking the last at the mean of the three cubes supplied by Mr. Trickett. One important point in stones is the expense of working them, and I believe it will generally be found that this increases with the strength and hardness of the stones, perhaps in not so great a proportion, and exceptions will be found to such a rule owing to the unevenness of grain, veins, &c. I also think that comparing the Corschill and Red Mansfield stones, it will be found that the latter is the most even-grained stone and would be the most durable; the former has veins in part like grain in timber, which while adding to the beauty of the stone, I fear takes from its strength; this is to be seen to a much larger extent in some of the red sandstone in Germany; much of the stone at the Archbishop's Palace at Mainz appears to be of petrified timber.—HUGH McLAUGHLIN.

[6761].—**Baths.**—A discussion with much information on the subject of bath, their fittings, and mode of heating took place in the *Building News*, 1873, it commenced by an article dated Jan. 3rd of that year, it was followed by letters and another article in the following numbers, Jan. 10, 24, 31, Feb. 11, 21, 28, and April 18, the last of no so much importance. The size of cisterns necessarily depends on the supply required for house, and how often in each day the bath may be used or filled, also is the hot-water cistern required to supply house as well as baths? Fifteen gals. per day is allowed, or domestic pump sees for each adult and child, and by Metcalf's Pocket-Book 35 gals. for each time of using a bath. Having measured the bath in the house in which I dwell, I consider this insufficient, and make it 51 gals., and, according to one account, I find a bath when full holds 100 gals., this would appear correct. In the house in which I dwell, the hot-water cistern supplies bath, housemaid's sink and scullery and would hold about 42 gals., it is heated from a boiler at back of kitchen, and is filled by a small lead cistern from main cistern above, it being situated a little below the main cistern, the hot and cold water pipes run along side, this danger from frost is avoided. There is, of course, a separate cistern for drinking-water at the bottom of the house, and, since the house has been built, about twelve years, the cisterns and supply pipes therefrom have never frozen. The bath is fitted with 1 1/2 in. hot and cold service pipes, 1 in. waste and overflow pipes, the hot opening into lead safe below bath, and from thence, by a warming pipe into the courtyard, about 25 ft. below. The hot water inlet has 1 in. flow off or waste pipe conducted into the housemaid's sink beneath it.—HUGH McLAUGHLIN.

[6766].—**Heating Chapel.**—In my opinion, the best and cheapest method for the purpose named is "hot-air." A. B. M. might ask for estimates from Messrs. Grundy, Constantine, and Boyd, or other respectable manufacturers, he may remember that the cheapest of any method is not always the best.—H. McLAUGHLIN.

[6767].—**Fixing Weather Tiling.**—One way, and the simplest that is carried out, is to nail or peg the tiles to the mortar joints between the brick courses; this may be further improved by nailing the tiles to the brickwork in cement, which, I believe, has also been done without any fastening to the courses by nailing. Possibly the best method is first to battan the wall, and then secure the tiles to the battening in the usual manner.—H. McLAUGHLIN.

[6767].—**Breaking Weight of Girder.**—I wish to correct an error of the engraver, who, in reproducing the sketch, which compares the lifting power of my contribution to this work, *Building News*, has had to do with diagonal lines to the floor plate and angle-iron of girder. This did not appear in my original drawing. All that was crossed there were the lower angle-iron, floor plate, and two lower of the web, following the conditions of the formula given. I only wished to show, as stated in my reply, that the portion of the section that had been crossed over, the portion of the bottom flange.—ALFRED C. HUBLEY.

[6787].—**Breaking Weight of Girder.**—I notice in your "ante communication" column of last week an issue two answers to a query, which appear very excessive for a girder of that construction. According to the working out of Moleworth's formula, I find the breaking weight is 23 1/2 tons.—D. H. ROBINSON.

[6794].—**Problem.**—B. pays A. 4-14 of £1,050 (the cash paid in advance), equal £380, and A. returns to B. 10-11 of £200 (the excess of rent beyond the £250 per annum), equal £142 17s. 2d., so that A's balance is £157 2s. 10d., which, so far, agrees with the answer of "W. U. O.," but I do not consider this equitable if B is to pay a proportionate price, and for this reason:—A. pays down the whole £1,050 ten years before B. has any interest in the property, and this sum of £157 2s. 10d. has been all the time useless to A. (otherwise B. wouldn't give it back) whilst instrumental in securing some benefit which B. will enjoy—as evidenced by augmented rent, pointing to increased value—and which A. loses, though both pay in striking the above balance an identical rate. A., in fact, ought to receive, in addition to £157 2s. 10d., compound interest thereon for ten years at 4 per cent. per annum, which would amount to £75 9s. 4d., making the total sum due to A. from B., £232 12s. 2d.—W. J. CHRISTY.

[6794].—**Problem.**—Mr. S. Daws writes we are all wrong. I differ from him, and call his attention to the following figures:—The rent during the lease would be £3,700, which, divided by 250 = 14'8. A. having the lease 10 years would be liable for 10 parts, B. for 4'8. We have only to deal with the following amounts (see issue of Dec. 21):—1818-255, 509-959, and the extra of £50 per annum for four years = 212-32.

	1818-255	
Add together	509-959	
Divide by 14'8	2328-244 = 157'4	
157'4 x 4'8 B's share =	755-52	
Then 212-32 x 14'8 =	143-346	
A's share being 10 parts, B. is entitled to	143-346	
	612-66	

Within a few decimals of mine of 2nd inst.—G. B. L.

[6797].—**Villa.**—Replying to "Young Architect," I am afraid any answers he may receive will only mislead him on his questions, as it is almost impossible for one not knowing the site and conditions to answer. I can, therefore, only give general replies. 1. Prospect ought certainly to have something to do with the floor on which the drawing-room is placed, and if other things do not interfere the rule of placing it on the ground-floor may be waived in this case. 2. This question depends entirely on the habits of the occupant. If he is fond of social gatherings a service door would be very necessary; generally in small villas one door is made to answer. 3. This question also depends largely on the same consideration. A lavatory and w.c. attached would be necessary in every well-planned villa, and the ground floor is the right place for it. 4. Consult Wright's "Hints to Young Architects."—G. H. G.

[6799].—**Contracts.**—Had the contractor been allowed to erect the stone fence as originally intended, it is only fair to suppose he would have made a profit upon it. Seeing that the architect sent his account for iron-work to the contractor for payment, it is only right that he should charge some profit for lying out of his money, and the trouble he had in the matter.—E. CALVERT.

[6800].—**Liability of Builders.**—When the architect first discovered a fault in the wall he should have written the builder at once upon the subject. It is too late to find fault six months after the building is completed. I had a parallel case in regard to a retaining wall, which bulged as soon as it was built. I noticed it at the time, and spoke to the contractor's foreman on the subject, but did not write about it to the contractor. This wall ultimately fell, and the combined action of frost and rain causing a lateral pressure on the wall got the blame of it. Some unforeseen agency may have been at work to cause the fall of your wall. I can scarcely conceive that it was not built plumb.—E. CALVERT.

[6801].—**Professional Practice.**—If your client wishes a copy of the sad documents, why not let him have them? Everyone likes to see what they are paying for, although they may not altogether understand the account. You can do less harm in yielding than refusing.—E. CALVERT.

[6803].—**Hoop-Iron Bond.**—This should not be carried through opening.—T. R. H.

[6803].—**Hoop-Iron Bond.**—Some architects prefer the band carried through the openings and afterwards cut, but to this there is a great objection—viz., the eventual rusting of the iron and discolouration of the brickwork.—LEWIS.

[6805].—**Bath.**—If "Alba" would write "Eureka," 52, Queen Victoria-street, he would possibly get the information required. The information is too lengthy to insert in this paper.—E. ALBA CONCRETE.

[6805].—**Bath.**—One scarcely sees how the cement can be permanently whitened. Paint would never stand; but I know of cases where baths are annually lime-whited.—LEWIS.

[6808].—**Brick Arcade Arches.**—As a practical man, I would strongly advise your correspondent to have centres for each of his arches, and not strike them until absolutely necessary—that is, if he wishes or expects his work to stand.—LEWIS.

[6808].—**Brick Arcade Arches.**—It does not require the advice of an "able contributor" to reply to "One in Doubt," or I should not attempt it. A centre must be made for every arch in the arcade, and should be left in as long as possible, due attention being paid to their being properly eased as the weight gets on them, but do not strike them until it is absolutely necessary.—B. S. J.

[6809].—**Repairs.**—It appears that A., under the will, becomes, as it were, trustee for the property to B. He is, therefore, bound at his death to deliver up the said property, unless any agreement to the contrary in the same state and condition as it was in when he received it; hence A. should also insure.—LEWIS.

[6810].—**Ownership of Drawings.**—Unless there is some special agreement, the builder is not compelled

to deliver up to the architect the drawings with which he has been furnished to carry out the works. It would be rather amusing to see their state and condition after knocking about on a job, as it is not every builder who sends out tracings on to the works and keeps the drawings in his office. If the architect wishes to try the question he must enter an action against the builder for unlawful detention, and I would advise the latter to try it out.—LEWIS.

[6810].—**Ownership of Drawings.**—In my query the word "favourites" is printed in the fourth line instead of "furnishes." I think the error is the printer's, as I do not think it any favour to the builder.—C. B.

[6811].—**Force of Impact.**—In Spence's "Dictionary of Engineering," under the article "Pile Driver," will be found the required information. The force of the blow amounts to the weight of the falling body, multiplied by its velocity, at the instant of striking the obstacle. In this case the velocity is that acquired from falling through a space of 7 in. = 7-12 ft., and is found from the equation

$$V = 32 \cdot 1 \cdot 6 \sqrt{\frac{S}{g}}$$

where $g = 16 \cdot 1 \cdot 12$ and $S = 7 \cdot 12$. Substituting these values

$$V = 32 \cdot 1 \cdot 6 \sqrt{\frac{7}{193}} = 32 \cdot 1 \cdot 6 \sqrt{0.0362694} \\ = 32 \cdot 1 \cdot 6 \times 0.1904 \\ = 6.125$$

so that the force of the blow = 3×6.125

$$= 18'375 \text{ cwt.} \\ = 1 \text{ cwt. } 42 \text{ lb.}$$

—W. J. CHRISTY.

[6812].—**Ventilating Pipes.**—If "Architectus" procures a copy of the by-laws of the district, he will find therein the rules which relate to the ventilation of drains, &c., and with them he must comply.—LEWIS.

[6812].—**Ventilating Pipes.**—"Architectus" does not give size and position of his one ventilating pipe, nor sufficient detail to enable one to judge the case properly. The siphon he has inserted between house and sewer is not effectual without ventilation. By "the surveyor," I presume he means the surveyor of the local authority, and if the model by-laws of the Local Government Board, or by-laws similar thereto, are in force within the district, then "Architectus" has not complied with the provisions of such by-laws as to ventilation of drainage, which, described shortly, are as follows:—Trap in drain between house and sewer and as near sewer as practicable. (a.) One untrapped opening (not less than 4 in.) from surface of ground, as near as can be to the trap, down to the drain, and on house side of trap. A second untrapped opening at highest part of drains, carried up by pipe (not less than 4 in.) clear of openings into house, and in no case less than 10 ft. in height. Where the foregoing are impracticable, the following shall be substituted:—(b.) Carry up pipe (not less than 4 in.) between house and trap to a height of not less than 10 ft. The second opening to be at highest part of drains, and to be level with ground surface. All soil pipes to be fixed outside and carried up (clear of openings into house) full size, which in no case is to be less than 4 in. in diameter. Where the situation, sectional area, height, and mode of construction of the upward continuation of soil pipe shall be in accordance with the requirements as to ventilating pipes, such soil-pipe may be deemed to provide the necessary opening for ventilation, or, in other words, to answer in lieu of such pipe mentioned in (a) and (b). "Architectus" should obtain a copy of the by-laws referred to.—C. E.

[6813].—**Water.**—Various methods of keeping the water back have been tried, but they are uncertain, costly, and generally useless. Drain, if possible.—T. R. H.

[6813].—**Water.**—Take up the paving and put in about 4 in. of good cement concrete, and then plaster over this and up the sides 1 in. thick in cement to above where water comes in. If properly done the remedy will be effectual. Asphalt would also do, but the expense is much greater.—LEWIS.

[6815].—**Hospital Construction.**—In reply to "Sigma," pilot stoves or jets of gas are desirable in most cases where central stoves are used in hospital wards. But the horizontal flues in Mr. H. Saxon Snell's thermohydric grates are encased in sand, and are so constructed otherwise that piloting is unnecessary. Full details of these grates, and the manner of constructing the flues are given in Mr. H. Saxon Snell's "Charitable and Parochial Establishments," but the makers, Messrs. Potter and Sons, Oxford-street, would, no doubt, furnish any applicant with full details.—C. M.

[6815].—**Hospital Construction.**—At the London Temperance Hotel, Hampstead-road, in a number of Manchester stoves (Shorland's) all having draught smoke-flues passing under the floors from centre of ward. The draughts have all been very good, and no "pilot stoves" are required.—FRED R. BARKER.

[6816].—**Cracked Pipes.**—I have known the best quality pipe crushed by the pressure of earth in deep trenches, and should advise that in such work, or when so near the surface as to be liable to damage from a heavy roller, they be encased in 6 in. or 12 in. of fine concrete.—T. R. H.

[6817].—**Whitewash.**—If there be no other reason than that the ivy should grow on the wall, the whitewash could be scraped and swept off.—LEWIS.

[6820].—**Demurrage.**—The arbitration clause in contract clearly refers to the architect being sole arbitrator for extras only, and not for any differences or disputes. I think, however, he would be secure in giving certificate for contract and extras with the contractors mentioned. It is, however, always difficult to give a correct opinion unless one is thoroughly conversant with the whole case.—LEWIS.

[6820].—**Demurrage.**—The architect has discretionary power with regard to damages as much as in any other part of the contract. The clause as to time is useful and necessary; but, for all that, the enforcement of the fine would often be unjust and harsh. Sometimes the period for completion is absurdly short. The architect must consider weather, extra works, and alterations.—T. R. H.

LEGAL INTELLIGENCE.

METROPOLITAN BOARD OF WORKS V. STEED.—High Court of Justice: Queen's Bench Division. (Sittings in Bane, before Mr. Justice Grove and Mr. Justice Lopes.)—This was a case which was argued last week, when the Court took time to consider its judgment. It appeared that the respondent had been summoned before a police magistrate for infringing a section of the Metropolis Local Management Act, which requires that no road shall be formed as a street for carriage traffic unless such road be widened to the full width of 40ft., or unless such street shall be open at both ends. The road in respect of which the respondent was summoned was 400ft. long, leading out of the Holloway-road. It was 40ft. wide, but at the extreme end from Holloway-road it abutted on another man's land, where a bar was put up prohibiting further traffic, so that the road, in effect, was a *cul de sac*, and was not open at both ends. The magistrates, however, held that, the road being of the statutory width, no offence had been committed under the statute, whereupon the Board of Works appealed, when Mr. Poland appeared for the respondent, and Mr. Biron for the Board of Works. Mr. Justice Groves: In this case, at the conclusion of the arguments, we were inclined to think that the case should be re-argued before three judges, as we were not entirely of the same mind. Now, however, we take the same view, and, therefore, we proceed to give judgment. This is a special case framed by a magistrate, and the main question is as to the meaning to be attributed to section 98 of the Metropolis Local Management Act, and to one single word in that section, and that is the meaning of the word "or"—whether it is disjunctive or conjunctive. To my mind the word "or" means "nor," and is disjunctive. His lordship here read the section, and continued: It would certainly have been better and more grammatical, if the sense I give to the word "or" is right, had the word been printed "nor" instead of "or." The real sense is that the road must be of the specified width, and be open at both ends. This is, I think, the meaning of the statute, and the reading of the magistrate was, to say the least, far-fetched. A very long and narrow street would hardly be any better or more salubrious with both ends open than if one end was closed. The street might be a quarter of a mile long, and the open end would be of no practical value. I do not think we are doing in this case what we have often refused to do in other cases—viz., construing the Act against the plain meaning of its words. Here, where the word "or" applies to the two prohibitions, the word "or," when preceded by a negative sentence, has a different meaning to what it has when preceded by an affirmative one. I have not looked specially, or else I could find instances in Acts of Parliament and in well-known writers where the word does bear these meanings. For instance, suppose I say you must have your house drained or ventilated, there the word "or" is plainly alternative, and you will satisfy the conditions if the house is either drained or ventilated; but if I say you must not have your house undrained or unventilated, that clearly means that you must have your house neither undrained nor unventilated. Here, in this statute, there is a preceding negative sentence, and, according to the example I have given, the word "or" is disjunctive, and must be read as "nor." In my opinion, therefore, the appeal must be allowed. Mr. Justice Lopes delivered judgment to the same effect.

THE WREXHAM TOWN COUNCIL AND THE LESSEE OF THE SEWAGE FARM.—On Wednesday week the disputes which have arisen between Lieut.-Col. Jones, V.C., the lessee of the Hafod-y-wern Farm, and the Corporation, as to the carrying out of the contract as originally agreed upon, came on for arbitration before Mr. Clare Sewell Read, acting for Lieut.-Col. Jones, and Mr. Evan Morris, solicitor, Wrexham, representing the Council. The arbitrators are also to decide the amount of damages (if any), to be paid to Lieut.-Col. Jones for the breaches of the covenant complained of. Mr. C. W. Cresswell, instructed by Mr. Vaughan Williams, solicitor, Wrexham, appeared for Lieut.-Col. Jones, and Mr. Higgins, instructed by the Town Clerk of Wrexham, for the Corporation. The inquiry was adjourned, after some evidence had been heard, to a date to be subsequently agreed upon.

ANOTHER CLAIM FOR EXTRAORDINARY TRAFFIC.—On Tuesday week, at the Apsinston Police-court, the case of The Seaton Local Board v. The Beer Freestone Company was heard. Mr. George Tweed, of Honiton (instructed by Mr. E. H. Wilton, solicitor, Colyton, and Clerk to the Seaton Local Board), appeared for the local board; and Mr. Arthur Ward, of Exeter, represented the defendants. In opening the case, Mr. Tweed said that he should ask the bench for an order that the defendants should pay the sum of £32 5s., on the ground that they had incurred that sum owing to their causing extraordinary traffic and excessive

weight to pass over the Beer-road from a point called Beer-hill to the Seaton Railway Station. The proceedings were taken under the 23rd section of the Highways Act, 1878. After a short consultation, the Chairman said that the Bench had no hesitation in coming to the conclusion that there had been extraordinary traffic and excessive weight, but taking into account the fact that the Company only began to work the quarries in the month of July, 1880, the Bench considered that three-quarters of the claim would be an adequate amount, and, therefore, they would make an order for £24—the costs to follow judgment. Mr. Ward intimated that he should give the necessary notice of appeal in this case.

WATER SUPPLY AND SANITARY MATTERS.

KILCREGGAN AND COVE WATER SUPPLY.—The first sod of the works for providing pure water to the sea-side resorts of Kilcreggan and Cove, N.B., was publicly turned on the 26th ult. The scheme has been prepared and is being superintended by Mr. Brand, C.E., of the firm of Messrs. Wharrie, Colledge, and Brand, civil engineers, Bath-street, Glasgow. The water is brought from the loch at Lochan-Ghlas-Laoigh, on the hill above Coulpport; this has a surface area of 20 acres, and lies 510ft. above the sea-level, and the water has been pronounced by the city analyst of Glasgow as of the same quality as Loch Katrine water, except that it contains more vegetable matter. A supply of 42,000,000 gallons is proposed to be taken, equal to 503 days' supply at 40 gallons per head, and the water will be conveyed in 12in. pipes to Duclage farm, where, after filtration, it will be stored in a tank holding 165,000 gallons, and afterwards will flow by gravitation to the villages to be supplied. The length of pipes is 13 miles. Mr. Peter Quin has taken the contract for laying the pipes and erection of filters; Messrs. D. Y. Stewart and Co. have that for the supply of pipes; and Messrs. Allen and McLellan that for the valves, &c.

THE FORFAR SEWAGE-FARM.—Mr. Campbell, the officer of the board of supervision, in a report to the board under the Public Health Act, says of the Forfar sewage-farm:—The Rivers Pollution Act, wherever enforced, has closed against local authorities the former easy mode of disposing of sewage by passing it on with all its impurities to the nearest stream. How to separate, in the volume of liquid poured through the sewers, the foul matter carried off by the water from the water itself, is a problem which the local authorities of inland towns and villages are now bound to solve. The water must be restored, as far as possible, to its original state of purity before it is allowed to enter stream or river. I found the solution of this problem exhibited in the sewage-farm of Forfar. I saw the foul, dark liquid passed over the farm, and on examining the effluent outlet, the water was seen pouring from it in appearance pure, as from a fountain spring. The system adopted at Forfar is that of intermittent downward filtration, combined with surface irrigation, which was carried out by Messrs. Bailey Denton, Son, and North, the engineers, of Whitehall-place, London.

ROSS.—At the last meeting of the Ross Town Commissioners, it was resolved, "That the scheme of Messrs. Gatto and Beesley for supplying the town of Ross with water from the River Wye, taken from above the rocks, and pumping it up to the high ground near Springfield and filtering it, be adopted; and that the clerk be instructed to apply to the Local Government Board for sanction to a loan of £7,000, to be raised by the commissioners to carry out the works."

RHONDDA VALLEY SEWERAGE SCHEME.—Mr. Lomax, C.E., the engineer appointed to carry out the sewerage of the Rhondda Valley, on Thursday week explained to the members of the Ystrad-fodwg local board his scheme. It is divided into two portions, No. 1 dealing with Trehafod, Porth, Cymmer, Ynshyr, Paridy, Penygraig Tongpandy, Llywynnyn, and a portion of Pontrhondla. For this district, having a population of 24,000, the engineer proposed to lay a main intercepting sewer along the bed of the Rhondda, an alternative scheme proposing to carry the intercepting sewer along vacant land adjoining the river in certain places. No. 2 district deals with the remaining hamlets and villages with a separate sewer, and the collected sewage is to be precipitated and filtered through earth, the effluent passing into the Rhondda. The scheme will be carried out, if finally approved, under the supervision of Mr. W. Jones, surveyor to the local board.

The local board of Claines, near Worcester, last week instructed Mr. Purchas, C.E., to inspect the district, and to report on the best way of disposing of the surface-water and slops.

Our Office Table.

THE terrible disaster at Vienna teaches no new lesson: it only adds to the bitter experience already accumulated of the results of neglecting old ones. We have only very narrowly missed such a calamity in this country on more than one occasion—in 1865, for instance, when the Surrey Theatre was burnt down in so short a space of time that, had it occurred at night instead of during the day, when the theatre was of course empty, very few of the many hundreds who would have been inside could have escaped with their lives. Fires at theatres are fast becoming more fatal than battlefields, yet no theatre as yet has been responsible for loss of life so great as that which occurred in 1863 at the church of La Campana at Santiago, when, in one hour, 2,000 people were reduced to ashes, so that the comparison of the construction of theatres with that of churches, made by some well-meaning advisers, does not go for much. What is wanted is the more thorough enforcement of well-devised regulations, both as regards theatre construction and appliances, and the rigorous punishment of any theatre proprietor who causes death by his neglect of their observance. Meanwhile—especially during the approaching pantomimes, with their flaring transformation scenes—every father of a family had better carefully note the peculiarities of the passages by means of which he obtains entrance, and mentally calculate his chances of exit, with a child or two on each arm, through a maddened and terror-stricken mob.

A LARGE and influential meeting was held in the Chapter House at Westminster on Tuesday, in furtherance of a scheme for raising a memorial to the late Dean Stanley. The Dean of Westminster presided, and among the speakers were the Prince of Wales, Earl Granville, the Archbishop of Canterbury, Lord Salisbury, Lord Lorne, and Mr. J. Russell Lowell. It was resolved to raise a national memorial to the late Dean, to take the form of a recumbent figure in marble, to be placed in the Abbey, and the completion of the windows in the Chapter House, in accordance with the plan commenced by himself.

The following memorial, signed by Sir Henry Cole, Mr. William Morris, Mr. H. S. Milman, director of the Society of Antiquaries; Mr. J. L. Pearson, R.A., architect of Westminster Abbey; Mr. F. C. Penrose, and others, has been presented to the Governors of Westminster School by the Dean of Westminster.—"On behalf of a meeting of gentlemen interested in the preservation of Ashburnham House and of the ancient remains on its site, and earnestly desirous that no encroachment should be made on the ground closely adjacent to the Abbey Church of Westminster, we venture to request that the governing body of Westminster School will not come to any decision adverse to the proposal about to be made by the Dean and Chapter until they have received and heard a deputation from such meeting on the subject."

THE Fifteenth Annual Convention of the American Institute of Architects closed on November 17, after a very agreeable and harmonious meeting. The convention, according to the *American Architect*, seems to have been quite as well attended as usual, and although no important questions were decided or even discussed, the field was at least left in a favourable condition for such as may come up in future. On the whole, the past year has been a prosperous one for the Institute. The individual chapters have not perhaps gained so much as was anticipated from the relaxing of the bonds which connected them with the national body; but the same step has had the effect of removing the Institute, as it were, to a somewhat higher and less familiar sphere, increasing the dignity of the organisation, and perhaps so far furthering the objects to which it was intended to apply itself. The opening address, by Mr. Latrobe, of Baltimore, was of itself enough to make the present convention memorable.

THE twenty-seventh annual general meeting of the members of the Society of Engineers was held on Monday evening last, the 12th inst., in the Society's Hall, Victoria-street, Westminster. The chair was occupied by Mr. Jabez Church, vice-president. The following gentlemen were balloted for and duly elected as the council and

officers for the ensuing year, viz.:—As president, Mr. Jabez Church; as vice-presidents, Mr. F. E. Duckham, Mr. Arthur Rigg, and Mr. W. Schouheyder; as ordinary members of council, Mr. R. Berridge, Mr. S. Cutler, Mr. C. Gandon, Mr. C. J. Light, Mr. Perry F. Nursey, Mr. Heber Duckham, Mr. A. F. Phillips, and Mr. Arthur T. Wainisley—the three last-named gentlemen being new members of the council; as honorary secretary and treasurer, Mr. Alfred Williams; and as auditor, Mr. W. H. Bennett. The proceedings terminated by a general vote of thanks to the council and officers of 1881, which was duly acknowledged by the chairman.

BLAST-FURNACE Slag and its Uses was the subject of a paper read on Saturday evening, at the Middlesbrough Oddfellows' Hall, by Mr. Charles Wood, of the Tees Ironworks. Slag (said the lecturer) was now being turned into various commercial products, whereas for many years it was only used for road-making. Perhaps the largest utiliser of slag was Mr. J. Fowler, whose vast undertaking at the Tees breakwater showed marvellous enterprise, in which some half a million tons of slag were annually used. Mr. Wood showed the process of procuring the slag for the South Gare breakwater, saying that the latter was so far completed, after several years' workmanship, that on Saturday orders were received to cease sending slag there, and the contractors were preparing to send it instead to the North Gare breakwater. Another stage in the utilisation of slag was to run the liquid slag direct from the furnace into a mould. Casts had been so made that were beautiful to look at; many attempts had been made to bring that product into marketable use, but eventually abandoned. Slag paving-blocks, Wood's slag shingling machine, slag sand, concrete, and slag wool were next referred to, the process of making each and the texture of each being minutely explained. It was stated that of the concrete bricks about 130,000 tons per week were making, consuming about 20,000 tons of slag per annum.

In consequence of the distribution of the Royal Academy prizes taking place on Saturday night, the students decided to give their supper on Monday, the 12th. The supper was given at Willis's rooms, Mr. Wilton Grossmith being in the chair, and supported by the president, Sir Frederick Leighton, Messrs. F. R. Pickersgill, R.A., Alma Tadema, R.A., J. C. Horsley, R.A., E. Armitage, R.A., W. C. Dobson, R.A., J. E. Hodgson, R.A., G. D. Leslie, R.A., W. Calder Marshall, R.A., H. T. Wells, R.A., Edwin Long, R.A., W. W. Ouless, R.A., E. B. Bird, A.R.A., F. Dicksee, A.R.A., S. L. Fildes, A.R.A., Frank Holl, A.R.A., P. R. Morris, A.R.A., Val Prinsep, A.R.A., Marcus Stone, A.R.A., Prof. Marshall, Mr. R. Phené Spiers, Mr. Ballantyne, and others. There were about 300 present altogether, being the largest entertainment of the sort ever given. The speakers were few in number. Captain Ballantyne, R.N., responded for the "Army, Navy, and Volunteers"; Sir Frederick Leighton, P.R.A., for "the members and professors of the Royal Academy"; and Messrs. Fisher, Hook, Juce, Junck, and Paret for the prizetakers, proposed by Mr. J. C. Horsley, R.A. The entertainment was of a most brilliant character, including recitations by Sir William Magnay, Bart., and Mr. H. Beerboom Tree; songs by Mr. G. L. Calkin and Mr. Arthur Mathison, songs and recitations by Mr. Terry, the actor; and songs, recitations, and musical sketches by Mr. George Grossmith; the company not separating till after 2 a.m.

The third of the series of Cantor lectures by Mr. Thomas Bolas, F.C.S. (on "The Industrial uses of the Calcium Compounds") was delivered on Monday, December 5th. After treating with sulphate of lime and its occurrence in nature, the lecturer mentioned the various qualities and species of gypsum, and alabaster, and proceeded to describe plaster of Paris, its preparation, and uses. The fire-proof concrete of Messrs. Dennett and Ingle, prepared from highly calcined gypsum, was shown and favourably commented upon. The lecturer also passed round a sample of "Super-super" plaster manufactured by Messrs. Bellman and Ivey, of 95, Wigmore-street, W., and called attention to its extremely fine character. The application of plaster of Paris, in the form of a stucco marble, as manufactured by the same firm, was explained, and the specimens shown (in which the material was applied to columns,

pilasters, wall-linings and pedestals for statuary) were much admired on account of their high polish and admirable representation of the marbles.

THE First Norfolk Artillery Challenge trophy, intended for competition in repository drill, was modelled by Mr. G. Archard, from drawings prepared by Mr. H. Dudley Arnott, architect, of Great Yarmouth. The trophy represents a 61-pounder M.L.R. gun of 71wt., mounted on a temporary sleigh, built up of the stores used in the service in dismounting and shipping ordnance. The materials used in the model (excepting the gun, shells, and cordage, which are of solid silver) is the same as that in actual service, and, together with the guns, shells, cordage, and other portions of the trophy, modelled to a scale of lin. to the foot. The plateau upon which the gun and sleigh rest is supported by six cannon shells and festooned with parbuckle ropes. The base of wainscot oak, with ebony reliefs, bears upon its several sides silver shields containing the arms of the different towns which are the head-quarters of the various batteries, viz., Norwich, Beccles, Lowestoft, and Aldeburgh, the arms of the brigade head-quarters, Yarmouth, being richly enamelled, and in high relief.

WE regret to learn that Mr. George Childs has recently died at his residence, 21, Offord-road, Barnsbury, after a long and painful illness, leaving his wife and family in great difficulties and a daughter severely afflicted. Many of our readers must have had occasion to avail themselves of Mr. Childs' services, and we feel sure if any of them feel sufficiently interested in his misfortunes to assist in any way those he has left behind him, their kindness will be wisely and beneficially displayed.

CHIPS.

Mr. C. B. Birch, A.R.A., has been commissioned by the Liverpool Conservative Club to execute the statue of Lord Beaconsfield to be erected in front of St. George's Hall.

A handsomely-carved Caen-stone pulpit, with red Mansfield columns to base, in the Early English style of architecture, has recently been completed for St. Stephen's Church, Nottingham, by Messrs. Jones and Willis, of Birmingham and London. The body consists of gabled panels—gables supported by red serpentine marble columns—and with the subjects, in panels, of the Four Evangelists, with carved monogram to fill centre panel. The gables are finished above with diaper-work and green serpent ne marble.

A memorial stained-glass window has been placed in Shaw church, Berks, the subject being the miracle at Cana of Galilee. Mr. Alexander Gibbs, of Bloomsbury, carried out the work.

The Bromsgrove local board received a report from Mr. Parker, C.E., as to a sewerage scheme of outlying roads, estimated to cost £2,000.

The Poole town council have adopted plans by their borough surveyor, Mr. H. Miller, for proposed baths and washhouses, the estimated cost being £4,000.

"Barracks" for the Salvation Army have just been opened in Willow-street, Coley, near Reading. The building seats 1,000 persons, and is said to have cost £2,000. "Commissioner" Sherwood, of the Head-quarters, Whitechapel, acted as architect.

At a general assembly of the Royal Academy held last week, Mr. Peter Graham, painter, was elected a Royal Academician.

In our description last week of the new Sandford-street Board-schools at Swindon, on p. 758, the name of Mr. T. Elsley, Great Portland-street, the manufacturer of the window-fittings, was incorrectly given as "Elsey."

Unless some arrangement is made, the construction of another bridge over the Tay at Dundee may be abandoned. The 21st section of the New Tay Bridge Viaduct Act, passed last session, provides that the old structure must be abandoned and removed to the satisfaction of the Board of Trade before the new one is erected. Last Friday, Mr. Stirling, the chairman of the North British Railway, several of the directors, and the engineer, had a meeting with the Dundee Harbour trustees, to discuss this unforeseen impediment to the progress of the new undertaking.

Holloway's Ointment and Pills are never at fault in successfully disposing of skin diseases, eruptions, sores, and venereal affections. In all venereal diseases there is a tendency to be relied upon, and by their means the most delicate may become strong, and the foulest blood may be gradually changed into the purest fluid.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—London Institution, Finsbury-circus. "Colour as Applied to Architecture," by G. Aitchison, A.R.A., F.R.I.B.A., 5 p.m.
Surveyors' Institution, 8 p.m.
Royal Institute of British Architects. "The Artistic Treatment of Constructional Ironwork," by H. H. Stannus, A.R.I.B.A., 8 p.m.
TUESDAY.—Institution of Civil Engineers, Annual general meeting, 8 p.m.
THURSDAY.—London Institution. "Mark Twain," by Rev. H. R. Haweis, M.A., 7 p.m.
Edinburgh Architectural Association. Annual Dinner.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE FOURTH ORDINARY MEETING of the Institution will be held on MONDAY, the 19th instant, at 5 p.m., when a Paper by HUGH STANNUS, Associate on THE ARTISTIC TREATMENT OF CONSTRUCTIONAL IRONWORK, will be read.
J. MACVICAR ANDERSON, Hon. Sec.
WILLIAM H. WHITE, Secretary.
9, Conduit street, Hanover-square London, W.

Epps's Cocoa.—Grateful and Comforting.—It is a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected Cocoa, Mr. Epps has provided our breakfast tables with a delicately flavoured beverage which may save us many heavy doctors' bills. It is by the judicious use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. Hundreds of subtle maladies are floating around us ready to attack wherever there is a weak point. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame. *—Civil Service Gazette.*—Made simply with boiling water or milk. Only in Packets labelled *—JAMES EPPS & CO., Homoeopathic Chemists, London.*—Makers of Epps's Chocolate Essence for afternoon use.

Lampough's Pyretic Saline is refreshing most agreeable, and the preventive and curative of FEVERS, RHEUMATISM, SMALLPOX, SKIN DISEASES, and many other ailments. Sold by chemists throughout the world, and the M-Ker, 113, Holborn Hill. *Use no substitute. See Medical Testimony.*

Douling Freestone and Ham Hill Stone

of best quality. Prices, delivered at any part of the United Kingdom, given on application to

CHARLES TRASK,

Norton-sub-Hamdon, Ilminster, Somerset.

—[Advt.]—

McLACHLAN & SONS, 35, St. James's street, S.W. Builders, Decorators, and House Painters. Designs and Estimates.

General Repairs and Alterations Executed.

Experienced Workmen always in readiness, and sent to any part of the country.—[Advt.]

BATH STONE. BOX GROUND, THE BEST FOR ALL EXTERNAL USE. CORSHAM DOWN

CANNOT BE SURPASSED IN BEAUTY OF APPEARANCE FOR INTERIOR WORK.

PICTOR & SONS, BOX, WILTS.

(See trade advt. on p. XXIII.) A377.

TENDERS.

Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender—it adds to the value of the information.

BATTERSEA, S.W.—For the enlargement of Stamford-street School, Battersea Park road, by 400 places, for the London School Board:—

Boyce, T.	...	...	£7,940 0 0
Hobson, J. D.	...	...	7,624 0 0
Downs, W.	...	...	7,353 0 0
Shurair, W.	...	...	6,993 0 0
Atherton and Latta	...	...	6,970 0 0
Marsland, J.	...	...	6,885 0 0
Nightingale, B. E.	...	...	6,725 0 0
Higgs and Hill	...	...	6,784 0 0
Oldrey, W.	...	...	6,784 0 0
Lathey Bros., Battersea	...	...	6,462 0 0

[Cost per head of school buildings, £5 16s. 11d.; total cost per head, £16 11s. 4d.]

BERMONDSEY, S.E.—For alterations and extension of premises, The Grange, Bermondsey, for Messrs. S. Barrow and Brother, Messrs. E. Kingdon and Son, architects. Quantities by the architects:—

Buller	...	...	£475 0 0
Wells	...	...	353 0 0
Eldridge and Gee (accepted)	...	...	318 0 0

BETHNAL GREEN.—For the erection of a school for 1,100 children in Mansford-street, Be haul Green, for the London School Board:—

Higgs and Hill (accepted on revised plans), £13,550

Cost per head of school-buildings, £5 8s. 6d.; total cost per head, £9 13s. 8d.]

BLACKHEATH, S.E.—For constructing 110 ft. run of 15 in. sewer in Charlton-road, Blackheath, for the Greenwich district board of works:—

Pount, J., Lee (accepted)	£160 0 0
---------------------------	-----	-----	----------

THE BUILDING NEWS.

LONDON, FRIDAY, DECEMBER 23, 1881.

GEORGE EDMUND STREET, R.A.

DEATH has been very busy amongst us this year, and busiest among our best. Our Christmas Number, indeed, is in great part an obituary, and the losses we record elsewhere, dwarfed as they are in comparison with the great loss which overshadows the heart of every one to whom the name and reputation were dear of the man whose life and works best embodied this century's noblest traditions of English architecture, make up no mean contribution to the death roll of 1881. Some of these men, indeed, already belonged either to the past or to the future as far as our knowledge of them was concerned. To most of us, Decimus Burton and Anthony Salvin were familiar only by their works, and the others had hardly done more than give promise of the fair careers that seemed to await them, but the death of George Edmund Street re-awakens even more poignantly the emotions of regret and grief with which William Burges was laid to rest last spring. Both were without rivals in their own spheres, and only rivals themselves in the splendour and truthfulness of their work, and the double blank left by the loss of both in English architecture is, indeed, a dark one. The death of each of them, too, caused doubtless by the self-same devotion to their work, had also this in common, that none of us thought we were about to lose them. Not many days since we recorded with pleasure Mr. Street's partial convalescence—not without misgiving, as we remembered how we published the same statement with regard to Burges, and how that was succeeded the next week, just as now, by the news of his death. From the attack of paralysis with which he was seized a few weeks since, Mr. Street had, indeed, so far recovered his strength that he was enabled to leave the house, and was actually preparing to make a journey to Egypt for the benefit of his health, when he was again struck down with paralysis on Thursday week, and from this attack he never rallied, but expired last Sunday night at the comparatively early age of 57, at his house in Cavendish-place. It is almost needless to say that his death removes one of the most active and conscientious, as he was certainly the ablest, exponent of Gothic architecture and art of the present generation. His death, moreover, leaves a void in the ranks of the profession, not only in this country but on the Continent and in America. Mr. Street was as well known in Paris and in Rome as in England, and had won a distinguished reputation among architects and artists in the United States, and the expression of the esteem in which he was held by his foreign brethren was emphasised by many marks of personal regard.

Mr. Street was born at Woodford, in Essex, in 1824, where his father, Mr. Thomas Street, lived, who was the head of a firm of London solicitors. Receiving his education at the Collegiate School at Camberwell, in March, 1841, he commenced his professional education at Winchester, and became a pupil of Mr. Owen B. Carter, an architect of more than local reputation, and well known as a skilful draughtsman, with whom he remained three years. In April, 1844, Mr. Street entered the office of the late Sir G. Gilbert Scott, where he remained till 1849, when he went to Wantage and commenced practice for himself. At this place he formed an intimate friendship with the

rector, the Rev. D. Butler. In the year 1852, having been appointed diocesan architect, he went to live in Oxford, and in the same year married his first wife, Mariquita, the daughter of Robert Proctor, Esq., of Gey's House, near Maidenhead, the issue of which marriage is his only son, Mr. Arthur Edmund Street, who was born in 1855, and has been lately with his father, and has taken an active part in his business. The appointment to the office of diocesan architect was obtained through the friendship of the late Bishop Wilberforce, who quickly perceived the ability and earnestness of the young architect, who was, moreover, a staunch Churchman. Mr. Street came to London in 1856, and first began to practise at 33, Montague-place, after which he moved to 51, Russell-square, where he practised till 1870, in which year he removed to his last residence in Cavendish-place. Mr. Street, having been left a widower in 1874, on Jan. 7th, 1876, married Jessie Mary Anne, daughter of Mr. William Holland, who met with her fatal illness while on a visit to Rome, and died in London only two months after the marriage.

Mr. Street held the appointment of diocesan architect not only of Oxford but to the dioceses of York, Oxford, Winchester, and Salisbury. His comparatively short career has been one of almost unparalleled activity, only equalled indeed by that of his illustrious predecessor, Sir Gilbert Scott. He was a great traveller; his draughtsmanship was unrivalled, and the rapidity and accuracy with which he could sketch out working details for his numerous works on the spur of the moment, and without the aid of instruments, was remarkable. It is well known that something like 3,000 working drawings were prepared by his own hand for the new Courts of Justice, and that he had lately furnished details for this great work which had practically completed his labours in connection with that undertaking. He knew personally most of the celebrated buildings in Europe; few of them had not at one time or another been sketched by him, and he lost no opportunity of recording the results of his labours. He seemed never to tire of taking the front in any movement or controversy which promised to help the cause of art in any manner. It was, however, his work as a practical architect which has brought his name into world-wide repute. He erected dwellings in every county in England, in Scotland, and in Ireland, as well as in many European cities. His earliest work was in Cornwall—viz., at Biscovey, and other parts of the county, and at Hadley Church, in Essex (circa 1844). As an ecclesiastical architect he attained, after Sir Gilbert Scott, the foremost position and the widest practice ever held probably by one architect in any age or country. We can only name here a few of his most noteworthy new churches, appending below a more complete list. Among them are Kingstone Church, Dorset—built in marble for Lord Eldon; St. Mary Magdalene, Paddington; Toddington Church; St. Saviour's, Eastbourne; St. John's, Torquay; All Saints', Clifton; St. John the Divine, Kennington; St. James the Less, Garden-street; the Garrison Church, at Portsmouth; and St. Margaret's, Liverpool. Among the numerous restorations and additions to churches, we may name Christ Church and Synod Hall, Dublin; new nave and western towers of Bristol Cathedral; Kildare Cathedral, the south transept of York Minster; St. Luke's, Lower Norwood; St. Peter's Mancroft, Norwich—now in progress; St. Peter's, Bournemouth; Salisbury Cathedral; St. George's, Bloomsbury; Wellington Barrack Chapel—a wonderful transformation, as pointed out by Mr. Arthur W. Blomfield—as noteworthy examples of his

skill as a restorer. Of churches abroad, may be mentioned two in Rome—one for the English and one for the Americans; one in Paris, the Memorial Church in Constantinople, besides English churches at Genoa, Loussanne, Vesay, Murren, &c. A very unique series of about a dozen churches was designed by Mr. Street in Yorkshire for one client, Sir Tatton Sykes.

Among houses and other buildings we must particularly mention Dunecht House and chapel for Lord Crawford and Balcarres; St. Margaret's Convent, East Grinstead; Holmdale, near Dorking; Dundee House of Mercy; Haddo House, additions and chapels; Cuddesdon, Theological College, Longmead, Bishopstoke; school buildings at Uppingham, and at Marlborough; house in Cadogan-square, private chapels, Grwyth Castle, and at Luton Hoo. His last and greatest work, the Royal Courts of Justice (to which he was appointed architect in 1868), is the one on which his reputation will mainly rest, and it is some satisfaction to know that the building is practically complete; and that the drawings which Mr. Street has left behind him will enable every detail to be finished in its integrity. Mr. Street's reputation, as we have said, was as great abroad as at home, as the honours and distinctions won by him prove. One of the earlier competitions (1855-6) in which he engaged was that for the cathedral at Lille, in which he won the second premium, the first going to Messrs. W. Burges and H. Clutton. How the work and the premiated designs were ultimately handed over to a local competitor, who occupied a low place in the contest, we recounted in April last in our memoir of Mr. Burges.

We have not named one building in our list which deserves more than casual notice, as it stands quite distinct in its character and design. It is the beautiful little church erected at Holmbury, Surrey, at his own cost, and which was consecrated and presented to the parish in 1879, and near which Mr. Street had built his country house. "The Church," he remarked, in alluding to his gift, "has been so constant a friend to me, that a crowning desire of my life was to do something for it in return." He had, indeed, throughout his life been a consistent and earnest Churchman. For many years he was a member of the congregation, and, indeed, the churchwarden, of All Saints', Margaret-street, the valued and trusted friend of the late Mr. Richards, and of his successor, Mr. Berdmore Compton. He was also, up to the time of his death, on the council of the English Church Union. He was also, throughout his life, a devoted ecclesiastical student, and spent much of his time in the designing of metalwork and ecclesiastical furniture. In every instance which we have seen, he has shown, not only a thorough acquaintance with the styles he designed in, but the true spirit and feeling of the artist.

The distinctions which were awarded to Mr. Street were numerous. In 1859 he became Fellow of the Institute; in 1867 he was elected an Associate of the Royal Academy, and in 1871 became R.A., and also occupied the high post of Treasurer, in succession to Mr. Edward M. Barry. He was elected President of the Institute this year; he was also Fellow of the Society of Antiquaries; he was a member of the Imperial and Royal Academy of Fine Arts at Vienna, and a Knight of the Legion of Honour, besides a number of other societies. It is not probably out of the remembrance of our readers that, on the refusal of Mr. John Ruskin, on the very moment of the presentation, to receive the Royal Gold Medal of the Institute of British Architects, Mr. Street enabled the Council to escape the difficulty of their position by accepting

it. In 1878 a correspondence took place between Mr. Street and the Archbishop of Canterbury, as to his replacement, at the instance of Dr. Thomson, by Sir Edmund Beckett, as architect to the York Diocesan Society, and later, our readers know what an active part he took in the matter of the restoration of St. Alban's Abbey, as well as his strenuous exertions to save the west front of St. Mark's, Venice, from what he considered the destroying hand of the modern restorer, and called meetings, of which he was the chairman, at his house.

In matters of professional practice he was always ready to use his influence as a champion of right. In 1880 he presented the competitions memorial to the Institute Council, a document which has had some practical effect in bringing about recent reforms of the Institute. Few of our readers have forgotten his recent election as president to the Institute of British Architects. Whatever may have been urged by the supporters of the Council, there could have been but one opinion as to the pre-eminent fitness of Mr. Street for the post. As an exponent of the art side of architecture, he enlisted the attention and support of many of the leading architects, especially the younger members, and his recent utterances from the presidential chair at the opening of the session still ring in the ears of those who listened to him, and must have convinced even his opponents of his earnestness in the cause of art and professional reform. Turning from his active career as an architect, we may refer to Mr. Street's position as an exponent of architecture. As a lecturer, he was always worth listening to for his earnestness and vigorous advocacy of Gothic principles. Our own pages have, from time to time, teemed with the results of his consistent teaching. As long ago as 1859, he made an appeal on behalf of the study of the Mediæval architecture of Italy, which appeared in a letter in our pages, in reply to Mr. Parker, and delivered lectures on the same subject (*BUILDING NEWS*, January 7, 1859). In 1879 he delivered a lecture on his favourite phase of Gothic, the Early English, before the St. Paul's Ecclesiological Society, a paper marked by thorough knowledge of the details of this beautiful period, which was reported in full, and illustrated by diagrams, in the *BUILDING NEWS*. As lecturer on architecture at the Royal Academy, Mr. Street has had no equal of late years, and his election to the Chair of Architecture was a well-paid tribute to his ability. We need not here say much of the thoroughness, learning, and earnestness shown in the course of lectures he gave at the Academy, which were reported in full by us at the time. They were masterpieces of teaching, clear and incisive in style, and though they clearly expressed the author's preferences, they showed him to be an accomplished student of other great schools of art, and one who could sympathise with Classic as well as Gothic design. The preliminary lecture was especially excellent in its enunciation of sound principle, and the thoroughly good advice it gave to the student of architecture, and we may express a hope that the few lectures delivered by him will be published in due course.

Mr. Street was the author of several important works. The "Brick and Marble Architecture of North Italy, in the Middle Ages," 1855, was a work which followed Mr. Ruskin's celebrated book on the Stones of Venice, and was written when its author's impressions of Italian Gothic were strong and vivid, and the influence of the style may be seen in many of the earlier works of the author, as at St. James', Westminster. The book exercised a powerful influence over the Gothicists of the day, though it is well to remark that Mr. Street's taste under-

went a change in favour of a more Northern style. The "Brick and Marble Architecture" was followed by "Some Account of Gothic Architecture in Spain," 1865, another work evincing a keen feeling for and appreciation of the more florid types to be found in that country.

Mr. Street's position and character as an architect, and a due estimate of his work, may safely be left to the dispassionate judgment of posterity. He was always sincere in his views, and fearless in asserting them, and he will ever hold an unrivalled position as a Gothicist who caught up the Gothic spirit in its thoroughness and integrity. As a thorough Churchman he had a real sympathy with the style he practised, and seemed ever to display those capabilities which we are accustomed to associate with the Mediæval masters. No other great Gothicist of our own age, save perhaps Pugin, ever devoted so much time and thought in the preparation of his designs, and as we are told on the best authority, no architect who ever lived drew so much with his own hand as Mr. Street. It was this practice which has stamped on all his work so much individuality of character, and the personal interest in art the deceased artist never failed to inculcate in all his spoken and written utterances. The value of draughtsmanship, pure and simple by the hand and eye, unaided by instruments, was ever enjoined by him on all students. Mr. Street's inaugural address at the Institute was a strong protest against the flippant style and meretricious kinds of display aimed at by many architects. How strongly he insisted upon the necessities of plan and construction, few will forget who then heard him. There is one quality in all his executed works, and notably the New Law Courts, which may well be referred to, and that is the massive character of his work. Mr. Street was never tired of dwelling on the value of real durability in building as far above every other consideration, and the employment of ornament only when it could be well afforded. The New Palace of Justice has been the subject of many adverse critical remarks, and the question of the real authorship of the plan, which is its greatest merit, has been already again raised, not very gracefully we think, by an anonymous writer. We are, at any rate, glad to see that the architect most interested in this matter—one of the four architects who are all that remain out of the ten who took part in that ever memorable competition, has promptly recorded his testimony to the fact that "Mr. Street has stamped the impress of his own fertile imagination not only on his plan, but on every detail and feature of his work," and that "none can rob his memory of any of the honour due to his genius alone as the designer of the new Palace of Justice."

Like others of his professional brethren, who, it might be thought, could have little in common with the art instincts of its designer, Mr. Street had his scheme for the completion of our metropolitan cathedral. Our readers may remember that we have more than once expressed our conviction that his proposal to retain the choir as at present for ordinary services, and to erect a second altar of more magnificent proportions under the dome, always seemed to us the most sensible of the many suggestions made from time to time, and the realisation of his idea would, it seems to us, be no unfitting memorial of his name, if such should eventually be contemplated, in addition to those which he built far and wide for himself throughout his short but active life, and of which few knew the full extent, so absent was there any disposition in their author to talk about his own performances. One of his latest letters to us recalls the modesty with which he shunned anything like ostentation or flattery. After his acceptance

of the Chair of Architecture at the Royal Academy, we had begun, naturally enough, to speak and write of him as of his predecessors. In a letter written just after the delivery of his inaugural address to the students at the Academy, he remarks:—"I notice you have begun to speak of me as 'Professor Street.' I hardly know myself under that designation, and should, indeed, be glad if you would not continue to use it." Whether this disinclination to wear titles would have extended so far as a refusal of that which must, sooner or later, have been pressed on his acceptance on the completion of his great work, we cannot say; upon all such titular distinctions, at any rate, he could well afford to look with contempt.

The Dean of Westminster has, in accordance with the prayer of the council of the Institute, supported by Sir Frederick Leighton, P.R.A., sanctioned the interment of the remains in Westminster Abbey, and the funeral will take place on Thursday next, the 29th December.

In the height of his fame, writes the *Guardian*, but before his work was done, has passed away one of our most distinguished architects. There is something more than usually pathetic and touching in the close of his brilliant career at such a moment. For the great work, which has employed him for so many years, and of which the manifold anxieties have probably tried his health and strength to the breaking strain, is upon the point of completion. It is as when the ship founders within sight of the port—as when the racer drops within reach of the goal. A work like that of the Law Courts could not go on without not merely much criticism, but much contradiction and dis-paragement. While gradually rising, and before the whole plan had disclosed itself, expressions of misgiving and disappointment might escape even friendly lips. But the architect, who saw the whole as it would be in imaginative vision, could look forward to the time when the effect of the completed whole would furnish his answer to objections founded on partial judgments, and justify his design by revealing the idea which had inspired it. We have seen successive portions of the building rise and extend themselves. We have seen scaffoldings disappear, and exhibit portion after portion of the finished, the highly finished, detail of the structure. A little while longer, and all that was planned would have been realised; and the architect would have had the knowledge that the work had received his care to the last, and that as a whole, and as perfect as he could make it, it represented what he intended. But there is a wide interval between *almost* and *completely*. He has not been allowed to see the end of the greatest of his efforts. Mr. Street's merits as an architect will be more properly judged elsewhere than in a hasty notice. But one or two points occur at once. No one had a greater sense of his calling as one of the fine arts. He studied it with enthusiasm, and with serious thought on its principles and purposes. He was an indefatigable observer, and his range of observation was very wide. He had a keen sense for all that is original and characteristic, and his ready and skilful pencil was always at command to record what he noted. And he himself in temper and genius was original and bold. Daring is not always a guarantee for success; but in Mr. Street's work there was always the mark of an idea which he wanted to express, and which he not seldom expressed with striking distinctness and nobleness, often with great beauty. But beauty was not what he first aimed at. It came, and it was welcomed, in the train of severe adaptation to the purpose in view, and with severe subjection of all subordinate detail and ornament to the main end and character of his work. But he never went out of his way to bring it in; he never sacrificed anything of truth and force to purchase it. He was a very genuine worker and a very genuine man. The Church has lost in him not merely a servant who thought nothing that his art could furnish too good for its service, but an intelligent and earnest member, who took the deepest interest in all that concerned its hopes and its difficulties. He has left his mark in great and

well-known churches, with which the world is familiar. But there are not a few persons, we imagine, who can remember how in some obscure country parish, Mr. Street has given ungrudgingly time and thought and pains, and has taken as much personal interest in making a plain village church suitable for G.D.'s worship, in all soundness of work and fitness of arrangements, as if he was watching over the rising magnificence of a cathedral. The Church and the clergy of England owe him a great debt, not merely for the work which he has done, but for the example which he set of religious devotion in the application of his art, and for the conscientious care which he showed that what he undertook for religion should be carried out as worthy of a purpose which he thought the highest an artist can set before himself.

Of Mr. Street's works we have illustrated the following:—New Law Courts, original block plan in the *Building News* for Feb. 22, 1867; original design (bird's-eye view) May 24, 1867 (N.E. angle) June 7, 1867 (interior of central hall), Sept. 3, 1867; (Strand front and new Temple Bar) June 26, 1868; the Embankment design, April 23 and May 3, 1871; the accepted design as carried out (Strand front), Nov. 17 and Dec. 8, 1871; (public staircase to galleries), Dec. 1, 1871; (interior central hall), Sept. 26, 1873. Cathedrals: Christ Church, Dublin, restoration, May 26, 1871; (St. Mary's Episcopal, Edinburgh, competition design), Jan. 10 and 17, 1873; (Bristol, new nave), Oct. 20, 1876, and Sept. 2, 1881. Convent (St. Margaret's, East Grinstead), Dec. 18, 1868. College (Wilberforce mem., Cuddesdon), Aug. 6, 1873. Churches (SS. Philip and James, Oxford), Aug. 30, 1861, and Feb. 20, 1863. (St. James the Less, Garden-street, Westminster), May 2, 1862 (St. Mary, Stone, near Dartford), April 10, 1863, and June 23, 1866; (St. Peter, Burnmouth), Nov. 27, 1863, and May 3, 1879; (St. Mary, Clifton), Dec. 16, 1864 (and four page illustration), August 4, 1865; (do. *rescotos in*), May 9, 1873; ("Crimean memorial, Constantinople"), Aug. 21, 1878; (St. John, Torquay), Oct. 16, 1868; (Teddington-park, Cheltenham), Jan. 7, 1870; (St. Saviour, Eastbourne), July 15, 1870; (Teddington), Dec. 20, 1871; (English ch. Rome, selected design for), May 24, 1872; (St. John, Moordown, Burnmouth), Aug. 29, 1873; (Kingsmead, Dorset), Sept. 4, 1874; (St. Mary, Southampton, D.C.), 21, 1877; (St. Mary, Speenhamland, Newbury), May 30, 1879; (St. Mary, Holmbury, Dorset), Sept. 19, 1879; (St. Mary, Monmouth, restoration and additions), Oct. 31, 1879. Rectory (Wigan), Oct. 3, 1873. Memorial brass (Sir Gilbert Scott, Westminster Abbey), Sept. 12, 1879.

Among his published works are: "Distinctive Features of the Middle Pointed Churches of Cornwall," a pamphlet, 1850; "Churches at Lubeck," pamphlet, 1854; "Brick and Marble in the Middle Ages; Notes of a Tour in the North of Italy," with illustrations by the author, issued in 1858; "Urgent Plea for the Revival of the True Principles of Architecture in the Public Buildings of Oxford University," 1858; "Architecture in the Thirteenth Century," 1863; "Gothic Architecture in Spain," 1865; "The Study of Foreign Gothic Architecture, and its Influence on English Art," 1868; "Report to the Dean and Chapter of Christ Church Cathedral, Dublin," 1868; "The Site of the New Law Courts," a correspondence with the late Prof. E. M. Barry, extending over 1869-72; "The New Courts of Justice," a reply to Mr. Jas. Ferguson and others, 1872; "Remarks and Suggestions on the Scheme for the Completion of St. Paul's Cathedral," in which the author proposes to retain the choir as at present, but to erect a second altar under the dome—in 1878. In 1858 Mr. Street drew the illustrations to the Rev. J. Barrow's book on "Soulmore Organs," and in 1869 he read a paper on Cathedrals at the Liverpool Church Congress. Before the Royal Institute of British Architects Mr. Street read the following papers:—"Churches of Le Puy en Velay in Auvergne," in January, 1861; "Restoration of St. Michael Penkevel Church, Cornwall," in December, 1862; "English Woodwork in the 13th and 14th Centuries," February, 1865; "Differences of Style in Old Buildings," November, 1869; and his inaugural address at the opening of the present session on the 7th ult., which will be fresh in the memory of all.

FINE AND DECORATIVE ART EXHIBITION.

THE second exhibition of pictures and works of decorative art was opened at the "European" Galleries, New Bond-street, last week. The collection of oil-paintings and water-colour drawings, which is, we understand, a new feature of this exhibition, comprises many works by artists of repute. On the first floor the visitor will find several noticeable pictures. L. Valles, in the "Poisoning Scene in Hamlet" (214), has been happy in the grouping and colour of his admirable picture. "Night and Sleep" is an imaginative study by E. Pickering, who has certainly caught somewhat of the spirit of Mr. Burne-Jones' style, though at some distance. One of the finest

marine subjects is Walter Shaw's "Off the Coast of Cornwall"—a very fine example of this artist's skill as a marine painter; the reflection of the setting sun on the water, the splash and spray of the waves as they rebound from the rocky headland, are painted with much technical power. We notice also No. 222, 235, and J. Pettie's "Lady of the 17th Century," as pictures of mark. A. Ludovici, jun., is the painter of two clever studies, "Clown" and "Pantaloone," and J. R. Herbert, R.A., contributes, "The Ridge of Hampstead Heath," known as the "Painters' Walk," "Ups and Downs," "Windsor Castle," and other landscapes, in his finished style of execution. Clara Montalbi's "Funeral at Venice" (250), a large picture, of considerable power, is full of the poetic feeling and luminous atmosphere which characterise this lady's work; the architecture is the least satisfactory part of the performance. "La Manola au Balcon" (258), a dark Spanish lady at a balcony, by A. Robert; J. E. Maxfield's "Young Lord," H. Muckley's "Flowers" (269), F. W. Topham's "Christening Party" (272), C. Calthrop's "In the Garden," are all admirable. We must notice also in praise a reduced copy of L. Filde's Royal Academy picture "Betty," a well-known and pleasant study of a girl coming out of a corn-field with a bucket on her arm; E. Barclay's "A Kabyle Woodman" (284), A. Bouchet's "A Negro Melodist," both feelingly painted, and a very pleasant group, "Still Life" (313), by S. Carter, jun., and the admirable truthful little study, "The Brook Side," by R. Collinson, next. "The Border Country," by J. W. Oakes, A.R.A., is thoroughly natural and vigorous in handling. The wild expanse of moorland, backed by dark mountain, and the grassy foreground are painted with much real feeling and power. E. Parton's "Still Pool," is another large picture of merit. We notice a replica of A. Ludovici's, "Le Feu Follet," in the Suffolk-street Gallery; and on the screen we remark several pictures by eminent masters. "Dwellers in Tents" (339), by F. Goodall, R.A. "The Shoemaker's Shop" (340), a lightly sketched study, by Capo Bianchi. J. Ammonier's "View in the Cotswold Hills" (341), "Emblems of Life," by J. R. Herbert, R.A., and a charming bit of finished execution and colour, "A Stranger in my Studio," by L. Alma Tadema, R.A., equal to this master's power as a delineator of *objets de luxe*.

"The Boyhood of Raleigh," by J. E. Millais, R.A., a study for a picture at the Academy is broadly painted in Mr. Millais's best manner. The young navigator is seated on the shore, his hands folded across his knees. A. Hennebiq in 356 has a highly finished incident, "A Sale of Objects of Art" (356), in which the grouping of the dealers in curios is excellent. No. 354 is a clever twilight effect.

The water-colours comprise several works of merit. Towneley Green's "Windfalls," Birket Foster's "Rome" (124), G. Truefit's "Design for Houses at Worthing" may be noticed in passing through the gallery. Madame de Cool has some choice paintings of flowers, No. 146, for example, crisp in drawing and rich in colour. No. 147 is another group of drooping tulips, very cleverly drawn. Kate Hastings sends "Autumn" (153) and "Spring," two studies in a light decorative key of colour. "Leaves from a Sketchbook," by Bernard Evans (168), is clever; we notice also a feeling sketch of "Cornfield," by J. Syer, jun.; J. D. Linton's "Day Dreams," a cleverly-drawn study of two girls, draped in yellow and scarlet—two colours which hardly blend agreeably. "Buy an Apple, Sir," is a skilful drawing of a little girl by Adrian Stokes. J. Orrock sends a pleasing landscape (174)—we note the same artist's clever sketch of oak, "In Charnwood" (185); a view of Abergavenny,

by H. Canty; "Lincoln," by A. B. Donaldson (191), and two clever sketches by Bernard Evans (193, 194), broadly handled, of "Summer and Winter." The wild winter's night depicted in 194 is drawn with much vigour. The same artist's view of Barmouth from the hills has fine depth of tone: the round-headed trees and distant blue sea have an almost oil-like opacity. Drawings in monochrome, and several etchings and engravings, are on view.

The works of decorative art are interesting. Chief among these we may draw attention to Felix and Wayman's art furniture. The cabinets, and Chippendale and Heppelwhite chairs in mahogany are good reproductions of the 18th century style. Maw and Co., Broseley, contribute specimens of mosaic tiles and pavements in Anglo-Roman style, some well-designed conventional floral tiles, hand-painted, intended for fireplace decorations, &c. We note, also, a display of art tiles by J. R. Thomson, Southwark, and painted plates by Bessie Guillod and Mrs. Mallam. A case of very fine faience by Boulenger and Co., Choisy-le-Roi, Seine, is on view, the faience being delicate cream colour, with ornament in alto relievo, decorated with gold, also *pâtes sur pâtes*, &c. E. Tourteau is also exhibitor of some choice faience, painted plaques, &c., worth notice. A pair of cloisonné enamel Chinese vases, by Mr. W. F. Ingram; and a case of Limoges enamels deserve attention for their beauty and delicacy of execution; also a case of rare goldsmith's work and jewellery by Messrs. Haneock. Choice specimens of Henri-Deux ware, by H. Boulenger, and of modelled faience, barbotine and plaques by E. Schopin; and bijouterie, painted in enamel, and some terra-cotta ware are exhibited.

Several examples of tapestry, by J. Hungerford Pollen, decorative panels by A. H. S. Westlake and B. Guillod, and ceilings are on view; we notice a very rich wall-decoration by G. C. Haite, in which the "Sunflower" has been adopted. The foliage and flowers are boldly drawn on a gold ground, with a dark dado. Messrs. Wylie and Lockhead, Glasgow, are the exhibitors. A design for a chimney-piece frieze in marble is also shown. The Lincrusta-Walton and the Papyrotile Company have specimens of their respective wall decorations well worthy of inspection. We must mention also some memorial and other brasswork by T. J. Gawthorp, Long Acre, and a terra-cotta statuette, the "Mother of Moses," by T. N. MacLean. The Ceramic Goods Co. have a stand of specimens of their hardware, called "inlaid chromo-litho vitreous ware," in various colours. The designs on the plates and vases are inlaid, and the colours are in good taste. The ware stands any amount of scratching or rough usage, and is extremely hard and durable, and likely to come into general requisition for artistic purposes. The Decorative Needlework Society have specimens of some choice embroidery and screens, and the decorative needlework of the College, Stratford, &c., may be looked at. There are also examples of decorative ironwork or enamelled iron by Willing and Co.; some wrought-iron lamps by L. Wilhelm, and other metal work, may be noticed. The model stamps for stamping designs and patterns on linen and fabrics for embroidery, shown by Hans Denk, are worth the visitor's attention. Those interested in decoration, French art faience, sculpture, tapestries, enamels, and jewellery, will be repaid by a glance at the European galleries.

SOME NOTES ON ANCIENT FLOORS.

IT may not be generally known that floors have attached to them a history which, to be made interesting, requires only to be

* The late Mr. W. Burges, A.R.A., won the competition for this church, but Mr. Street, who was placed second, carried out the work.

chap'ered out into dates or periods by the technically educated chronologist.

The use of floors for dwelling-houses—and under the name “floors,” we are referring mainly to the surface covering of floors, such a surface as flooring boards nowadays usually supply—is one of such antiquity that a history of floors is to be dated back to the most remote times.

Far away into by-gone ages, and long before a primitive civilisation created for the nineteenth and following centuries, records of flooring, or any other forms of architecture, the cave-dwelling tribes of these islands made for themselves floors to render warm and dry their secret recesses. Had we time and space at our disposal, we should experience no great amount of difficulty in tracing the progress of architectural civilisation, from the times when these barbaric tribes strewed over their cave-bottoms bundles of dried rushes, to later days when powdered and dampened clay, mixed with these rushes, rendered the same floor more or less damp-proof, and passing onward, and over the period when mosaic and tiled floors were common, to the introduction of wooden floors, until, eventually, we arrived at the times when those what may justly be termed “Art Floors” were constructed, we could refer our readers to those splendid specimens of parquetry flooring now to be seen in most of the European capitals. The palaces of the nobility of Russia contain some of the finest examples of mosaic wooden floors, and there are many of these of which it may truly be said that they are of wondrous splendour. Perhaps the most wonderful of all these specimens are to be met with in the palaces of the Czar of Russia.

There are large floors in the Winter Palace of the Czar, constructed entirely of small squares of tropical woods, and it is said that one of these large spaces is made up of pieces of wood, none of which exceeds an inch square in size. In the Summer Palace of the Czar of Russia there is, in particular, one splendid specimen of mosaic flooring. It is entirely made up of small squares of ebony wood, extravagantly inlaid with mother-of-pearl.

But although the subject or history of floors is not to be treated in this paper other than in a discursive way, there is, nevertheless, sufficient space at disposal wherein to touch upon a good many matters of interest connected with the floors of by-gone periods. We have had furnished to us, by means of the recent excavations, conducted by Dr. Schliemann at Troy, examples of the floors of the flint or pre-historic age. It is extremely unlikely that there will ever be any earlier examples than these furnished to us. The floors brought to light are found to have been made by means of reeds having been laid across the posts, and then covered with powdered clay. This primitive form of manufacture, and one which is adopted by some of the birds of the air in the building of their nests, has formed the basis of a plan for several of the patented floors of recent days.

We do not find that floors were ever boarded over with wood until houses had attached to them an upper story. There have been a good many examples of ancient floors preserved by the great eruption of the volcano Vesuvius, which, in A.D. 79, overwhelmed the Cities of Stabiae, Herculaneum, and Pompeii, and which caused them to lie buried under horizontal beds of loose tufa and lapilli until the middle of the 15th century. The disentanglement of Pompeii, which began in 1755, has brought to light valuable specimens of mosaic and tile-flooring, which the extravagant luxury of the age greatly affected. Some of these floors are made of marble. In no instance can it be found that wood has been employed. The extraordinary freshness of the

colours of the unearthed floors at Pompeii, and their great beauty of design, show clearly enough that in those days to the securing of an elegant floor a great amount of attention was paid.

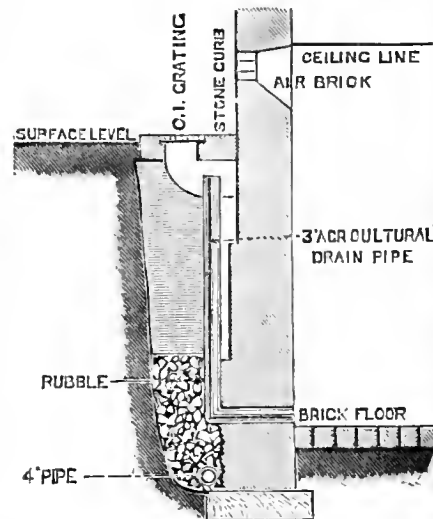
We are not able to find any distinct records of wood having been employed for the boarding of the floors of dwelling-houses until towards the latter part of the middle ages, when an upper story began to be attached to middle-class houses in consequence of the increased value of land. The most abundant specimens of these early wooden floors are to be met with in London, probably for the reason that land being of higher values there than elsewhere, upper-storied houses were more common. The name of “lofts” was given to these upper storied rooms on their first introduction, from whence we have the compound word sentence of “up-a-loft,” and the word “cock-loft” has, probably, the same derivation, for we find it now to be occasionally employed in some of the villages in the Midland counties to signify an up-stairs bedroom.

Wooden floors appear to have had their origin in Sweden, and this, probably, for the reason that wood was there the most convenient and abundant material at hand. With the rude implements and tools common in Sweden two or more centuries ago, and with the primitive notions of joinery which the inhabitants possessed, very rude flooring-boards were, as might have been expected, turned out. For instance, no attempt was made to reduce the flooring-boards to a parallel width. On the contrary, they were laid down with all the natural taper of the tree, from which they had been cut, preserved. By reversing each board, however, and by placing together alternately a broad and narrow-ended board, a tolerably close-jointed floor was secured, although a rather peculiar appearance was the result.

Those wooden floors are yet exceedingly common in all parts of Scandinavia, and the primitive method of manufacturing them is resorted to in some parts of Sweden and Norway at the present day. The Early English custom, now out of date, of strewing rushes over the floors, as a sign of welcome to coming guests, is still common in all parts of Sweden, although the tassels of pine-trees are there substituted for the rushes, on account of the resinous exhalations which the pine-leaves emit, and which are greatly esteemed by the Swedes for their supposed hygienic properties.

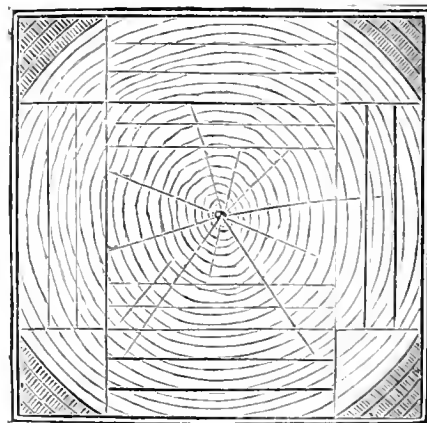
In England, and just previous to the general introduction of wood flooring-boards, the floors of dwelling-houses were mostly made by plastering a concrete preparation over reeds, the latter of which were fastened to the joists. When the concrete became dry it assumed the character of a solid slab of unbroken stone, and inasmuch as it was strong enough to bear a heavy load of itself, without the aid of the supporting joists, and because it was fireproof, the plan produced a good floor. Its demerit was that it struck cold, even through the carpet with which it was usually covered. A good many examples of these concrete floors are to be found in the country-houses throughout the Midland Counties of England, and most of them are in a most excellent state of preservation—thus proving that they are of a very lasting character. Two cogent circumstances induced to the general adoption of wooden floors. These were, firstly, the repeal of the duties placed upon foreign timber; and secondly, the introduction of steam-power planing-machinery. At the time that all flooring-boards were laboriously planed by means of hand-labour, as alluded to in our article in last week's issue of the BUILDING NEWS, entitled “Some Notes on Flooring Boards,” and when the duty upon foreign timber

added greatly to the cost of wooden floors, such floors were esteemed too much of a luxury to be covered over with carpet. A perfectly clean floor was then the delight of housekeepers, and a considerable amount of pains was bestowed upon the securing of one. For mansions and palaces English oak was usually employed, although fir-wood was nearly as much esteemed, and indeed, was almost as expensive, for the imported logs were sold at 4s. to 5s. per cubic foot. As will be seen by the subjoined sec-



tional sketches, about half, or nearly half, of the wood was not used.

The feather or grain of the firwood boards was highly esteemed, and it was displayed with as much effect as possible. The worst effect arising from strongly-grained wood being employed for flooring-boards was that, not being protected with any sort of covering, the grain soon worked up under the action of traffic into splinters, and occasionally very serious accidents resulted therefrom. The logs out of which the boards were sawn were imported either from Archangel or St. Petersburg, and for the purpose of flooring they were always selected with peculiar care. They usually came in sizes varying from 15 to 18 in. square. There are no similar logs reaching



this country nowadays, the wood being always sawn into deals or boards on the other side, and so reaching us in a converted form. The annexed sketch, showing in what manner the boards were cut out of the logs, explains with what care the sap-wood and the shaken part of the heart were avoided, and it will also show how the feathered or grained wood was secured.

The logs were cut by hand-sawyers, who were, for the most part, a drunken and degraded lot of workmen—men whose presence could never be relied upon, and who

in consequence of the demand there existed for them, gave themselves such "airs and graces" as to earn for themselves the ironical title of "lords of the building trade."

Of course, the system of cutting the logs varied somewhat in accordance with the peculiarity of the log being cut, but the main principle, as shown in the sketch, was adhered to.

The boards, being planed, were put together with dowels, and any show of nails was most carefully hidden. Being laid, it was customary to keep the boards bright by applying a preparation of beeswax, and, with the aid of a large amount of "elbow-grease," a really beautiful floor was obtained. The economy and practicability of using machine-prepared flooring-boards, which have been furnished by the steam-power planing-machine, have caused these floors to be things of the past, and, although a good number of examples of these floors still exist in our old houses, we feel justified in ranking them under the title of "ancient floors."

We have, for the present, exhausted the subject of ancient floors, so far as we have felt justified in entering upon the details associated with them. Our sketch-paper, for it cannot be deemed to be anything more, has merely touched upon a history which, extended, is capable of furnishing material enough for a folio volume. But, before we place aside our pen, we desire to call the attention of architects to the eminent practicability of employing some of the beautifully-coloured and figured woods of the tropics for flooring purposes. There is mahogany, for instance, which would provide a floor that even our fastidious ancestors might well envy. Good straight, well-coloured mahogany logs can be bought for about 4d. to 5d. per superficial foot of inch thick (nett measure). In well selected logs there should not occur more than about one-fifth of waste.

Reckoning 3d. per foot for the machine work required to be done in the cutting of the logs and in the planing of the boards, it will be seen that prepared mahogany flooring-boards could be produced at about 7d. per foot at the most, or about 58s. per square, which is not more than an ordinary wooden floor costs when covered with carpet. For library or smoking-room floors mahogany would be highly suitable, and nothing could surpass it for beauty. There are other goods to be got which are cheaper than mahogany—American walnut, for instance—which would also make an elegant floor; but to the former wood we attach our preference. It has many qualities to recommend it; its beauty of grain, its rich colour, its unshrinking character, its tenacity with which it holds to nails, and lastly, the fire-resisting quality which it unquestionably possesses.

TECHNICAL EDUCATION AND ART WORKMANSHIP.

IT would be very hard to find a subject connected with art in these latter days of more import than that of what is so familiarly termed, Technical Education, and that this is so is sufficiently proved by the fact that an English Royal Commission on Technical Education has been busy in Paris for some time past in visiting the higher, the secondary, and the primary instruction schools, and more especially and particularly those in which manual and technical instruction is provided. Their special object, we are told, is to inquire into the education of those engaged in "manufacturing" and industrial pursuits, and includes the bearing of that instruction on the industry of the country in which it is given. Their commission is thus not a little wide and comprehensive, for they are to enquire into the state of instruction in

the districts in which cotton, woollen, and silk manufactures are carried on; and, also, which so nearly touches ourselves, into the pottery manufacture as it now is in other countries, and to find out what are the resources available for the like purpose in the pottery districts in this England of ours. Truly a subject of no small interest. The commissioners have, it would appear, already commenced their labours by visiting Yorkshire and Staffordshire. It is also the intention of the commissioners to visit Germany, and they have, indeed, as it is, already set on foot, in Berlin, some preliminary investigations.

Now this, as it appears to us, is a very important matter, and when looked into closely, exhibits a state of things not a little curious and instructive; for might we not in the first place ask how it is that we, who have had an architecture for some centuries in the past of our own, need to go into foreign parts for any such purpose as is here indicated? For it is to be observed that we are going into far off places, not simply to learn what they in foreign parts are doing, for purposes of simple comparison, but to learn a something and a somewhat of them, and then to profit in some way or the other by it; and, in short, if truth must be told, to copy their ways of work, if not the very work itself. But few will, in all probability, demur to this; but if any do so it may, perchance, occur to them to ask how it is that we are not sufficient unto ourselves, and able, not only to do our own work, whatever it may be, in our own way, but to offer it to others as exemplars of that nationalised and individualised work, and as evidence too of what we, as a distinct nationality, can do in art in this nineteenth century, and what the results are of our educational system, in so far as it influences fine art, and the production of objects of fine art. It would be impossible, as we take it, to find a subject of more curious and instructive import than this, however looked at.

And here, in the first place, let it be observed that the especial object of the commissioners is to ascertain what the foreign systems are of fine-art instructions, and what they are now doing in the "drilling" (there is no better or more accurately descriptive word) of bodies of students or workmen and workwomen, in the manipulative power, and in combination towards the production of a given art result, as a plate, or a dish, or a cup or saucer, confining ourselves, by way of illustration and simplicity of outlook, to works in clay and china-ware. There is no better or more useful illustration possible, or one more universal in its application. It would be impossible to do without art, and fine art, in the production of objects of burnt clay. No mere goodness of form—mere form, or outline—will suffice. There must needs be more than this: there must be drawing, and outlines, and colour, and even pictures in it and on it; and the great question then really is not alone who is to do this, but how is it to be best done, and what is the best system, or practical way of doing it. And here it is that we may well go back into the past of things, and into far-off and distant countries, and centres of art action to find out what has been done, in them, under conditions so widely different from anything we see, or can find, round and about us, always bearing in mind that in this, our clay machinery, of which the old world never dreamed, can, if need be, do all but the whole of the work.

We shall then look forward, with no small curiosity and interest, to the report of this commission of inquiry into such a subject, for it is only by inquiry on the spot, and in each special spot, that thorough and exhaustive answers can be got to the many and great questions involved. We do not dare to anticipate what the result of this inquiry may be; but there can be but little doubt,

that in these days, and certainly in all civilised, and the highly civilised centres of Europe, e.g., Paris, Berlin, and the other great centres of art manufacture, the system in the main is the very same, and that the work, whatever it be, is more or less divided, and that the object, whatever it is, is the production of a given number of hands, and that the same object passes perhaps through a number of stages, and that the very simplest and most common object, designed and manufactured, is the result of an ingenious application of art labour ingeniously divided, and so apportioned, as to most economically utilise the artistic and manipulative power of each workman, as a working force, the design being already prepared for him or them. We had from the late Herbert Minton, the well known manufacturer, some important details of his mode of work in vogue in his own manufactory and workshops, and he always contended that the division of labour, thus applied, was a necessary consequence of our modern idea of art, and art manufacture.

But how different all this, whatever its advantages or disadvantages, from the old-world and antique way of work, and how different the art action of the workman and workmen who, in past days, did bring such objects into the world's markets, or into their own markets. We are often reminded, in one way or another, of this wonderful power of organisation, and of the wonderful results of this division of labour, whereby an object, or rather the raw materials for it, enter at one door of a long room, and after passing through a number of "hands," each doing a little to it, passes out of the opposite doorway a finished and complete art object, and the more fully and in detail this can be done, no man working with his right hand knowing what his left is doing, and the more effective the organisation which produces it, the better is it fitted for the world's market, and the cheaper it is, and, consequently, the more widely diffused. Indeed, as Minton boasted, it then must needs go round the world, and it certainly does so, and it may, therefore, be a question indeed, as to how far, and how deeply education has helped, and how far it is likely to help, or to hinder, its development in the future. And this, as must be admitted, depends a good deal as to what is meant by "education" in its art aspect, and as to its influence on the mind, and even manual power, of the executive workman; and more than all, as to how far, and in what way, he can, as an individual, make use of it, and thus compel the world to look at his work.

How curious, then, it would be if the imperial commissioners, after looking at the now so universal ways of work, as they are doing, could, but for a short hour, get but a glimpse of, say, an "Etruscan" workshop, such a one as must have been common when the famous "vases" were moulded into form and painted, and could they, at the same time, get to see, for a passing moment, the workmen at their work. The shop, itself, could have been but a rough one, and the mechanical appliances but of rude construction; no steam-engine most certainly, and the *modus operandi* of the human element in this rough workshop would, indeed, have surprised the imperial commission, for each individual workman must needs have been an artist himself. Let the vase-room in any one of the capital cities they visit bear its testimony to this, and the longer, and more closely the objects, one by one, are looked at and studied, the more emphatically will the truth of it assert itself. In the rough days of the old world, the workman was himself an artist, however rough and uncultured he might be, and our own museums, and those on the Continent, sufficiently prove and bear this out, for in them we do, indeed, see, not alone the work itself, e.g., a Greek vase, and its form, and outline, and

the drawing in it, and the painting; but we do see as well, not alone the workmen, but the workman, and the artist, however rude. We cannot but hope that the imperial commissioners will look well into this phase of this curious subject. C. B. A.

OBITUARY.

DECIMUS BURTON.

IN Mr. Decimus Burton the profession has lost one of the few surviving links which connected the present with the past generation of architects. Mr. Burton was one of a band of architects of which Holland and Nash were the leaders. He was born in 1800, and was the son of Jas. Burton, the only survivor of the family. In his father's office, and that of the late Mr. Geo. Maddox, he received his architectural education. His principal works were commenced between 1823 and 1826. These comprise Holwood House, Kent; improvements at Tunbridge Wells for Mr. J. Ward; and at the same time Grove House, Regent's Park, for Mr. G. Greenough; and the Colosseneum, Regent's Park, for Mr. Thos. Horner. From 1826 to 1841 Mr. Burton was engaged on the buildings in the Zoological Society's Gardens, and from 1825 to 1846 he was employed in the design of the improvements and entrances at Hyde Park. The Royal entrance in Constitution Hill was from his design, but was not carried out in its integrity, and we believe was always a source of disappointment to the architect. His other principal works are the mansions of Lord de Clifford and Lord Stuart de Rothesay; the Athenaeum Club House, Pall Mall; Halford House, Regent's Park; Charing-cross Hospital, Rectory, Sevenoaks; additions to Pains Hill and to East Cliff House, Ramsgate, for Sir Moses Montefiore; Devonshire House staircase; the Marquis of Hertford's villa, Regent's Park; Broom's Hill; Burrwood; Boreham; Club Chambers, Regent's-street; Grimstone Park Mansion, Yorkshire, for Lord Howden; the United Service Club improvements; Dublin Phoenix Park improvements, the latter from 1834 to 1849. He was also architect to the Royal Botanic Society from 1840 to 1850, for which he designed all the principal buildings which were executed under his direction. Among other houses are Stanwick, built for Lord Prudhoe; Carlton House, Bentham Hill; Penhurst, Oakland; and Cagburn, Hastings. One of his chief works was the Palm House and Winter Garden at Kew, an illustration and details of which we gave last year, and which our readers may remember led to a question of the real authorship of the design. Mr. Burton's favourite style was monumental, and adapted itself to the public edifices he was called upon to design, but was ill-suited for domestic buildings, a branch of practice in which he ultimately managed to secure a large share. He, in fact, relinquished public works from a desire to avoid the disappointments and vexations incidental to it. One of his most successful designs for residences was the Doric villa he built in Regent's Park for Mr. G. B. Greenough. The portico in *antae*, and the circular bay with engaged columns group pleasingly together. Mr. Burton was at least skilful in making the severe Greek forms adapt themselves to domestic buildings, and some of his best designs show success in adapting the style for modern use; but the rising school of Gothicism were beginning to create a distaste for this inflexible style, and Mr. Burton, like a few others of his school, turned their hands to the design of Gothic houses, many of which he erected. Grimstone House, Yorkshire, is one of the most successful of his Classic residences. The design partakes of an Italian character, and its long front, enriched by an open order and a campanile at one end, is an example of Mr. Burton's taste as a designer.

Mr. Burton had a cottage residence at St. Leonard-on-Sea, a place his father started; but he lately came to live in his town residence, 1, Gloucester-house, Gloucester-terrace, Hyde-park, where he died last Wednesday week, at the advanced age of 81. He was never married. His remains were interred on Tuesday last at Kensal Green Cemetery. Mr. Decimus Burton was made a Fellow of the Institute of British Architects in 1834, and with the excep-

tion of his intimate friend, Professor Donaldson, was the oldest member of the Institute, has filled the office of vice-president, and was a donor to the funds of that body. He was also a Fellow of the Royal Society, and a Fellow of the Society of Antiquaries.

ANTHONY SALVIN.

The announcement of the death of Mr. Anthony Salvin, F.S.A., an event which occurred on Sunday morning, at his residence, Hawksfold, Fernhurst, Hazelmere, carries us back to the earliest days of the Gothic revival. The late Mr. Salvin, who has died in his 83rd year, commenced practice nearly sixty years ago, at a time when the enthusiasm of architectural students had been aroused by the recent publication of the elder Rickman's "Attempt to Discriminate the Styles of English Architecture," and early attracted attention by his adaptation of the formal Late Gothic, just then rising into favour in domestic work. Although he showed in his subsequent practice that he could work in all phases of English Gothic, from what was then considered Late Norman to fully-developed Tudor and even Renaissance, this Early Fifteenth-century style was that in which those which will be permanently regarded as his most successful works were carried out, and in all an infusion of a Scottish element, due to his early associations, is evident. As an architect, his works, which were to a very large extent executed for members of the aristocracy, were marked by a taste and a refinement much in advance of his age. Much of his earlier church work he would, doubtless, in his later years have been glad to have seen effaced; but the true principles of four Mediaeval ecclesiastical architecture were not fully comprehended in those days, and it should also be remembered that a church architect half a century ago had to educate and vigilantly watch at every turn not only his assistants, but yet more his builders and their foremen. Mr. Salvin was a well-read and accomplished gentleman; a good linguist, and an artist of great ability, but of such extremely retiring manners that his high attainments and social qualities were little known beyond a small circle. It is probably due to this cause—to his marked diffidence as to his own powers, and possibly to some extent to his commencing practice with the ambiguous advantage of possessing large private means independently of his profession, that he never became conspicuous in the learned societies to which he belonged, nor contributed papers to the Institute or the other bodies with which he was associated. He was a quick and vigorous draughtsman, and would with great rapidity sketch, always in perspective, for a client his ideas of what should be done. In the decoration of buildings he displayed a rich elaboration, which, in its day, was highly admired, and a fine sense of colour harmony, which will give his works a lasting interest. Mr. Salvin's earliest building of note was Moreby Hall, near York, built for Mr. H. Preston, a Tudor building of brick, faced with stone, with mullions and double transoms to windows, which was erected between 1828 and 1832. Mamhead, near Exeter, the seat of Mr. Robert Newman, was begun in the former year, and was not completed till 1838; it is entirely built of stone, and is a work of considerable size and importance. In 1837 he carried out and fitted up Seaford Castle, Sussex, for Mr. Hussey in the same early 16th-century Baronial style. To attempt to give a complete list of Mr. Salvin's works would occupy more space than is at our disposal. His practice was very extensive, and included the repair of palaces, the erection and restoration of castles, mansions, cottages, lodges, colleges, cathedrals, churches, banks, hospitals, bridges, and every class of building. As architect to the last and present Dukes of Northumberland, and a valued friend and adviser of the former nobleman, he designed and superintended the execution of work to the extent of many hundreds of thousands, including Alwick Castle, six district churches in Northumberland, besides three in Tynemouth; many cottages, bridges, and other improvements to the estate, in addition to Albury House, which cost £34,000. It may be noted that in 1870, a few years before the demolition of Northumberland House in the Strand, he added a new ball-room to that mansion. For these works, for the heads of the Percy family, the late Mr. George Smith, of the firm of Smith and Co., was the builder. Among his

other works we may passingly enumerate, roughly following the order of execution—Brancepeth Castle, where he carried out alterations and additions at the beginning and near the close of his practice; Moreby Hall, 1828-33, which cost £10,000; Methley Hall, for Earl Mexborough, cost £17,000; the additions to Farham Hall, Framlingham, for the Hon. G. F. Curzon; Barworton House, for the Hon. G. F. Hamilton, afterwards Lord Boyne, in 1835; Cowsley Hall; Durham University, 1835-40; Observatory and Cathedral, 1844; Grey-stoke Castle, for the Hon. H. Howard; Rufford Abbey, in "the Dukeries," for the Earl of Seaborough, 1838-40; Warden Hall, Chorley, for Mr. Ffarington; at Cambridge, masters' lodge, 1842, and two new masters' courts to Trinity College, 1859-61, Perpendicular in style; the restoration of Holy Sepulchre ("Round") Church; and at much more recent dates Trinity Hall, the new Anatomical Schools, and the new buildings of Caius College, of Jacobean character; Kelham Hall, for Mr. Speaker Manners Sutton, afterwards Lord Canterbury; repairs to Carnarvon, Carlisle, and Newark-on-Trent Castles; Ilafod House, North Wales, the erection of which was entirely abandoned after £21,000 had been expended; Narwerth Hall for Earl Carlisle, 1846-8; Peckforton Castle, Tarporley, for Mr. (now Lord) Tolemache, 1846-50; a 13th-century stone building fitted in o.k.; Tabley House, Cheshire; restoration of the choir of Wells Cathedral; Flixton Hall, Bungay, for Sir R. A. Adair; restoration of Rockingham Castle and Lanercost Priory; Pattendale Hall; Gurney's Bank, Norwich; extensive works at Balliol College, Oxford; yacht club-houses at Queenstown and West Cowes; Keele Hall, Staffs, 1855-60; Marbury Hall, Cheshire, Italian in style; Congham, Norfolk; Crosscigge, Foresby, White (Cumberland), and Somerset halls; Dunster Castle, for Mr. Luttrell; Manchester Hall, Cumberland; Warwick Castle for a long period till 1866; additions to Encombe Hall, Dorset, for Earl Eldon, £40,000; additions to Budball House, £11,000; and Thorsby Hall, in the Dukeries, for Earl Manvers, in the Renaissance style, one of the most charming and effective of his works. At the Tower of London he carried out, during a long series of years, only ended in 1873, important works, including the restoration of the Traitors' Gate, Beauchamps, Saltery, White, and St. Thomas's Towers, and the adaptation of the latter for use as the jewel-room; and at Windsor Castle, the new and piquant roof to the Curfew Tower; the restoration of the Hundred Steps; of the Embankment-wall to High-street; Henry VII.'s library; the Canons' residences, &c. Mr. Salvin practically retired from the profession 10 years since, owing to feeble health, but continued a few of his works, perhaps the last to be given up being the important commissions for Lord Leconfield, the restoration of Petworth Castle, and the new town mansion in Chesterfield-gardens, which by his desire were transferred to his lifelong friend, the late Mr. T. H. Wyatt. Mr. Salvin was one of the senior members of the Royal Institute of British Architects, having been elected Fellow in 1836, two years after its foundation; but beyond serving the honorary office of Vice-President, he never took any prominent part in its management; in 1863 he was awarded the Royal Gold Medal. For many years he had been a Fellow of the Royal Society of Antiquaries.

Mr. Salvin married the daughter of the well-known landscape gardener, Mr. Nesfield, who predeceased him, and he leaves a son Osbert and two daughters. His eldest son, Anthony, followed the profession of an architect, having an office in Adam-street, Adelphi, but died last year. Of the elder Salvin's assistants we may mention his nephew, Mr. Robert Nesfield and Mr. R. Norman Shaw, R.A., the joint authors of the well-known "Sketches." The funeral of the subject of our notice takes place to-day (Friday), at the quiet country churchyard of New Ground, Fernhurst.

ARTHUR L. BRADBEER.

Mr. Arthur L. Bradbeer, of Lowestoft, one of the earliest and most constant of the members of our "Designing Club," has, after an illness of only four weeks, been removed by death. He was attached to Mr. Chenene, of Lowestoft, and for several months afterwards an assistant of Mr. Angelo W. R. Simpson, of Blackburn. Since then he has had the charge of a new hos-

pital at Worthing, and returned home for a holiday in October last, having seen the hospital completed. He took a chill, broke a blood-vessel, and rapid consumption of the lungs supervened, and he died on the 17th of November. He was making his way well upward in his profession, when suddenly, with scarcely any warning, he was called away at the early age of 24.

ALFRED JAMES HISCOCKS.

Mr. Alfred James Hiscocks, F.R.I.B.A., and L.M.S.A.S., died on Sunday at his residence, Alfred Lodge, East Hill, Wandsworth, in the 76th year of his age. Mr. Hiscocks had been for 37 years district surveyor of Wandsworth and Tooting, under the Metropolitan Board of Works and their predecessors. He joined the Institute as an Associate in 1838, and became a Fellow in 1866.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

AT the ordinary meeting of the Royal Institute of British Architects, held at its rooms, 9, Conduit-street, W., on Monday, a paper on "The Artistic Treatment of Constructional Ironwork" was to have been read by Mr. Hugh Stannus, Associate; but, in view of the recent death of the President, Mr. G. E. Street, R.A., it was deemed advisable by the Council that the communication should be postponed. A letter of condolence from the hon. secretaries of the Architectural Association having been read, Professor HAYTER LEWIS, Vice-President, said:—Before I allude to the event which has just taken place, I have also the very unpleasant task of referring to the deaths of two other of our distinguished members and past vice-presidents, Mr. Anthony Salvin and Mr. Decimus Burton. Mr. Salvin was probably better known to the generation immediately before us than to the present, and he was known as a very earnest worker in the same cause as Mr. Street, whom he predeceased by but a single day. Many of our large castles and country seats owed their designs to him, and up to the latest period, I believe, his life was occupied in extensive restorations in London. Mr. Decimus Burton's works are well known. If I remember rightly, two of the clubs in Pall-mall—the Athenaeum and the Senior United—were his works, and you all know his work at the entrance to the Park. In his time there was no architect better known, and none ever more respected than Mr. Decimus Burton. I now have to allude to the business of this evening. The Council, of course, could not by any possibility postpone their meeting, the event having happened at so very recent a period. It was only about half-past ten on Sunday night that Mr. Street died. I told you at our last meeting that I had had an interview with him, and I likewise read a portion of a letter from his son, and I know what were the feelings of his physicians. Those feelings were decidedly hopeful, and the favourable signs continued throughout the week. Last Friday he was to have left town for Egypt, where he hoped to spend some short time in entire repose. It was a new country to him, and one which he always wished to see, and of which he would, no doubt, have made valuable use in his future writings. But, man proposes; God disposes. On Thursday afternoon, while sitting conversing with an old friend, an Academician, he was struck down heavily by a severe stroke of paralysis. The whole of the left side was paralysed, and he was rendered speechless. For some little time he was conscious. He suffered no pain, but from the first few hours after he was struck till he died he remained unconscious. He had, I need scarcely say, every possible advantage that the skill and science of physicians could bestow, and the love of his family and friends, and I hope you will not think me descending to trivialities if I add, the affectionate solicitude of the domestics about him. Mr. Street has been too much before the artistic world to need that I should give you much of his history, and you all knew him too well and respected him too highly to require that I should say much in his eulogy. To many of us he was known as a friend—heartily and cheery and ready of wit—giving and taking sallies and home-thrusts in the most playful way. Above all, he was sincere, fearless in asserting his own views, and no doubt sometimes came into collision with

others, towards whom he may have appeared to bear himself somewhat harshly. But who is there that feels strongly that does not speak and write strongly? And I know of no one to whom, from my personal knowledge of him, I could more closely apply the beautiful words of Shakespeare in the advice of Polonius to Laertes,—

"The friends thou hast, and their adoption trial,
Grapple them to thy soul with hooks of steel."

To all of us he was known as a skilful artist, a most powerful writer, a fearless champion of the views he considered right. Fearless of what others thought or of what the results to himself might be, he had the courage of his opinions, and he stuck to them through thick and thin, no matter what the loss of profit or place might be to him. To those who have known him by and in his works, he was a high-minded gentleman, a friend to all that was noble and true in art; ever ready to aid the progress of art in every shape, sparing no exertion of any kind that he thought needful, and attending to his work in all its details, which, indeed, he looked on as being as important as the whole design itself. He was an absolute master of every detail, and those who knew him well must often have been struck by his marvellous power of work. As an instance of this, I may tell you that in his great work, the New Law Courts, where there are hardly two windows or two doors which have the same moulding, there is not a single moulding from top to bottom which was not drawn out by himself in full size. Others will speak more worthily than I, but none can be more sensible of the loss of a dear friend, and no one can feel more keenly than I that a great power in art passed away when George Edmund Street died. It is hardly necessary for me to add that the Council have passed a resolution of condolence with the members of Mr. Street's family—his son, his brother, and his sister—and, as a mere form, I will ask your acquiescence in that resolution, for I am sure that you will all heartily and thoroughly endorse it. It is to the effect that the secretaries be requested to transmit to Mr. Arthur Edmund Street a letter in the name of the Council expressive of their sorrow, collectively and individually, at the loss they have sustained in the death of Mr. Street, and of condolence with the family in their sudden bereavement. I ask you to express your formal acquiescence in the action of the Council.

Mr. BEESFORD-HOPE, M.P., said:—I have a painful duty to discharge, and one which I should have shrunk from taking on myself; but, looking round the room, I find I enjoy the melancholy pre-eminence of being the senior past President here, and in that character I venture now to speak. I venture to come forward in this moment of solemn grief to make myself the mouthpiece of the Institute, as the institute, and not only of its governing body, to the world. In this dreadful year—forgive me if I talk with very strong personal feeling—in this dreadful year of 1881 we have been walking in *tenebris et umbrâ mortis*. I am glad there are only ten more days in this year to be passed, and I pray God they may not be days of catastrophe. I cannot help reflecting that it was just six weeks ago that I was standing up where I stand now, and was addressing him whom we now mourn, healthy, vigorous, earnest, delivering that grand, massive address, well argued, logical, powerful in tone, admirable in composition. We all were proud of him. Could any of us then have thought that in only six weeks we should have met as we are meeting here to-night? I feel that we have come to bury Cæsar, not to praise him, but we must say something. But you, Sir, have so clearly pointed out the great, good points of his grand character that I feel there is very little for me to add as to his honesty, his boldness, the way he conquered people by the conviction that about him was no trickery, no diplomacy in a bad sense, his fearless, earnest advocacy of what was right, and true, and beautiful—beautiful in the moral and in the material world. He has passed away young, but he has passed away in many ways full of honours; he has passed away our President; he has passed away ten years a Royal Academician; passed away just completing the monumental building of our own later generation—the New Law Courts. He has gone, following only by a short time his noble-hearted rival,

Burges. I could go on for a long time, but I should only by piling up words weaken the sorrow that wells up in our hearts. I move that that resolution be made the resolution of the Institute, and after that that we dismiss all other and less pressing business, and go away in sorrow to meditate on him we have lost, and to make him our personal and our artistic example of our own exertions.

Mr. CHARLES BARRY, Past-President, seconded the resolution. He could not forget that during the three years he occupied the chair of the Institute Mr. Street, as Vice-President, was his loyal coadjutor, a man much his superior in mental vigour and artistic power, but one who did not feel it inconsistent with the possession of those greater powers to give the chair every possible support. It was known, of course, that on certain points they thought it their duty to take different views, and had since followed opposite courses, but beyond that official difference of opinion the friendship between them, which had been the growth of many years and which was greatly cemented by their three years' association, never faltered for a moment.

The resolution was agreed to *sub silentio*.

Mr. HORACE JONES, V.P., City Architect, moved that as a fit tribute of respect to the memory of the deceased the business set down for the meeting be adjourned.

Mr. EWAN CHRISTIAN, V.P., seconded the motion, remarking that a great light had been quenched and that the art world had lost a prince and a leader.

The motion was at once agreed to, also in silence.

Mr. BARRY added that the senior Vice-President (Prof. Lewis) and the two secretaries had that day been appointed by the Council a committee to take such measures as they thought fit to do public honour to the memory of the late Mr. Street, and to make known to their friends, as well as time permitted, what arrangements would be made.

The proceedings then terminated.

LECTURES AT SMOKE ABATEMENT EXHIBITION.

AT the recent Smoke Abatement Exhibition Captain Douglas Galton, C.B., F.R.S., read a paper on "The Abatement of Smoke in Fires for Warming and Ventilation." We had now, he said, arrived at this point—that the absolute disappearance of smoke from manufacturing chimneys in England depended only upon the desire of the manufacturer himself to avoid smoke. It was certain also that if the smoke from domestic fires were stopped the manufacturers would soon follow the example, as smoke was only permitted to exist because the community was not sufficiently educated as yet to realise the necessity of getting rid of it. The removal of this nuisance would probably be a very slow matter, but it was indubitable that smoke seriously affected the health of those who breathed air polluted by it, and while it was not the only impurity of town air, it was a very serious one. The author referred to the fact that the evil of a polluted atmosphere in London was growing in an accelerated ratio, and now a persistent canopy hung over London which was only removed from one part of the metropolis to another by any but a very strong wind. He urged that all ventilating arrangements would be useless unless we could bring pure air through the ventilators. If it was admitted that pure air was a necessity we must be prepared to make some sacrifices in the warming arrangements in order to secure it. The methods of ventilating and warming in use in houses might be classed under three heads:—1st, the use of open fire-places; 2nd, close stoves or coils of pipes in the several rooms or passages; and 3rd, fresh air warmed either by a stove, or by hot-water pipes in the basement, and conveyed to rooms by flues. In the two last arrangements the coal could and should be burned without smoke. With the ordinary open fire there was more difficulty. The open fireplace of the old-fashioned pattern was undoubtedly the best engine of ventilation for a room; moreover, the open fire possessed many advantages as a means of warming. But with all its merits it was a relic of barbarism; and an ordinary open fire would not burn bituminous coal without smoke. In the Exhibition the numerous grates which claimed

to prevent the creation of smoke might be spoken of under three heads:—1st. Those which brought air warmed or otherwise to the top or back of the fire. The usual barrack fireplaces would, when the fire was attended to, prevent most of the smoke, and with trifling alterations would be almost entirely smoke-consuming. Under the same head Messrs. Burnard and Bishop exhibited, in the glow-grate, a fireplace which claimed to prevent smoke. Griffin's grate would also fall under this head. 2nd. Those which drew down the gases and flame through the fire to unite with warmed air, or otherwise, at the back, whence the gases passed up the chimney. Of this class the Derwent Foundry grate might be instanced as one form. 3rd. Those based on the principle of coking the coal before use. Of this class Dr. Arnett's was the earliest example; a method which had many adaptations in the Exhibition. 4th. Those which claimed to obtain a smokeless fire by means of smokeless coal. 5th. The plan of using coke and gas, as proposed by Dr. Siemens; or 6th. The combustion of gas on asbestos, or gas on fire-clay balls—the latter could only be classed as mere makeshifts which did not give the real advantages of the open fire. Unless the substantial advantages and comfort of the open fire were preserved, it was not worth while to retain it. If these substantial advantages had to be sacrificed in the prevention of the smoke, we might just as well face the question boldly and abolish the open fire. Having pointed out some of the disadvantages of the open fire, in wasted heat, labour, and force, Captain Galt said there were two other modes of conveying heat to rooms which might be adopted—gas and steam. In the first, we should continue to have separate fires, but we should have our fuel conveyed without labour to the point where wanted. If the gas companies would arrange to give gas suitable for heating purposes at a cheap rate, improved methods of employing the gas for warming and ventilation could easily be devised. At the present time, whilst great progress had been made in the application of gas as a fuel for cooking purposes, the arrangements for warming and ventilation had not been satisfactory; but that was because the price of gas for lighting purposes was too high to admit of its economical use simply as a fuel for warming and ventilation. In applying heat for ventilation, in which case the whole of the products of combustion of the coal would be utilised, it might be assumed that with coal at 20s. a ton, and gas at 3s. 4d. 1,000 cubic feet, gas would be seven times as dear as coal; but for heating purposes, where the whole of the products of the combustion of coal cannot be utilised, but where the heat given out by gas can be almost all made available, the cost with gas would vary from three to six times that of coal. In cooking, the actual cost of gas would be about three-and-a-half times that of coal. Where a coal fire had to be maintained all day to perform occasional work which could be done with gas in three or four hours, gas might be cheaper than coals. Moreover, the facility with which gas afforded of obtaining at a moment's notice a fire exactly suited to the requirements of the cook, compensated for the difference of cost. By the use of gas each individual created the heat he required in his own house, just as he would do with coal. Gas was simply a convenient form of fuel which conveyed itself wherever it was wanted, and created comparatively little dirt. But if gas was burned in a room, it consumed and vitiated the air of the room, unless accompanied by special ventilating appliances. The other system for avoiding the use of coal in houses was the use of steam, according to the system which had been adopted in the United States of North America, and which was called the "Combination System of Steam Heating." Under this system of steam heating, for towns and villages, of which Mr. Holly was the projector, the steam was supplied from a central fire to a large number of houses for domestic purposes, and thus the necessity of having separate fires in each house was avoided. In fact, by this system heat was supplied from some central place, just as water is supplied; so that each person could take, and pay for by meter, what heat he required, either for warming, ventilation, cooking, or washing, or for power in working machinery. Having given some details of the Holly system (which was fully described in our issue for October 14, page 491) the author added that

the loss by condensation in the street main had been ascertained to be not more than 2½ per cent., and the prices paid for heat in the United States were a lump sum of 8s. per 1,000 cubic feet of air-space per annum, or for an artisan's house about 10d. to 1s. 3d. a week. At these prices gas was about five times as expensive as steam, while the latter system would vastly diminish the risk of fire. In conclusion he said:—If we are to give up the open fire for heating, we must reconsider all our warming arrangements, and adopt a new starting-point. The arrangements hitherto suggested for applying gas to heating purposes are all of a makeshift character. They have been based upon the open fire or the coal stove. The gas fire is but a clumsy attempt to imitate the coal fire, without the charm and great merits which, with all its inconveniences, the open coal fire possesses. Similarly the arrangements for steam heating and for heating by hot water leave much to be desired in a hygienic point of view. Warmed air alone does not produce comfort, because it is less pleasant and invigorating to breathe than cold air, and it leaves the walls colder than the air of the room, and the heat of the body is radiated to the colder walls. To avoid this cause of discomfort, the temperature of the warmed air is frequently raised beyond what is either comfortable or healthy for breathing, and thus discomfort in one form or the other can with difficulty be avoided. To insure comfort it is essential to combine warmth in the walls and floors with cool air to breathe; as, for instance, air at a temperature of 54° to 58°. By the use of gas as a warming medium we might communicate warmth to skirtings or dados in a room, and thus avoid the uncomfortable feeling of radiating the heat from our bodies to the cold walls of the room. In a similar way, hot water or steam might be applied. Special arrangements must also be made for the change of air in a room. It is in these directions that we should seek to apply heat for warming purposes if the open fire is discontinued; but it would at the same time be necessary to make arrangements for the frequent change of the air of the room.

On Saturday afternoon, Mr. Thomas Fletcher, F.C.S., of Warrington, delivered an interesting lecture on the subject of "Economy of Fuel for Domestic Purposes," before a large audience at the Smoke and Fog Prevention Exhibition at South Kensington, which will be found fully reported in to-day's *English Mechanic and World of Science*. His object was to show, from his own practical experience, how, at a very small first cost, the coal consumption in private houses could be reduced to about one-half, with far less labour, dirt, and smoke. Taking for granted that the open fire will not be superseded in our time, he dwelt at some length on the momentous distinction between convected and radiant heat, and insisted that for economy of fuel, since all metals conducted the heat away and were bad radiators, no metal should be used in making grates unless absolutely necessary. Our first care must be, as far as possible, to encase our fires with a non-conductor, and the best was builders' fire-clay. It was shown how, by mixing this with silicate of soda, at 1s. 3d. a gallon, our present iron grates might be cheaply plastered over, or patched in case of cracks. He had thus adapted his own fireplaces. If building again, he said, he should build every fireplace entirely of bricks and tiles, using metal bars, two at most, in front only, the ends of which would be built into the bricks at the sides. As for the question of utilising the heat which escaped up the chimney, the lecturer said that in his own house the flues were built in inside walls, and were but half a brick thick. The back of the fire in one room did much towards heating the room behind it, and the warmth of the flues could be distinctly felt in every room up to the top of the house.

The second lecture in connection with the exhibition was given on Monday evening in the Lecture-hall, South Kensington, by Dr. Neale, on the subject of chemical lungs for purifying the air in workshops, hospitals, and the Underground Railway. The lecturer observed that impure air, especially when it reached the degree of foulness noticeable in the Underground Railway, was an evil with which all Londoners were painfully familiar. His remarks would have special reference to the condition of the air in the Underground tunnel, through which so many thousands of travellers passed every day;

and the apparatus which he would explain was the result of the conception that each train might be furnished with an artificial lung, by which the noxious gases generated might be consumed. These noxious products were carbonic acid gas, sulphur gases, and carbonic oxide. The carbonic oxide could not be got rid of by any chemical means; but much might be done to disinfect the vitiated atmosphere if the carbonic acid gas and the sulphur gases, which were the chief constituents of the air of the tunnel, could be exposed to the action of caustic alkalis. According to his scheme each train would carry its chemical lung in a carriage fitted either with a fan which would drive the air through tanks of lime-water, or with a system of gills in the shape of trays of slaked lime, through which the air would be made to pass with great rapidity. It appeared certain from calculations made that if each train were fitted in this manner, the whole of the air in the tunnel would be forced through the lungs and purified every twenty minutes. From a chemical and mechanical point of view the operation was sufficiently simple, while the cost of the lime that would be required was inconsiderable. His plan had been known to the directors of the railway for the last eighteen months, but various arguments were urged against its adoption, and, as everyone was aware, nothing of the kind had been attempted. The arrangements that he recommended for purifying the air in workshops and hospitals were similar in principle, but were less complicated and less expensive. Chemical punkahs, several of which had already been successfully tried, were so contrived as to bring the vitiated air into contact with a caustic solution of soda. The punkah itself, which is made of a vegetable fibre, is saturated with this mixture by means of a reservoir at the top of the fan, the weakness of the capillary attraction rendering necessary this method of saturation. There was no doubt, indeed, experience showed, that this apparatus was efficient and easily managed wherever scientific ventilation was impracticable. Examples of the chemical punkah were exhibited in the lecture-room, and a vote of thanks was accorded to the lecturer.

THE INSTITUTION OF CIVIL ENGINEERS.

THE sixty-third annual general meeting was held on Tuesday, the 20th of December, the president Mr. Abernethy, F.R.S.E., being in the chair. The notice convening the meeting having been read, and scrutineers of the ballot for the election of a council for the ensuing year having been appointed, the secretary read the annual report of the council upon the proceedings of the Institution during their period of office and upon its general condition.

It had been pointed out by Thomas Tredgold in 1828, when requested to define the nature and objects of civil engineering, that the domain of the civil engineer would extend with every discovery of science. A comparison of the papers contributed thirty years ago with those of the present day bore out this opinion, as it showed the great changes brought about in the interval in the practice of the profession by the new industrial applications of science. Having regard to the increasing number of subjects which occupied the attention of engineers, it was manifestly important that the papers read at the meetings of the Institution, and selected for publication, should be so varied as to be useful to its members in whatever branch of the profession they might be engaged. The tendency of modern manufacturing processes was to rely more and more upon machinery, the design and construction of which, as it became more elaborate, could no longer be the work of the mere handicraftsman, but called forth the highest powers of the skilled engineer. It thus happened that men were now to be found exercising engineering vocations widely different from those of the designers of roads, bridges, and similar public works, who, very erroneously, had often alone been recognised as civil engineers. As the Institution was largely composed of the former class, it was necessary that the range of subjects for papers should be widened, so that all interests might be consulted. The Council appealed to the four volumes of "Minutes of Proceedings" issued since the last annual meeting, as evidence of the success that had been attained in this direction.

A short synopsis was then given of the contents of the four volumes. It was stated that, besides Mr. Abernethy's address as president, which related mainly to the remarkable growth of dock and harbour accommodation for the commercial marine, fourteen papers had been read and discussed at the ordinary meetings, while thirty-seven other communications had been selected for printing, including six students' papers out of eighteen read at as many supplemental meetings. The combined articles ranged over most of the questions now occupying the attention of engineers. The foreign abstracts continued to be highly appreciated, especially by members resident in distant countries who were debarred from access to information respecting the progress of engineering on the Continent and in America.

During the past year there had been an increase of 52 members, 119 associate members, and 49 students, with a decrease of 16 associates, while the honorary members remained the same. There were on the books on the 30th of November last, 18 honorary members, 1,261 members, 1,406 associate members, 552 associates, 662 students; together, 3,899. At the same date in 1860, the number of members of all classes was exactly 1,000. The Student class had only been created fourteen years. In the interval, 1,462 candidates had been admitted, of whom 400 had since been elected into the Corporation, and 400 had ceased to belong to the Institution and in most instances to the profession. The deceases had been at the rate of 19 per 1,000, and had included several very old members, notably Mr. James Ashwell, the survivor of the five founders of the Institution.

The income last year was £12,393 11s. 5d., besides which the receipts had included £3,076 14s. on account of admission fees and i.e. compositions (which were rigidly treated as capital, and were not used for defraying ordinary expenses), and £431 5s. 6d. from dividends on trust funds. The general expenditure had amounted to £12,092 7s. 11d.

The President then presented the premiums and prizes to the respective recipients, and, in doing so, expressed his high sense of the obligations the general body of members were under to the authors of papers.

THE TOWERS AND STEEPLES OF WREN.*

THE steeples of Wren will always have an interest to the architect. Mr. Andrew T. Taylor, A.R.I.B.A., has brought out a little book under the above title, with illustrations and a descriptive and critical essay. The substance of the essay recently gained the Medal of the Institute, since which it has been revised and further illustrated. The sketches, plans, and sections given in the book have been made by the author on the spot, and though on a small scale, appear to be trustworthy and accurately drawn. Many of the steeples have been pulled down, and of these the author has obtained the best representations, chiefly from Mr. Clayton's valuable work on the subject. The critical essay prefixed to the book gives a rapid sketch of the evolution of towers, steeples, and spires, couched in rather high-flown language, tracing the history of the tower, from the Tower of Babel to the steeples of Wren. The merits of Wren's steeples are examined, their scientific construction pointed out, and the author refers to the care Wren bestowed on building his towers and steeples without the aid of iron tie-rods. Alluding to the merits of these steeples, Mr. Taylor remarks upon their proportions, that all Wren's towers would bear lanterns or spires without destroying their appearance, and that all the steeples with lead lanterns would bear the removal of the upper portions without detracting from the beauty of the towers. As architectural features these towers were never poised on roofs, or made to rise from behind porticos, but sprang from the ground in a plain and dignified manner, the upper stages only being varied in outline.

The steeples illustrated and described are classed into (1) those in London, existing and pulled down, and (2) those outside of London. The existing towers are divided into (1) stone

steeples, of which there are nine; (2) the timber and lead spires and lanterns; and (3) the towers (12 in number).

Plate I illustrates six of these steeples—St. Bride's, St. Mary-le-Bow, St. Vedast's, Fosterlane; Christ Church, Newgate-street; Campanile of St. Paul's, St. Dunstan-in-the-East. These are drawn as perspective sketches to a small scale. Describing St. Mary-le-Bow, Cheapside, Mr. Taylor says Wren, in sinking the foundations, came upon an old Roman causeway 4ft. thick, and on this the tower was built. The tower was begun in 1671, and finished in 1677, and cost £7,388, or nearly as much as the church. The author thinks the cylinder behind the beautiful peristyle might have been increased in diameter 3ft., which would have given greater solidity. A section of this steeple, as well as that of St. Bride, are given, showing the central spiral staircases. The campanili of St. Paul's are considered justly amongst the finest of Wren's compositions. St. Bride's steeple is carried on an ogee-shaped dome. Sections and plans of the other steeples are given, which will be found useful. St. Michael's, College-hill; St. Stephen's, Walbrook; St. James's, Giltick-hill; St. Mary Magdalene, complete the stone steeples illustrated. The second and third of these are compositions of much grace and beauty, and the sketches given of them are truthful. The lead spires and lanterns include the following illustrations:—St. Magnus, London-bridge; St. Margaret Pattens, St. Swithin, Cannon-street; St. Augustine and St. Faith, St. Anne and St. Agnes, St. Belet, St. Edmund-the-King, St. James, Westminster; St. Margaret, Lothbury; St. Lawrence Jewry, St. Martin, Ludgate-hill; St. Mary Abchurch, St. Mary Aldemary, St. Mary Bassishaw, St. Mildred, Bread-street; St. Nicholas, Fish-street; St. Stephen, Coleman-street; St. Peter, Cornhill. Of these, St. Magnus, London-bridge, is, perhaps, one of the best; but in many of the leaden lanterns we discern playful outline and picturesqueness. St. Augustine's, Watling-street; St. Martin's, Ludgate; St. James's, Westminster; St. Margaret, Lothbury; St. Mary Abchurch, and St. Mildred, Bread-street, are all unique compositions which serve to indicate the materials used in their upper part. We cannot mistake these lanterns for stone ones.

Several towers of much beauty appear. All Hallows, Lombard-street, is one of the plainest. In this part we find the tower of the gateway of Christ Church College, Oxford, a domical lantern termination in Late Gothic crowning Wolsey's tower. The Gothic towers of St. Alban, Wood-street, St. Mary Aldemary, St. Michael's, Cornhill, are characteristic, and some of them possess a dignity despite their detail. Mr. Taylor's little work is increased in interest and value by the sketches of the steeples and towers which have been pulled down. We are glad to find a correct sketch of St. Antholin's, Watling-street, a stone spire of much simplicity and character. The critical remarks appended to some of the descriptions are just, though we are inclined to disagree with the author sometimes. The translation of the Gothic types into Classic forms was one of the remarkable instances of Wren's power, as pointed out in describing St. Margaret Pattens; but St. Antholin is even a better illustration of this. In conclusion, the author pleads for the preservation of the steeples of Wren, and it is saying a good deal when we hear of so decided a Gothist as Mr. Street advocating the same cause. Mr. Taylor's book is neatly printed and got up by B. T. Batsford, and we commend it to every one who takes an interest in the history of our English Renaissance, and who requires a compendious handbook to the steeples of England's greatest architect. As a record of many of the towers which have been taken down, and of others which are likely to disappear in a few years, the work has a special value to all antiquaries.

LONDON MARKETS.

THE new market at Leadenhall was opened last week. It has been designed by the City Architect and—so a City contemporary says—his "powers of design are very well displayed in this his latest achievement." Entrance is obtained from Gracechurch-street, through a gateway, a handsome and substantial structure, with two wings. An area between 26,000 and

27,000ft. has been built over and covered in to form the market, to which there is at present access by roadways 30ft. wide from Gracechurch-street on the west and from Leadenhall-street on the north. A new street, which will give an approach from Lime-street, is nearly finished, and it is proposed to make another new street from the end of the south arcade to Fenchurch-street. The principal arcade, running east and west, is about 290ft. long and has a width of 30ft. throughout. The shops on either side are of two storeys above the ground floor, and have cellars. These shops have a frontage of about 16ft. each and they extend back from 16ft. to 35ft. As now divided, there are 31 shops let to retail and wholesale dealers, all the old tenants, it is said, except some of the live-stock dealers, having had accommodation provided, and at rents below the value of the land for commercial purposes. The land to the north-west, at the corner of Gracechurch and Leadenhall streets, a part of the old Hide Market, has been let on lease, and offices and shops will be built upon it. A double system of drains has been provided in the new market, the upper to carry off surface water. The market has been erected by Messrs. Nightingale, at a cost of nearly £50,000. The shutters and fittings in connection therewith for the shops were supplied by Messrs. Francis and Co., 174, Gray's-Inn-road.

Encouraged by the success of their fruit and vegetable market at Stratford, the Great Eastern Railway Company are now constructing an extensive fish, fruit, and vegetable market underneath their new goods depot at Bishopsgate, formerly their passenger terminus. The area set apart for the purpose is about 4½ acres. Three lines of rails will be laid down the centre of the plot, to which trucks will be lowered by hydraulic hoists from the goods station above. On the north will be a row of 33 warehouses for fish, and on the south 16 large warehouses for fruit and vegetables, each having a cellar beneath and offices, and other trade conveniences on the rail level. The fruit and vegetable warehouses will also be provided with a "dock" or siding, which will accommodate one, two or three trucks, according to the extent of its area, and there will be a line of rails running the whole length of the exterior of the market, communicating by two sidings with the three centre rails. Each row of warehouses will have a covered roadway along the whole front protecting the loading of carts and wagons during inclement weather. The market will have four entrances, two from Brick-lane, one from Bethnal-green-road, and one from Norton Folgate. The market and approaches will be illuminated by the electric light, and will be open at night for retail trade, as well as in the morning and during the whole of the day for wholesale business. Part of the market is expected to be ready in three, and the whole to be completed in six months.

WHAT IS THE CAUSE OF PLUGS OR PUTTY-HOLES SHOWING?

AS for the above, says the *American Carriage Monthly*, there are a great many answers given. Almost every painter you ask will give you a different reason, while the majority of them will tell you when the plugs show that it is the fault of the body-maker in not putting them in right, and the body-maker will tell you that it is the painter's fault, and so it goes.

We have heard some men tell us the way they overcame this difficulty of keeping the plugs from showing, which is to avoid putting any glue in the hole; glue the edges of the plug only, and as you drive it in, avoid coming in contact with the head of the screw, because if you let it touch the screw the wood is temporarily upset, and as it seeks its natural condition, and being free to expand but one way because of the screw head back, they are bound to come beyond the panel on the outside surface, but if they are not driven back upon the screw-head it will be more than likely, instead of showing on the outer surface, to go the other way, which would prevent it from showing.

Be this true or not, we cannot tell; but there is one thing certain, they show, and the painter cannot stop this, and therefore should not be to blame. There are very few places where there are plugs put in that they do not show, and

* The Towers and Steeples designed by Sir Christopher Wren, &c. With numerous illustrations. By Andrew T. Taylor, A.R.I.B.A., Architect. London: B. T. Batsford, High Holborn.

how to remedy it, so far as the painter is concerned, will remain a mystery.

In putting nail-holes or screw-heads, we do not favour the plan of most body-makers putting the brads or screws in as deep as they can get them without going clear through the panel, as it is very hard to get the lead colour in these deep holes. But where this is the case, we must do the best we can with the priming and leading. We must get in the holes all we can, and as far as we can, and then take some hard drying putty and fill the holes about half full, and when this is dry fill up the rest of the holes. This putty, we think, is the best, because it dries firmer and harder, and there is not so much danger of shrinkage as there is in putty made of whiting. The first putting in a deep hole cannot dry as quick as the outer part, on account of the air not getting to it so well. If you should putty them full with the one puttying, there will invariably be trouble with shrinking or swelling of the putty. Some painters do not use putty for brad-holes, but fill them up with paint and filling. Should there be any places that are not entirely filled up after the body is rubbed down they then use the putty. We have no experience in this way of working, but give it as one of the methods described to us.

We have seen brads and screws where they have been put in level with the surface or a little below, after being puttied and painted, and no trace of them could be found, and sometimes remained hid a great deal longer time than some that are put in deep; but of this you cannot convince the woodworker or get him to acknowledge any of the theories presented on this question.

Now we have seen the brad level with the panel and no putty used, and yet show as if it had been puttied, and the putty swollen out. This, we think, is caused by not having thoroughly seasoned wood, and is occasioned by the shrinking of the panel. Some painters imagine the putty is more inclined to show by the wood swelling than by its shrinking, because, as they say, in driving a brad or nail into the wood, the wood being pressed away to make room for the nail, the damp weather will swell the wood around the nail, and thus force the putty out. We have noticed the swellings do not look the same at all times—sometimes very bad, and again hardly visible to the eye. Whether dampness causes this, we are unable to say, but are inclined to think it has somewhat to do with it.

The only thing we can do is to use thoroughly seasoned lumber, have the woodworker to drive the nail or put the screw in so as to require the least amount of putty, and then for the painter to let the putty as well as the paint have time to dry. We have seen painters putty a job, and a few hours afterwards give a coat of paint, so that he may finish the puttying the next day; now it has been puttied twice before the first has had time to dry, and consequently will show every place where there is a nail or screw, because no precautions have been used against it.

PRACTICAL NOTES ON PLUMBING.—XXII.*

By P. J. DAVIES, H.M.A.S.P., &c.

(Continued from page 753.)

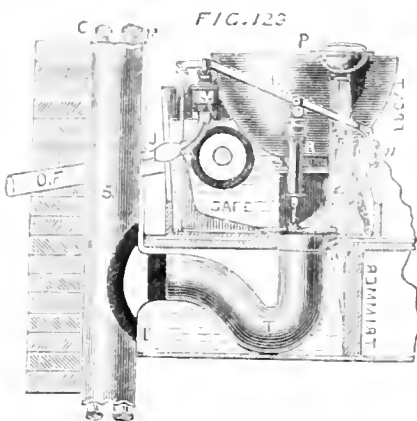
INSIDE WORK, OR SANITARY PLUMBING, CLOSET, &c.
FIG. 123.

THIS diagram illustrates a valve-closet, fixed over the half S-trap (wrongly designated a U-trap). This kind of closet, above all others, *must* be fixed over this kind of trap, as the momentum of the water in passing from the valve of the closet entirely destroys the water-seal of the trap, which necessarily renders the trap totally useless. Under all such closets, a properly constructed S-trap is the only one at present invented that will prove thoroughly efficacious.

This closet, like all others, should have an ample supply of water, so that every part of the basin may be thoroughly washed, more especially the front part. A very excellent method for testing the efficacy of the water flushing is to dry the basin by partially opening the closet-valve, and then painting the basin all over with a good coat of plumber's soil; then in the ordi-

nary manner pull up the handle of the closet, and if any part of the basin is not cleansed, the flushing is not perfect.

In order to avoid such a contingency, it is necessary, first of all, to have a properly-sized



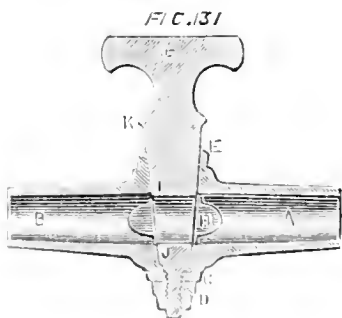
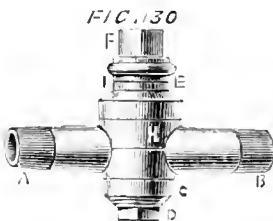
pipe and valve, and by all means do not make any very sharp bends or a lot of branches. When you are so circumstanced that you are compelled to have branch joints, you should always make them at the easiest possible angle.

By adhering to the following instructions (which will, in most cases, be found a very good workable table), a very effectual flush may be relied upon for a closet supply. When the head of water is 5ft., use a 1 1/2 in. full-way valve with the same-sized pipe; but when the pipe has to be taken in a horizontal direction, in all cases use the next size larger to allow for friction. When the head of water is between 5ft. and 15ft., use 1 1/2 in. full-way valve and pipe; though if the pipe runs from 7ft. horizontal, use 1 1/2 in. pipe to allow for friction. Again, should the head of water be from between 15ft. and 40ft., use a 1 in. valve; and, in my opinion, nothing less than a 1 in. valve should be used, although in cases from 40ft. to 60ft., a 1 in. pipe may be used; but larger, according to whatever length of horizontal pipe there may be. Perfect flushing also depends, to a very great extent, upon the kind of closet-basin used.

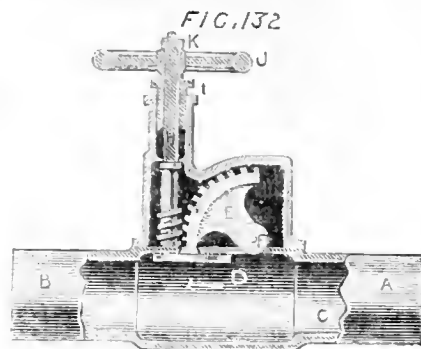
In my estimation, Sharp's pattern, known as the flushing rim, is the best. In using this basin, care should be taken to prevent any dirt or other foreign matter getting into the rim, as it will prevent the water passing all over the basin, and consequently leave it only partially cleansed.

CLOSET-PIPE STOP-COCKS.

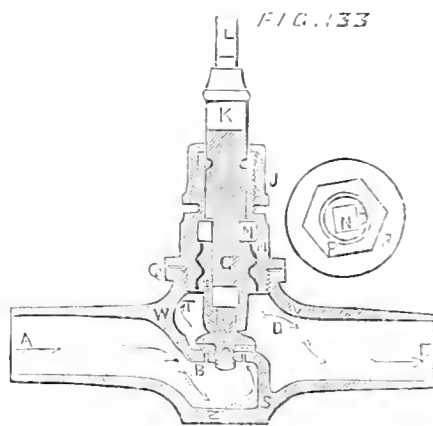
When selecting stop-cocks to be used on pipes in connection with closets, great care should be taken to select only those having a straight full-way, known as a "round-way,



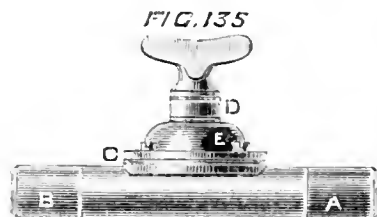
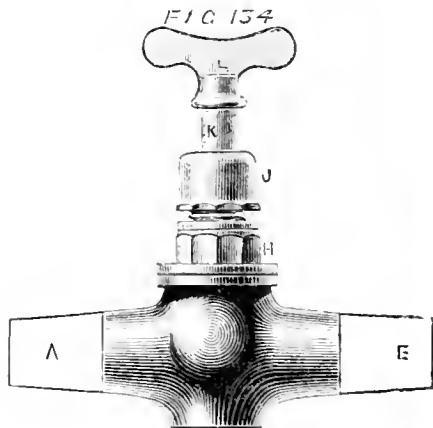
In cases where it is compulsory to use valve-cocks, always select them with straight ways, similar to that shown at Fig. 132.



On reference to Fig. 133, it will be easily observed that the seating B is so constructed



that the water is greatly retarded in its progress for these reasons:—It first strikes against the partition W, and rebounds from there to the bottom Z, from Z to S, thence from S through the seating B, and up against T, back to V, from V to X, and finally onward along E. Now



this diagram and explanation shows distinctly that the water has to take no less than six different sharp curves before it can pass out of the stop-valve or cock; and, curious as it may seem, the shell and seating of this stop-valve

* All rights reserved.

ground-in stop-cock," shown at Figs. 130 and 131.

is the one generally adopted by our water companies.

Farther on I shall give the full particulars of a practical test of the loss of head-water by the use of such stop-valves.

Fig. 134 is an elevation of the last-named stop-valve, showing the stuffing, cap, the squares on the tap, and the tinced ends; A the inlet, and B the outlet. Fig. 135 is another kind of stop-valve, made without the stuffing-box, but having an indiarubber diaphragm at C to answer the same purpose. The water-way is much the same as in Fig. 133.

(To be continued)

THE NEW CATHEDRAL AT TRURO.

THESE works, as most of our readers are aware, have been carried on up to the present time by Mr. Pearson's trusty clerk of works, Mr. James Bubb. Under the immediate direction of this genial and efficient craftsman, a large staff have been for some time at work. They have pulled down the neighbouring houses, and entirely removed the old church of St. Mary, with the exception of its south-east end, and have put in the foundations of the choir and built the crypt. The works being thus far advanced, it has been deemed well to secure a trustworthy and tried contractor to carry out the actual building. This has been satisfactorily arranged, and on Monday, December 19th, Mr. Shillitoe (late of the firm of Shillitoe and Morgan, of Doncaster) commenced his contract for building the choir. Mr. Shillitoe has already built some of Mr. Pearson's best churches, and so is by no means an untried man. Mr. Bubb, of course, continues as clerk of works, to fulfil the duties he has so faithfully carried out heretofore. We hear that his connection with Mr. Pearson extends over quarter of a century.

IRISH BUILDING-STONES.

MR. G. PHILLIPS BEVAN, in speaking of the industrial resources of Ireland, before the London Statistical Society, on Tuesday evening, said that many of the building-stones of Ireland are equal to the best in Great Britain. Professor Hull, of the Irish Geological Survey, than whom no better authority exists, states that the Donegal red granite is equal in beauty to that of Peterhead, and capable of receiving a high polish; while those of Wicklow and Down are of a greyish tint, and are extensively quarried at Kingstown, Newry, and Castletellan. There is scarcely any country in the world which, for its size, possesses greater variety of building marbles of all colours. At Kilkenny and in the quarries of Galway there is black marble to any extent, while the latter county yields also white marble, absolutely pure in tint, and, as far as quality goes, of the strongest kind of limestone. Red, yellow, and blue marbles are found in the county of Armagh, purple and white, and blue and white at Churchtown (county Cork), ash-coloured, grey, and dove-coloured at Carrigaline and Castlemartyr (county Cork); variegated near Tralee; sienna near Shannon Harbour, on the Galway side; fine grey in King's County, and Tipperary; striped white and red at Killarney; and brownish-red at Ballymahon (county Longford). Then again, in Galway and Mayo, are quarries of serpentine of the most valuable kind. A recent letter in *The Times* calls attention to the fact, that while the red, green, and black marbles of Ireland are largely used, green Irish porphyry is scarcely known; and also that some of the green marbles are of the most lovely colour and quality imaginable, looking like dark green seaweed beneath the clear sea. And yet even Irishmen are oblivious of the rock-treasures that lie at their very doors—as witness, for instance, the splendid mansion of Castle Coole, near Enniskillen, built of freestone brought over from Bath at a fabulous price, though marble of the first quality was to be had for nothing. The slates from Killaloe and Valentia Island are well known and appreciated, as are also those of the Clanwilliam Slate Company at Wooden Bridge, county Wicklow; but there are many other places in which slates are known to exist, even though they are not of such first-rate quality as to compete with North Wales. Sir R. Kane mentions such at Clonakilty and the Old Head of Kinsale; at Westport, in

Mayo; and at Ross, in Waterford. And yet, according to Dr. Neilson Hancock, writing in 1864, the streets of Dublin are paved with Welsh paving-stones, and the houses slated with Welsh slates, which, it may be naturally assumed, were preferred because they were better. Judging, however, from the character which the quality of the Irish slates have attained in the market, it seems more likely that that the real stumbling-block is that of expense, caused by one of Ireland's chief difficulties—viz., the lack of communication and means of transport.

BOOKS RECEIVED.

Sketch of the Life and Labours of Mr. Alderman John Guest, F.R.S., of Rotherham, by THOMAS BEGGS (London: Simpkin, Marshall and Co.), is a life written by an intimate friend, of a man who did a good deal in his time, in conjunction with others, for sanitary science. The details given in this volume, however, are for the most part of a personal character, and will probably interest many who knew the subject of the memoir better than in his business life.—*The Royal Indian Engineering College, Cooper's Hill, Calendar for 1882* (London: W. H. Allen and Co.), is an official almanac and guide to the course of study at the college, by whose authority it is published.—*Calvert's Mechanic's Almanac and Workshop Companion for 1882* (Manchester: John Calvert), is published for the ninth time. It is as complete and cheap a publication of its kind as we have ever seen, full of information and worth many times its cost to every intelligent workman and amateur.—Messrs. Hudson and Hearn, of 83, Southwark-street, have sent us some copies of their *Diaries and Date Indicating Blotting-Pad Diaries*. The distinctive feature of these diaries is their comprehensiveness, each volume forming in itself a complete set of books indexed and paged throughout. No. 12 and 13 are specially arranged for the use of architects and surveyors, but are most useful for all professional or business purposes; they contain not only a diary which is virtually a day-book or journal, but a cash-book, ledger, and note-book, rent, and insurance registers, and the paper and binding are of unusual excellence. No. 11 is specially adapted to the requirements of those in the building trades, and contains a series of tables of a practical rather than of a scientific character, including the calculation of wages, the checking of estimates, &c. In all these diaries the index is a valuable feature. The "Date Indicating Blotting-Pad Diaries" we consider particularly useful, and know that they have been very well received. They are this year indexed, and there are also added a few pages for entering cash received and paid, both valuable additions.—*Letts's Diaries*, 1882, of which we have received some specimens, are as useful and numerous as ever. There are, we are told, over 307 bound books, and a further 200 varieties in Russia, Morocco, silk, &c., for presents in endless varieties of form, size, or price. Messrs. Letts publish a very clear and intelligible list, which can be obtained on application either direct to themselves at London-bridge or from the nearest stationer's or railway station.—A capital Card Almanac is also issued by Messrs. Steven Brothers and Co., of Upper Thames-street, well known to most of our readers as the owners of the largest iron foundry in Glasgow, which covers over seven acres and employs over 1,000 men.—Messrs. T. J. Smith, Son, and Co., of 83 and 84, Queen-street, Cheap-side, and 13 and 14, Pancras-lane, have also sent us some specimen Diaries for 1882 of a handy and useful character.—*Suffolk Directory and Almanac*, 1882, by John Glyde, Ipswich, is well got up and carefully compiled.

FLEXIBILITY OF MARBLE.

ELASTICITY is a general property of matter, but its manifestations are very variable according to the form of bodies and the nature of the stress exerted. Thus, a crystal ball will rebound to a great height from a pavement, and a thread of glass has all the flexibility of silk; but that does not prevent us from commonly saying, "As fragile as glass," because of the common accidents that we see in daily usage. The rigidity of marble has served as a

subject from the remotest times for the metaphors of all poets; and I do not know that a single architect has ever foreseen that a slab of stone might bend and act like a fir plank without flying into fragments. This, however, is something that may at present be seen at the palace of the Alhambra, at Granada, as one detail lost among the thousands of wonders of that enchanting maze. One of the two doors that have been christened "La Mezquita" (probably because near by there is an old unfinished chapel of the time of Philip V.) exhibits an ancient facing of three slabs of marble, the upper resting as a lintel upon the two others, which form uprights 11ft. in height, 9in. in width, and only 2½in. thick. If we compare this door with that to the left, we at once remark that it is much smaller, having been diminished on every side, not only by the thickness of the white marble, but also by a thick layer of plaster beginning at the point where the old facing of tiles is set in.

Now, whoever has had an opportunity of admiring the mathematical precision of Arabic structure cannot possibly doubt that all this has evidently been added too late to remedy a subsidence, of which evidence is still to be seen in several cracks in the upper wall. But nothing resists certain stresses, and an enormous thrust upon the right must have been the sudden cause of the rising of this side as well as that of the upper slab. How comes it, then, that the marble, instead of breaking or of rupturing its casings, has simply bent and curved as if it were wood? How comes it that it has been able to remain thus, like a bent bow, from an epoch which is totally indeterminate, but which, it is quite likely, dates back to the explosion of a powder-mill on the other side of the Darro, which, in 1590, destroyed a large portion of Mezcuar? What is certain is, that the propwork of joists now to be seen was put up only at quite a recent date, and during the course of the restorations so fortunately undertaken, some few years ago, to bring to light that graceful stucco lacework and those superb mosaics of faience, and all those masterpieces of profane art which Christianity had so piously buried under thick layers of plaster of Paris. The setting of vitrified bricks, moreover, was found completely destroyed up to about 12in. from the top of the door; and it is exactly at 18½in. that the slab begins to curve and to detach itself from the wall, to attain its greatest distance therefrom of 3in. at about 3ft. from the bottom.

We may ask what would happen if, by any means whatever, the stone bow should be unbent, or one of its extremities be set free and given play, or the other be unloaded of the weight which holds it in place? Would the stone be seen to straighten back like a spring, or would it remain permanently misshapened? Or, indeed, would it break in pieces on escaping from the slow and gradual cause which alone has produced in it so singular an effect? Might not there be found in the molecular homogeneity to which it has evidently owed its resistance to fracture, curious crystalline modifications like those produced artificially by Mr. Walter Spring by means of great pressure? Unfortunately, we can only place here a series of interrogation points, and we shall esteem ourselves fortunate if some interested reader down there will keep us informed as to anything new that may happen.—*La Nature*.

GLASGOW PHILOSOPHICAL SOCIETY.

THE following awards, among others, have been made by the Glasgow Philosophical Society, in connection with the recent Gas Exhibition:—

VENTILATING AND SANITARY APPLIANCES, &c.

Jurors.—Professor James Thompson; Mr. John Horveman, I.A., F.R.I.B.A.; Mr. A. Lindsay Miller; Mr. H. K. Bromhead, I.A., A.R.I.B.A., convener.

Medal.—William Paton Buchan, Glasgow, for Buchan's cascade-action ventilating tap for drains. Messrs. J. & M. Craig, Kilmarnock, makers; William Paton Buchan Glasgow, for Buchan's "Carmichael" wash-down accessible water-closet.

Honourable Mention.—James Combe and Son, for washing apparatus for public wash houses; Faraday and Son, London, for ventilating gas pendant; British Sanitary Co., Glasgow, for earth closet; J. and M. Craig, Kilmarnock, for white enameled sinks and wash-tubs.

CONTENTS.

George Edmund Street, R.A.	813
Fine and Decorative Art Exhibition	815
Some Notes on Ancient Floors	815
Technical Education and Art Workmanship	817
Obituary	818
Royal Institute of British Architects	819
Lectures at Smoke Abatement Exhibition	819
The Institution of Civil Engineers	820
The Towers and Steeples of Wren	821
London Markets	821
What is the Cause of Plugs or Puffy holes Showing?	821
Practical Notes on Plumbing.—XXII.	822
The New Cathedral at Truro	823
Irish Building Stones	823
Books Received	823
Flexibility of Marble	823
Glasgow Philosophical Society	823
Our Lithographic Illustrations	824
Competitions	824
Tides and Tidal Secour	824
Building Intelligence	824
Architectural and Archaeological Societies	824
To Correspondents	824
Correspondence	824
Chips	824
Intercommunication	824
Legal Intelligence	824
Our Office Table	824
Statuses, Memorials, &c.	824
Meetings for the Ensuing Week	824
Tenders	824

ILLUSTRATIONS.

ELY CATHEDRAL TOWER AND CHAPEL OF THE COLLEGE.—SOUTHWELL MINSTER, AS RESTORED BY J. W. H. CHRISTIAN.—CENTRAL INSTITUTION OF THE CITY AND GUILDS OF LONDON INSTITUTE.—ANCIENT SEPULCHRAL MONUMENTS.—NEW INFIRMARY AT CARLISLE.—NEW CHURCH OF ST. GERMAN'S, CARLISLE.—STAINED GLASS: SCENES FROM "THE MERRY WIVES OF WINDSOR" AND "AS YOU LIKE IT."

OUR LITHOGRAPHIC ILLUSTRATIONS.

ELY CATHEDRAL TOWER.

THE interest attaching to this drawing would perhaps be more properly ascribed to picturesqueness of grouping than any special merit displayed in its several features. It is taken from a point adjoining the college grounds looking on the south front of the great west tower, with the Grammar School Chapel and other buildings in the foreground. The tower itself (at least the upper part) can hardly rank as a good example of even a declining period, as though the masses are well arranged to appear advantageously at a distance, the detail is disappointing; neither can the other surroundings embraced in the drawing lay much claim to architectural significance. But, taken as a whole, its charms are incontestable; and given a fair day and broad shadows, as I was favoured with, a lover of the art must acknowledge the spell at once, and will scarcely rest a moment till his pencil has paid tribute to its beauty. Every accessory about that art or nature can provide will be found; with gables and dormers, turrets and tower, "mantling ivy" and foliage interspersed—all blending and mellowed by the tints of time and hallowed by the sacredness of association for centuries past. If the emotional is not always to be subordinated in this practical, competitive age, here at least its softening influences might be permitted a little latitude.

Meanwhile the bees are chanting a low hymn;
As fluttered by the wings of cherubim,
And, lost to sight, the estate link above
Sings like a soul to itself of love.

Chronologically considered, the chief epochs connected with the edifice are too well known to need recapitulation here. But the tower, which forms the centre of interest, is the work of two distinct periods. The earlier by Bishop Rickh, between the years 1171 and 1189 Anglo-Norman; the latter by Prior Walsingham, commenced 1521 and completed 1543. The former square tower, which was originally placed at the intersection of the nave and transept, is recorded to have fallen in the year 1320, but rebuilt by the same architect in the form of an octagon, with lantern over; the wooden construction now completing it, and covered with lead, being a much later importation of a thoroughly debased type. It is only a few years since the western tower also gave signs of weakness, and an evident tendency to follow its predecessor, in consequence of which the late Sir Gilbert Scott was engaged to strengthen it, cramping and bracing the whole structure together by a system of iron ties; and we may fairly hope it has now entered on a new lease to

adorn for many ages the venerable and beautiful fabric over which it so conspicuously reigns.—J. D.

CENTRAL INSTITUTION FOR THE CITY AND GUILDS OF LONDON INSTITUTE FOR THE ADVANCEMENT OF TECHNICAL EDUCATION, SOUTH KENSINGTON.

THE great advances made of late years in the law of technical education abroad and its attendant good results in the way of increased manufacturing prosperity, have induced many thoughtful persons in this country to turn their attention in this direction—not surely before it was needed. None appear to have done so to more purpose than certain influential members of some of the City Guilds, who have combined together to do what in them lies to remove the stigma of indifference to scientific education on the part of our manufacturing population, by inducing their Guilds to establish certain schools and endow others. Their greatest concentrated effort will be seen in the building which we illustrate this week, and which they have confided to the care of Mr. Alfred Waterhouse, A.R.A. The "foundation-stone" or memorial column of this building was laid by H.R.H. the Prince of Wales, surrounded by a distinguished company in July last, in Exhibition-road, South Kensington. The foundations have been already put in by Messrs. George Munday and Sons, and the contract for the superstructure having been competed for, is likely to be confided to Mr. H. Lovatt, of Wolverhampton. The building will consist of a front of 300ft. in length, of five stories in height, averaging 15ft. 9in. from floor to floor so far as regards all but the topmost, which will be of varying heights, the central room and the two rooms at the extremities of the building being much higher than the rest. The north-west corner at the back is only four stories in height, consequent on the greater height of the lecture-rooms penetrating the first floor. As it is not known how far light can be commanded on the north and south sides of the plot, it has been decided, with the exception of the two front end gables, which, of course, derive their light from the east, towards Exhibition-road, to set the building back 20ft. from the boundary north and south. On the western side the building comes right up to the boundary along its entire length. Should the Institution ever be extended beyond the bounds of the present site, these areas on the north and south might possibly be widened to 40ft., and so give excellent internal courts for light and ventilation. A corridor 10ft. wide runs right through the building from north to south, and there is a cross corridor 7ft. wide in the return portion of the building on the north. All the space at the back behind the main corridor (with the exception of the lecture-room wing on the north) is left for the present unoccupied, save by workshops under glass roofs at the basement floor level extending over a portion of the space. This main corridor is lighted by large windows at either end, and by a range of windows on either side of the main staircase on the ground-floor and upwards, and also by the windows themselves. The main staircase, which rises by a double flight immediately opposite the principal entrance lights by its numerous windows the centre of the building. The entrance is in the centre of the main front, the ground-floor level being approached by about ten steps from Exhibition-road through a large and handsome hall, 37ft. by 33ft. 6in., the groined ceiling of which is supported by four piers, the inner ones being of granite. It was one of these which formed the memorial-stone before alluded to. In order to facilitate communication between the different floors, two subsidiary staircases are placed on the west side of the main corridor towards its extremities, and have lifts in their immediate proximity. The requirements which were originally decided upon, though they were, doubtless, not exhaustive, involved a superficial area of 11,000 square feet of floor-space, not including corridors, &c. The plans contain accommodation under the following heads:—Mechanics—Nine workshops or classrooms; three sheds with glass roofs; mathematical classroom. Physics—Thirteen class-rooms, &c. Art—Seven class-rooms, &c. Chemistry—Six vented laboratories, classrooms, special laboratories, and private rooms. Metallurgy—One workshop. Council chamber and six other rooms for the administrations; two unappropriated rooms; two lecture theatres, each holding upwards of

200 students, with preparation rooms adjoining. Students' rooms—Reading-room and library, refreshment room and lockers; housekeeper and porter; engine-room and heating apparatus; coals and wood; lavatories, w.c.'s, &c. Behind the centre of the building are three glass-roofed sheds, which can be divided at pleasure, and will be adapted for processes which might give rise to annoyance if within the walls of the main building. There are so placed as to leave the space, 78ft. by 66ft., above mentioned, entirely clear for an additional wing. On the first floor, in the centre, is the council chamber, a handsome room, 37ft. by 33ft. To the right are five rooms devoted to the administration, with two rooms on the opposite side of the corridor unappropriated, the students' library and reading-room being at the north-east corner of the building. To the left are four rooms devoted to Physics. The upper part of the lecture-rooms occupy the rest of the first floor, and the corridor between them will be of use in gaining access to the upper seats. On the second floor are placed seven rooms devoted to Art in its various branches, whilst the whole of the north end of the building on this floor is given to Chemistry, there being two large chemical classrooms, with a photographic room in the centre, two private rooms behind them, and four rooms to the front. The front and returns up to the north and south areas are proposed to be faced with red brick and terra-cotta. The chief merely ornamental features of the front will be the arms of the City of London, and of the various Guilds the benefactors of the building, which are up to the present time as follows:—(1) Mercers, (4) Goldsmiths, (18) Plasterers, (7) Ironmongers, (15) Carpenters, (9) Clothworkers, (6) Silvers, (2) Drapers, (7) Coopers, (13) Armourers and Braziers, (19) Needle-makers, (10) Dyers, (3) Fishmongers, (12) Pewterers, (21) Wheelwrights, (16) Cordwainers, (11) Leather-sellers, (5) Skinners, (8) Vintners, (14) Bakers, (20) Plumbers.

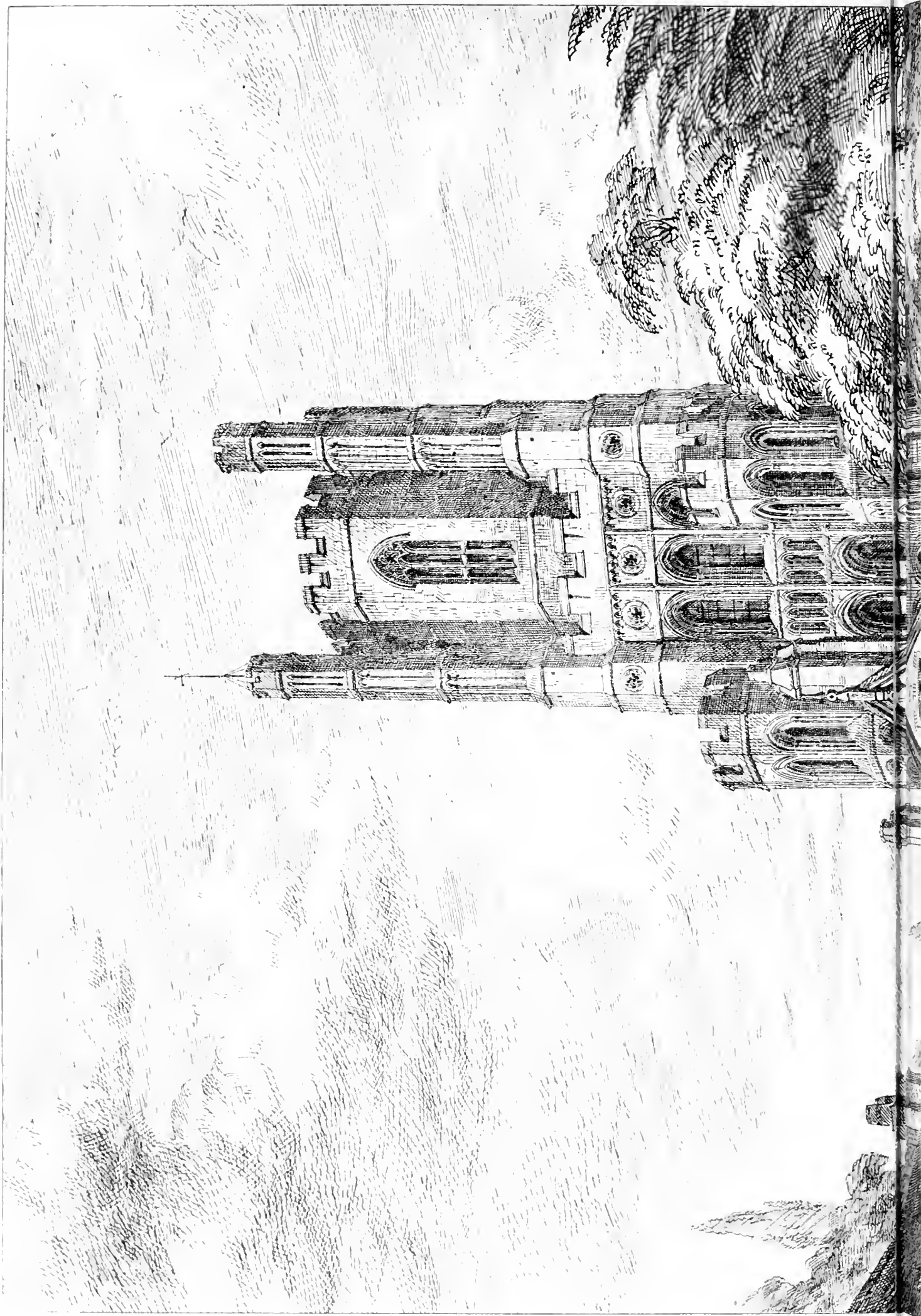
ANCIENT SEPULCHRAL MONUMENTS.

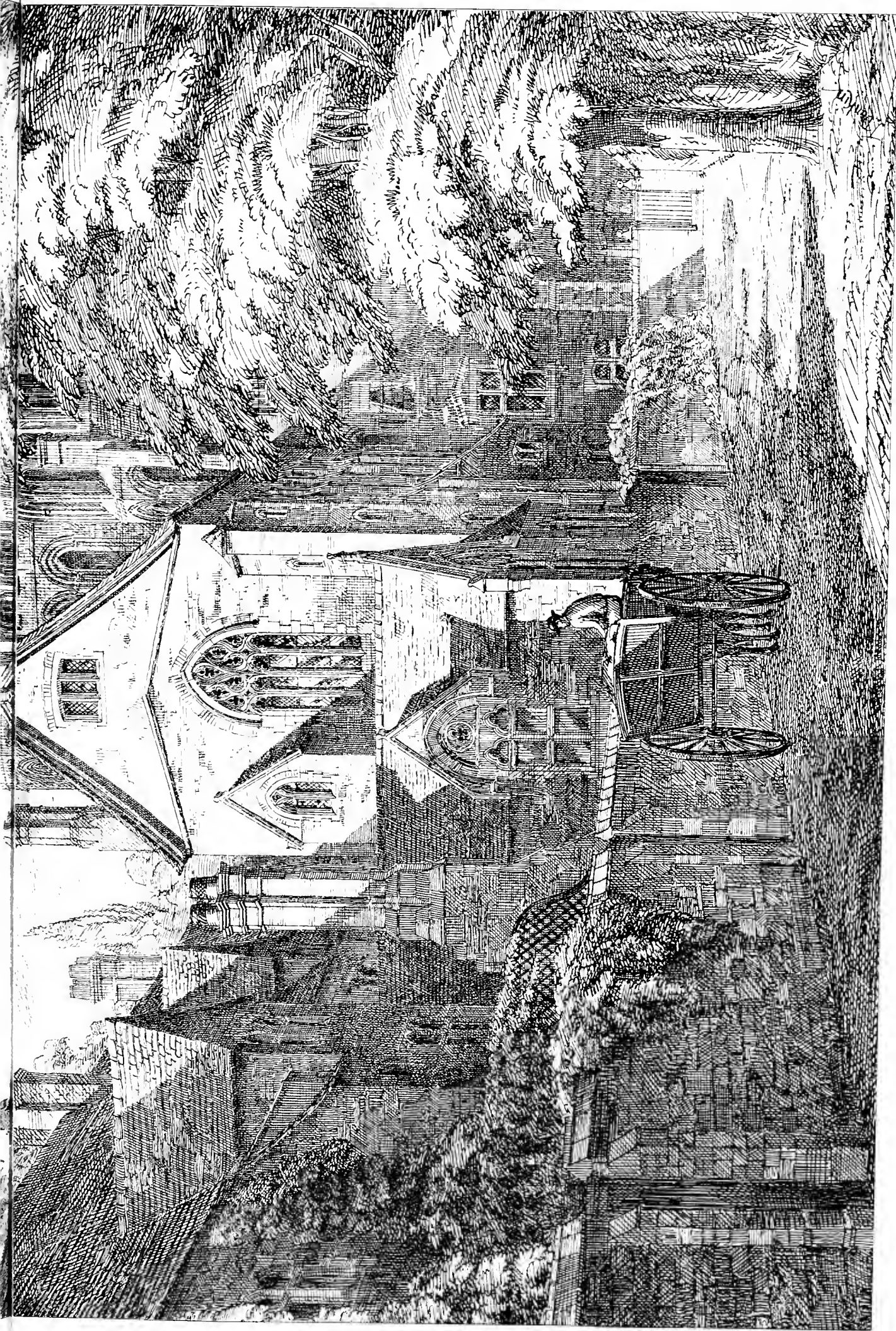
THE double-page plate of monuments we give is selected by us from proofs of plates for a new work on "Ancient Sepulchral Monuments" by Mr. Brindley and Mr. W. S. Weatherley, architect. The work, intended to be a text-book on the subject, will consist of 200 plates imperial quarto (half of which are, we believe, already printed), containing between 500 and 600 examples of all styles from various countries, from the earliest period to the close of the last century, comprehending head-stones, tombs, crosses, obelisks, incised slabs, wall-tablets, &c. Some 50 plates are reserved, we understand, for Gothic examples. Although the plates we give are somewhat elaborate, the purport of the work would seem to be chiefly simple monuments as suggestions in design for our everyday requirements. We may mention as a great merit of the work that the drawings are, as far as possible, to the uniform scale of 1in. to the foot, with details one-fourth real size. Great care has been exercised in the collection of accurate material, and in the choice of suitable specimens. The plates are drawn by Mr. Weatherley, who illustrated and edited Sir Gilbert Scott's "Royal Academy Lectures." The work is being printed by Messrs. Vincent Brooks, Day, and Son.

THE NEW GLAMORGAN AND MONMOUTHSHIRE INFIRMARY AND DISPENSARY, CARLISLE.

THIS building is intended to replace an old structure erected for a similar purpose about 35 years ago by the munificence of Mr. Daniel Jones, of Beaupré. The site has roads on north, south, and western sides, from the latter of which the administrative block will be entered. A corridor extends eastward from this block, from which the ward blocks will branch alternately north and south. There will be accommodation for 102 beds by the present contract, and allowance for future extension to a similar number has been arranged. The wards will be warmed with the Thermodyne grates, and the latest improvements for the admission of fresh air and the extraction of foul air will be applied. The architects are Messrs. James, Seward, and Thomas, of Cardiff, and tenders are now being invited for its erection, which will be commenced early in the new year.

(Continued on page 861.)





ELY CATHEDRAL TOWER AND CHAPEL OF THE COLLEGE
DRAWN BY J. DONKIN

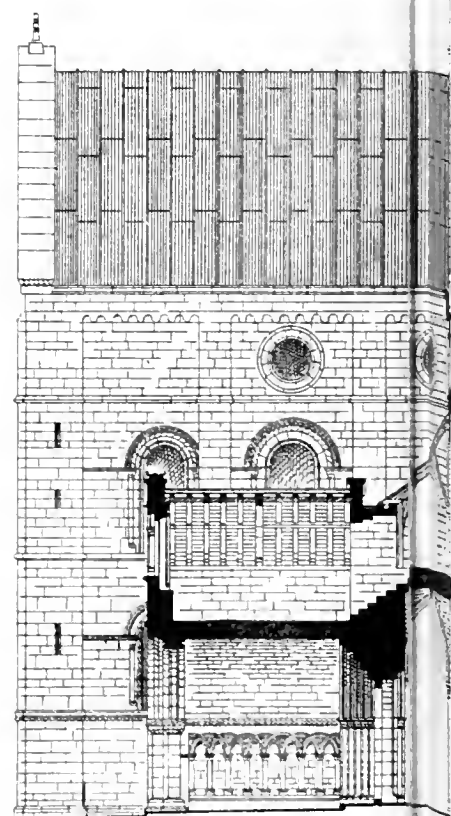
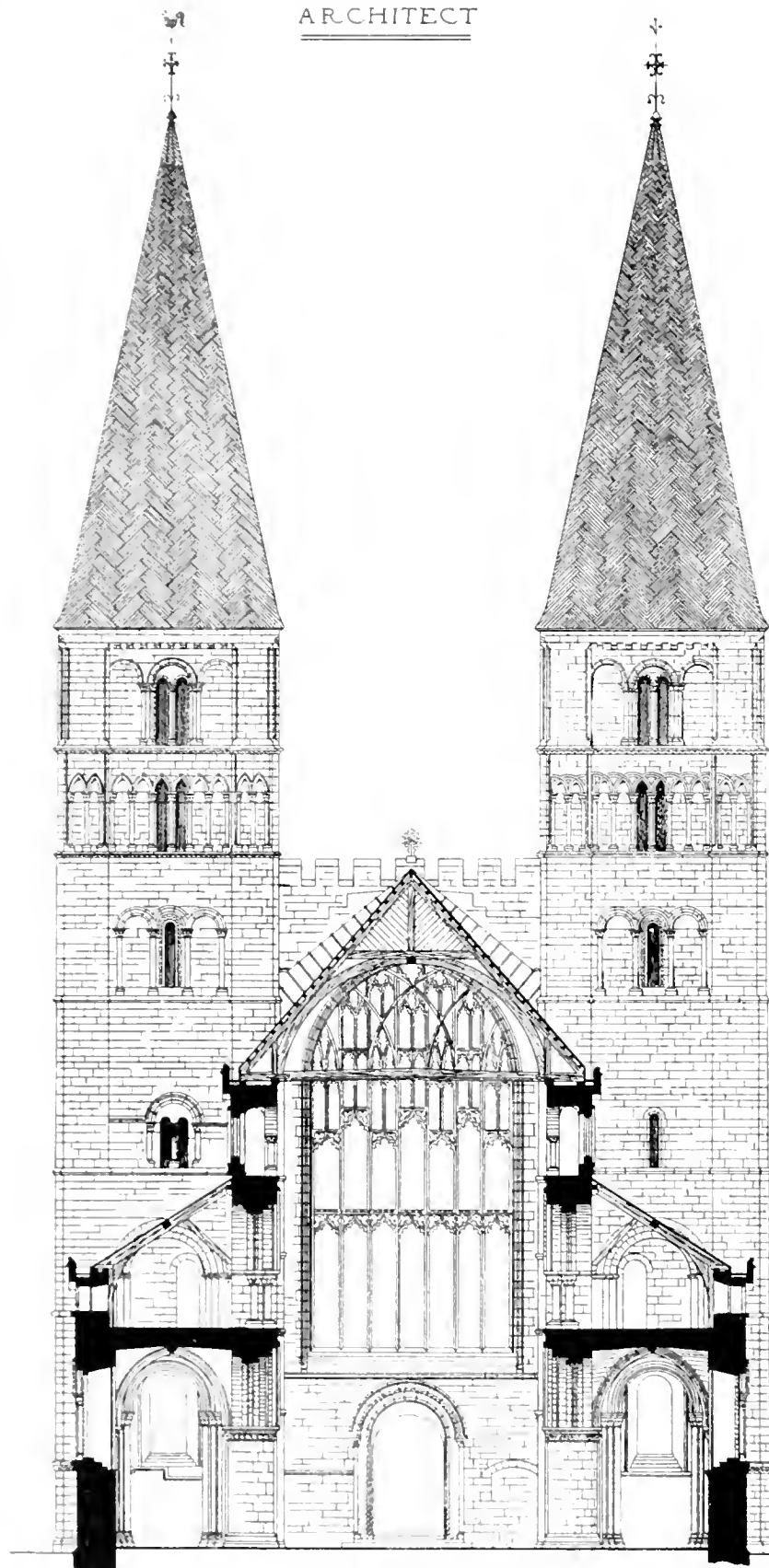
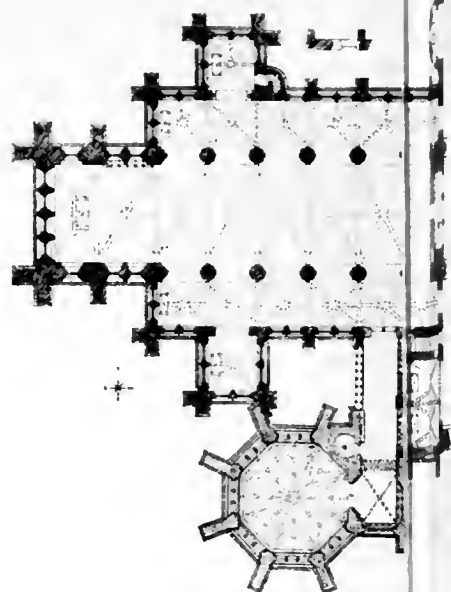
Photo Lithograph & Printed by James Alderman & Joseph Rogers of

SOUTHWELL MINSTER

AS RESTORED BY

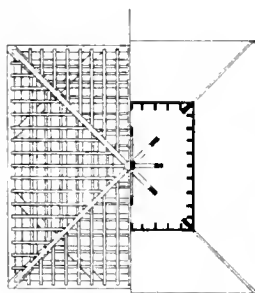
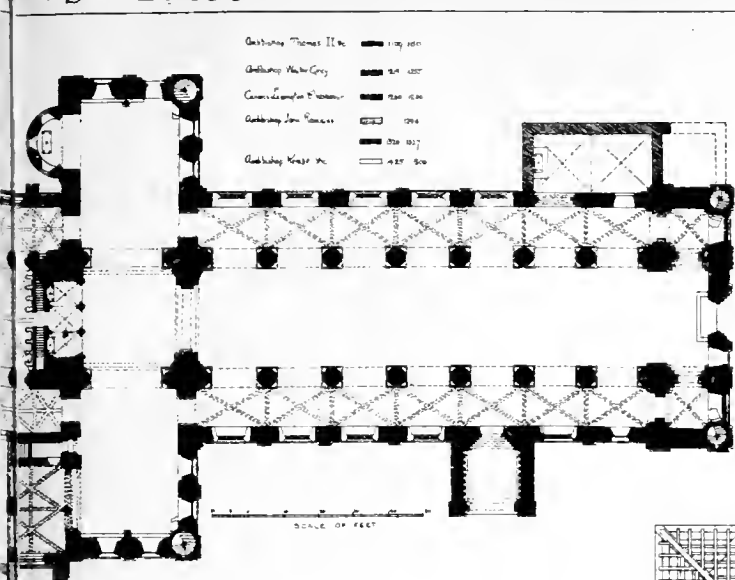
EWAN CHRISTIAN

ARCHITECT

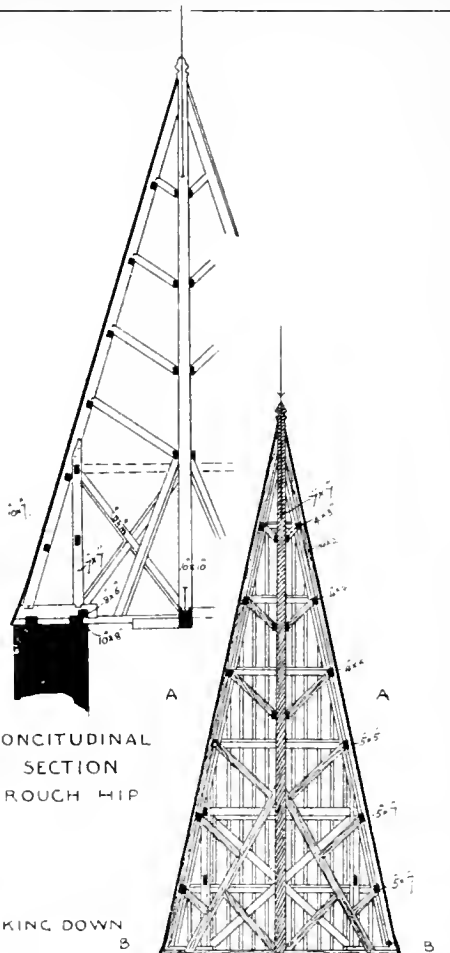


— SECTION THRO' NAVE & AISLES LOOKING WEST —

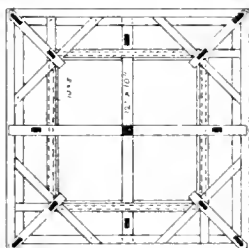
SCALE OF 10 5 0 10



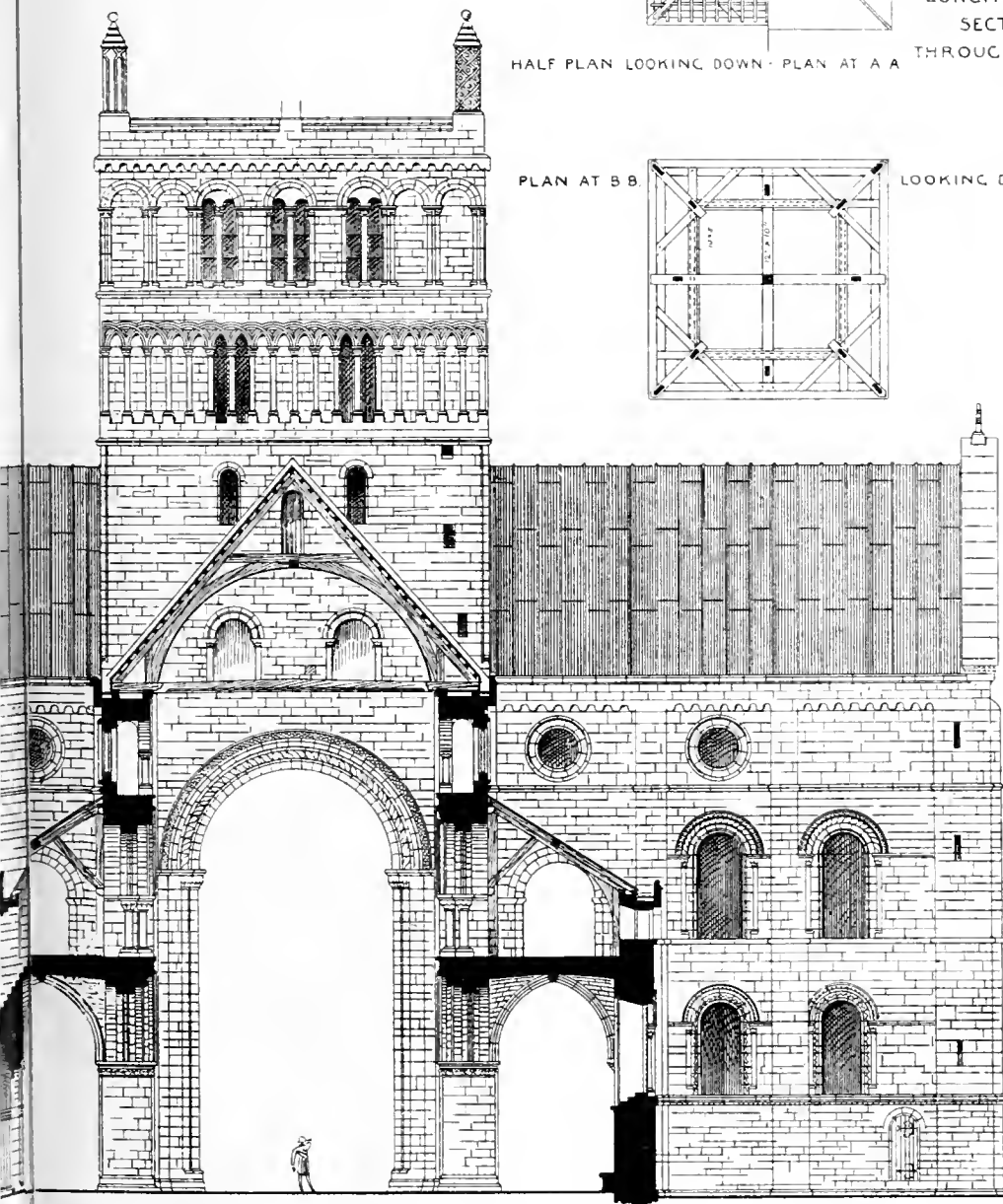
HALF PLAN LOOKING DOWN - PLAN AT A A



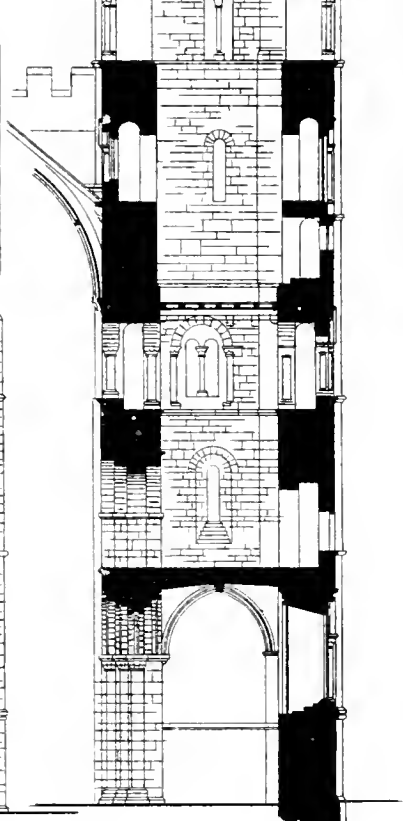
PLAN AT B B



LOOKING DOWN B



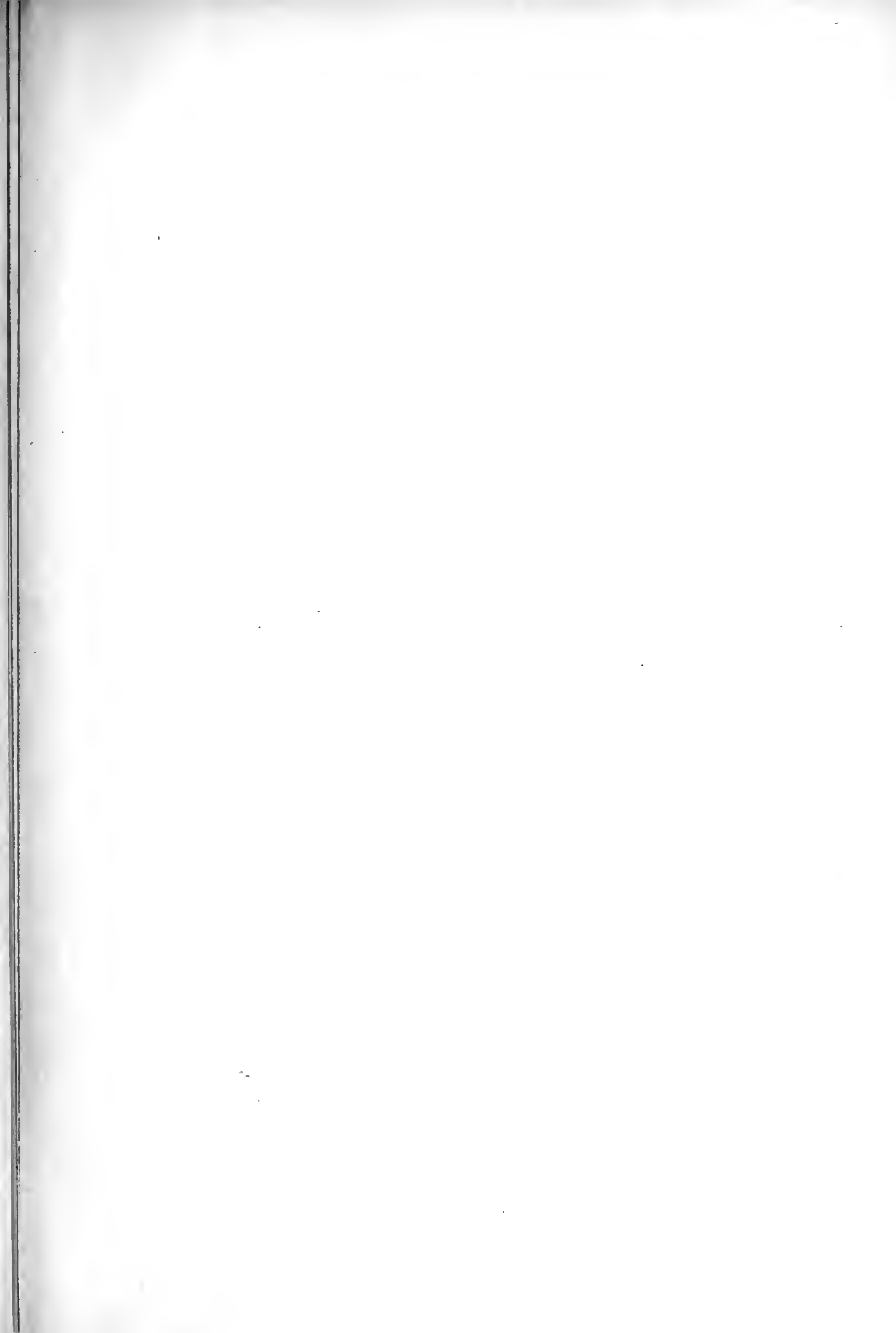
SECTION THRO' NAVE & AISLES LOOKING EAST



SECTION THRO' N.W. TOWER LOOKING WEST

1871
1872
1873
1874
1875
1876
1877
1878
1879
1880
1881
1882
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893
1894
1895
1896
1897
1898
1899
1900

23

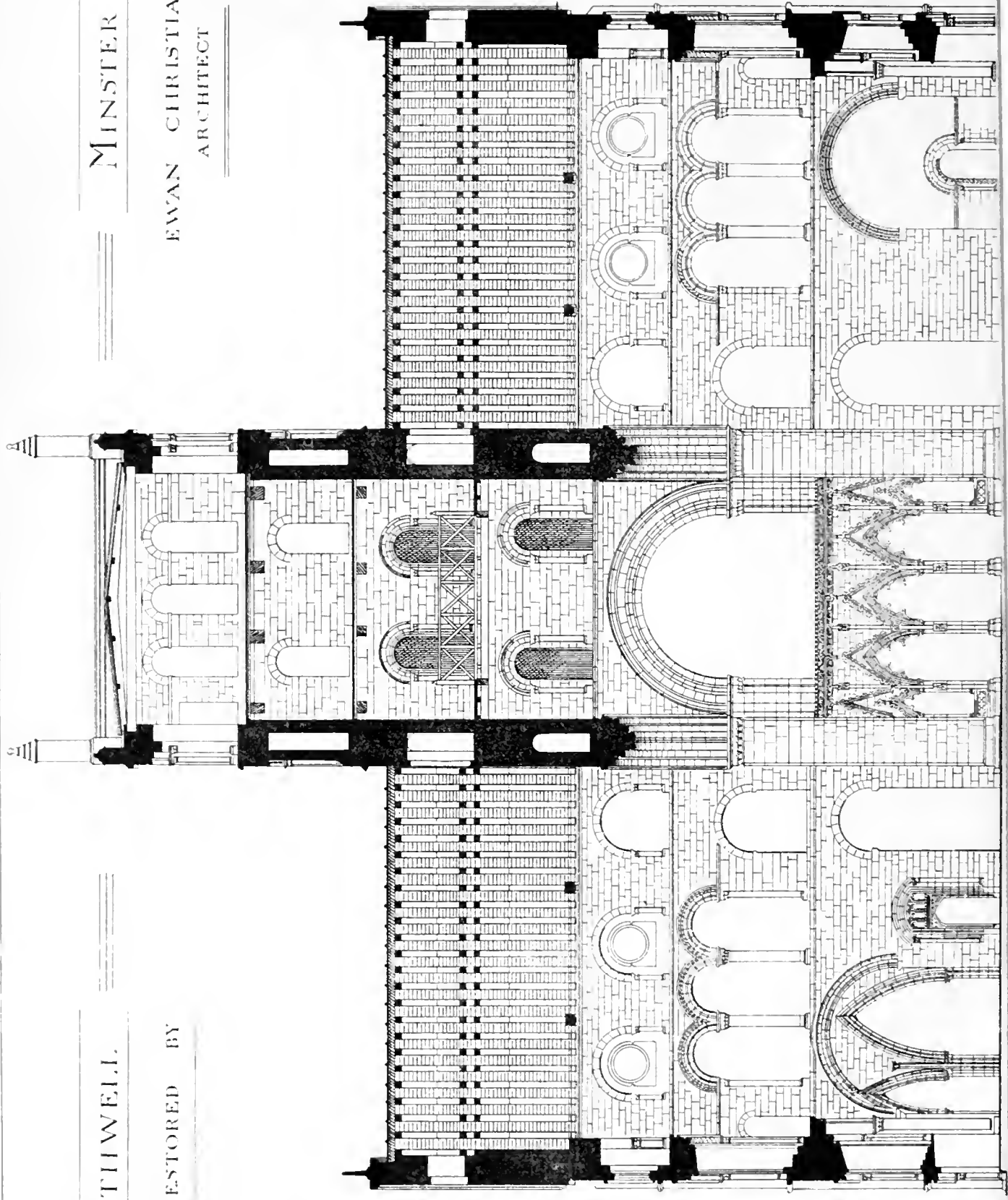


SOUTHWELL.

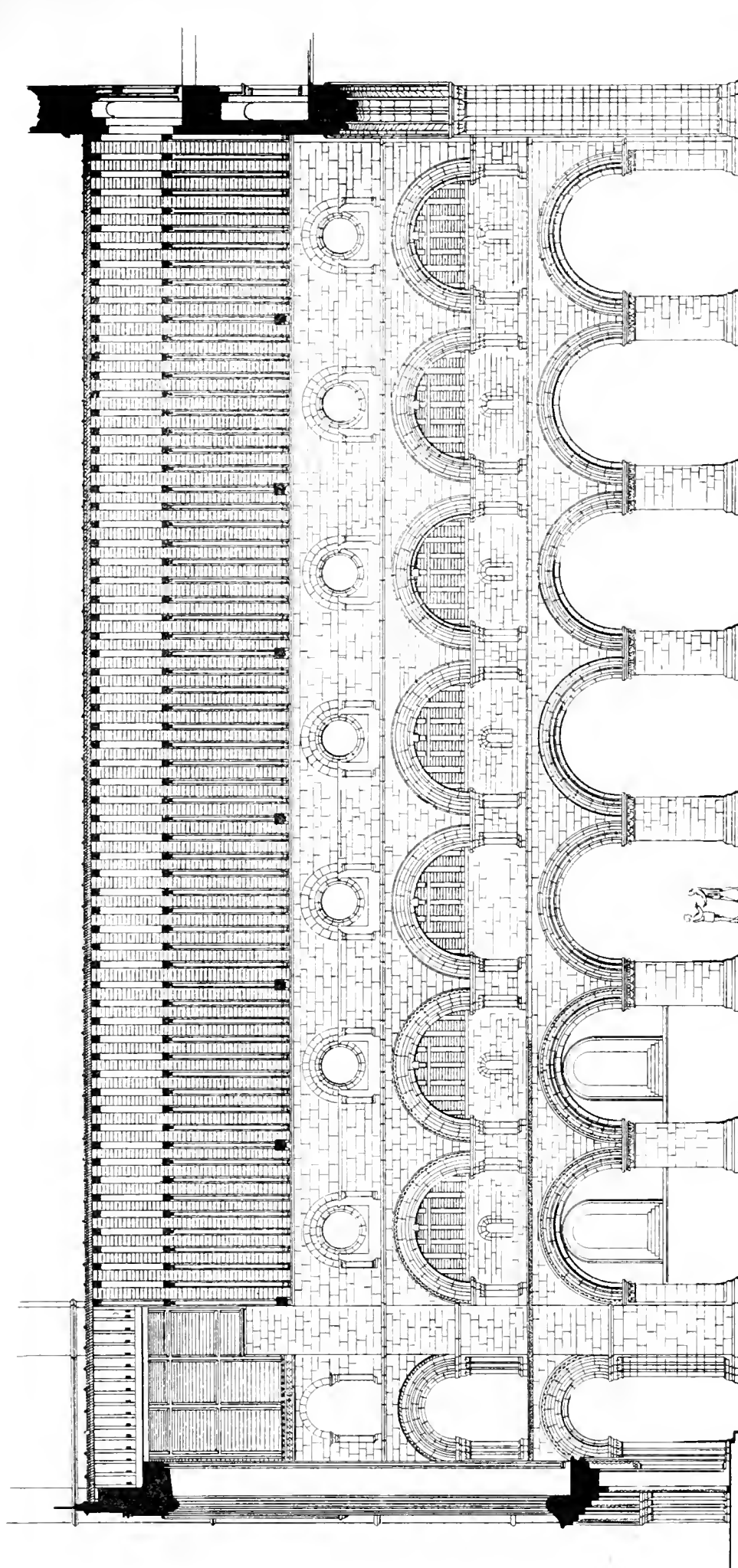
AS RESTORED BY

MINSTER.

EWAN CHRISTIAN
ARCHITECT



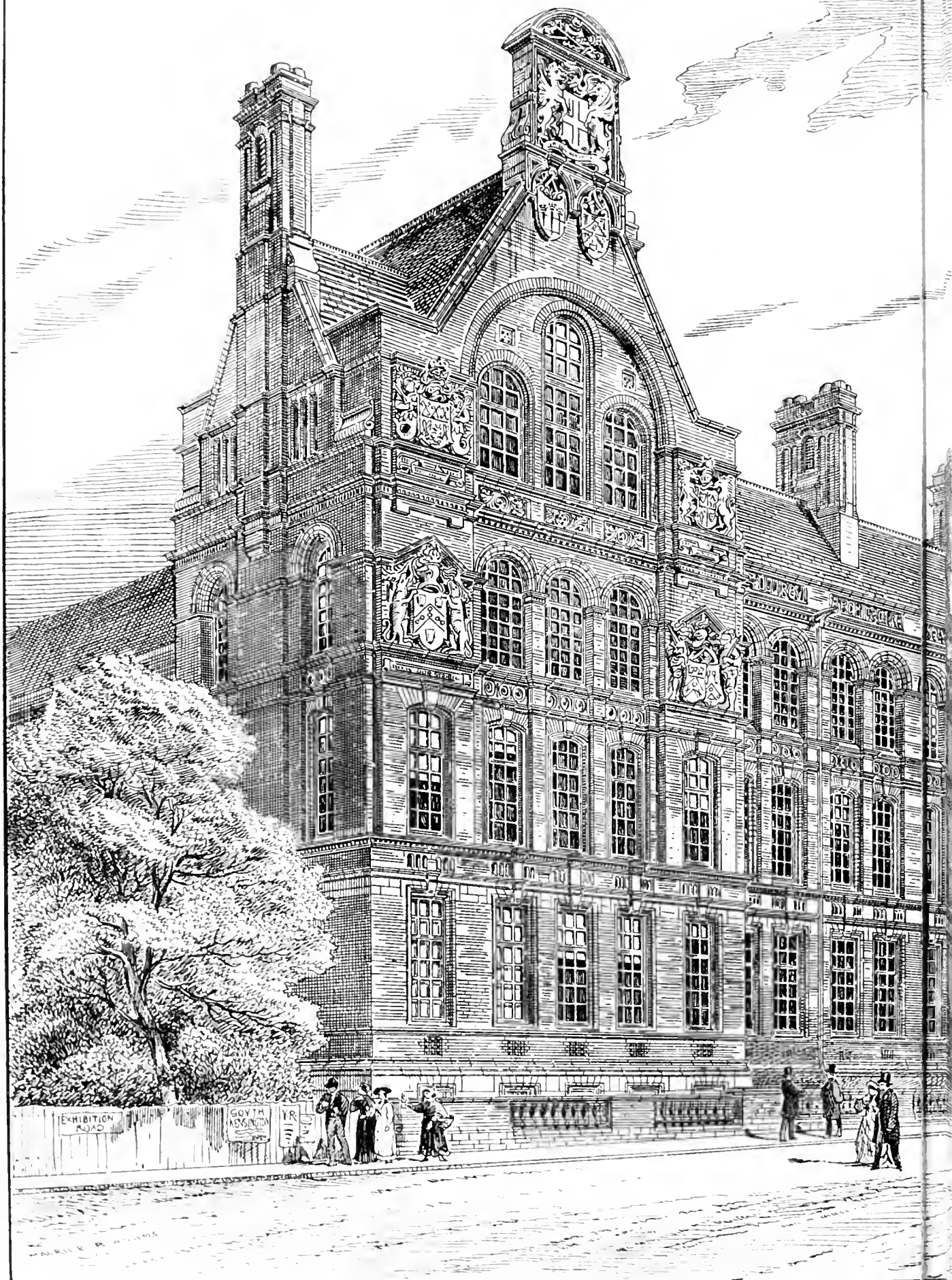
SECTION THRO' TRANSEPTS LOOKING EAST



- SECTION THRO' NAVE LOOKING NORTH -



SCALE OF FEET



VS. DEC. 23. 1881.

CENTRAL INSTITUTION OF THE CITY & GUILDS OF LONDON
INSTITUTE FOR THE ADVANCEMENT OF TECHNICAL EDUCATION,
EXHIBITION ROAD, KENSINGTON.

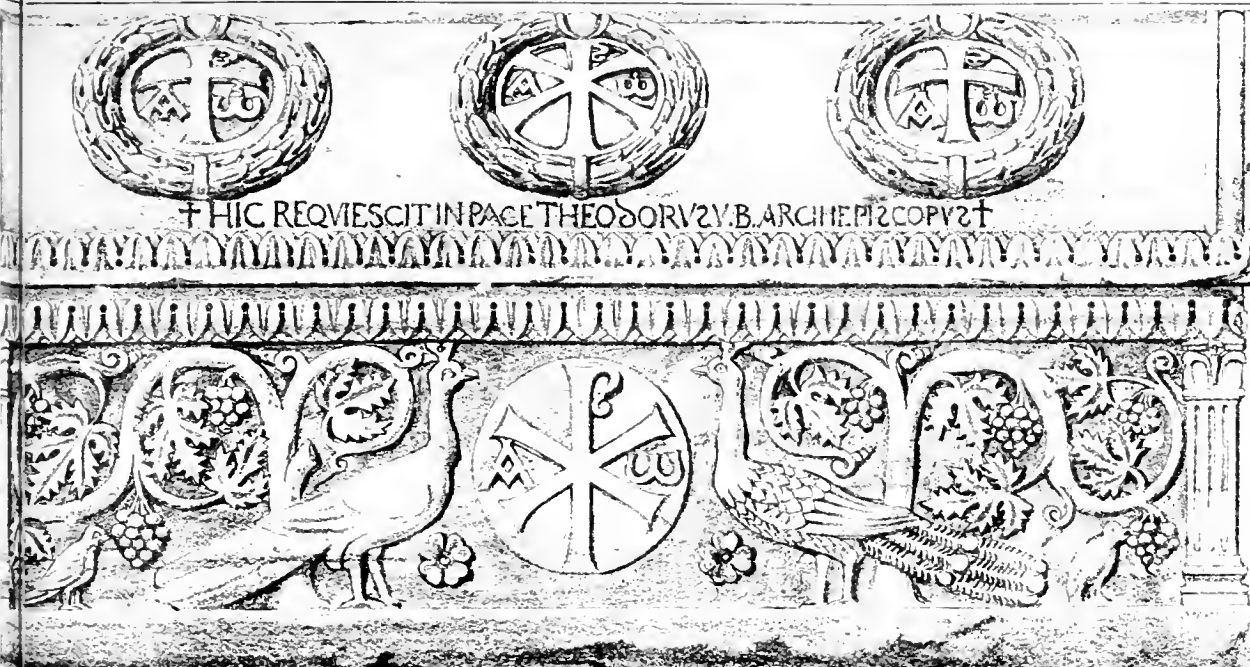
ALFRED WATERHOUSE A.R.A. ARCHITECT





To Francesco Tomabue
S. Maria sopra Minerva



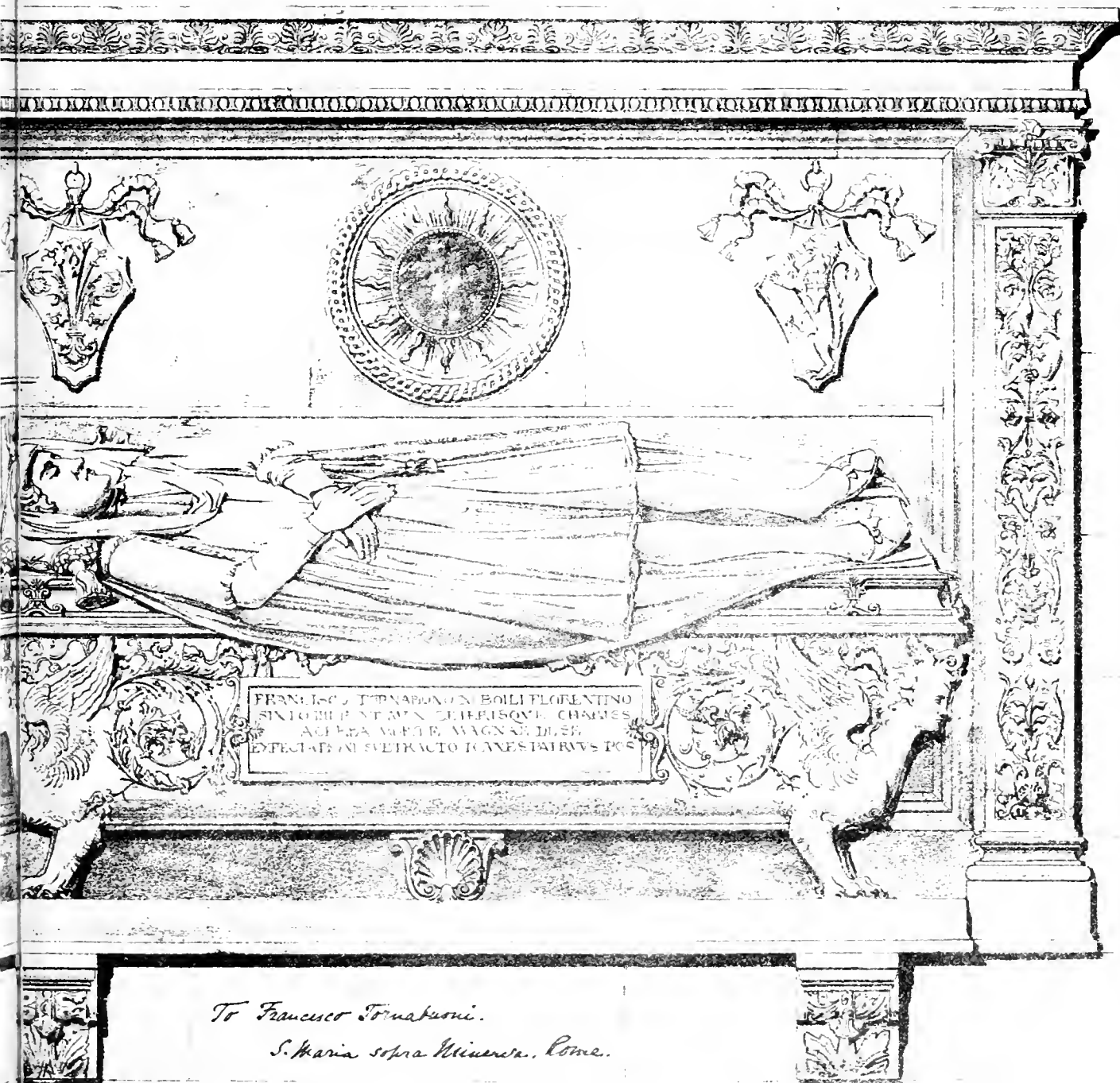


Sarcophagus. S. Apollinare in Classe, Ravenna.

ANCIENT SEPULCHRAL MONUMENTS.

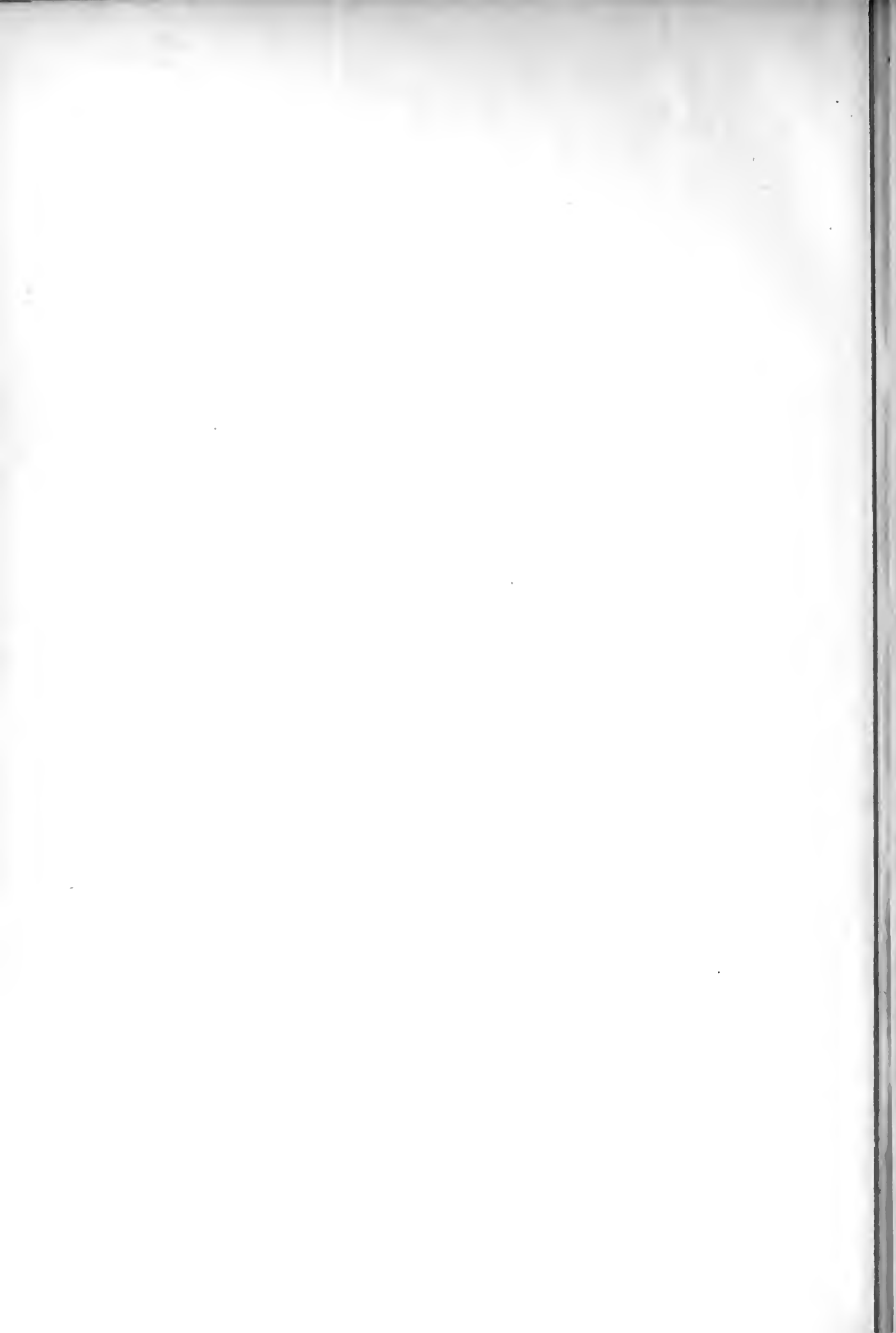
ARRANGED AND DRAWN, W BRINDLEY SCULPTOR AND W S WEATHERLEY ARCHITECT

Maria, Rome.



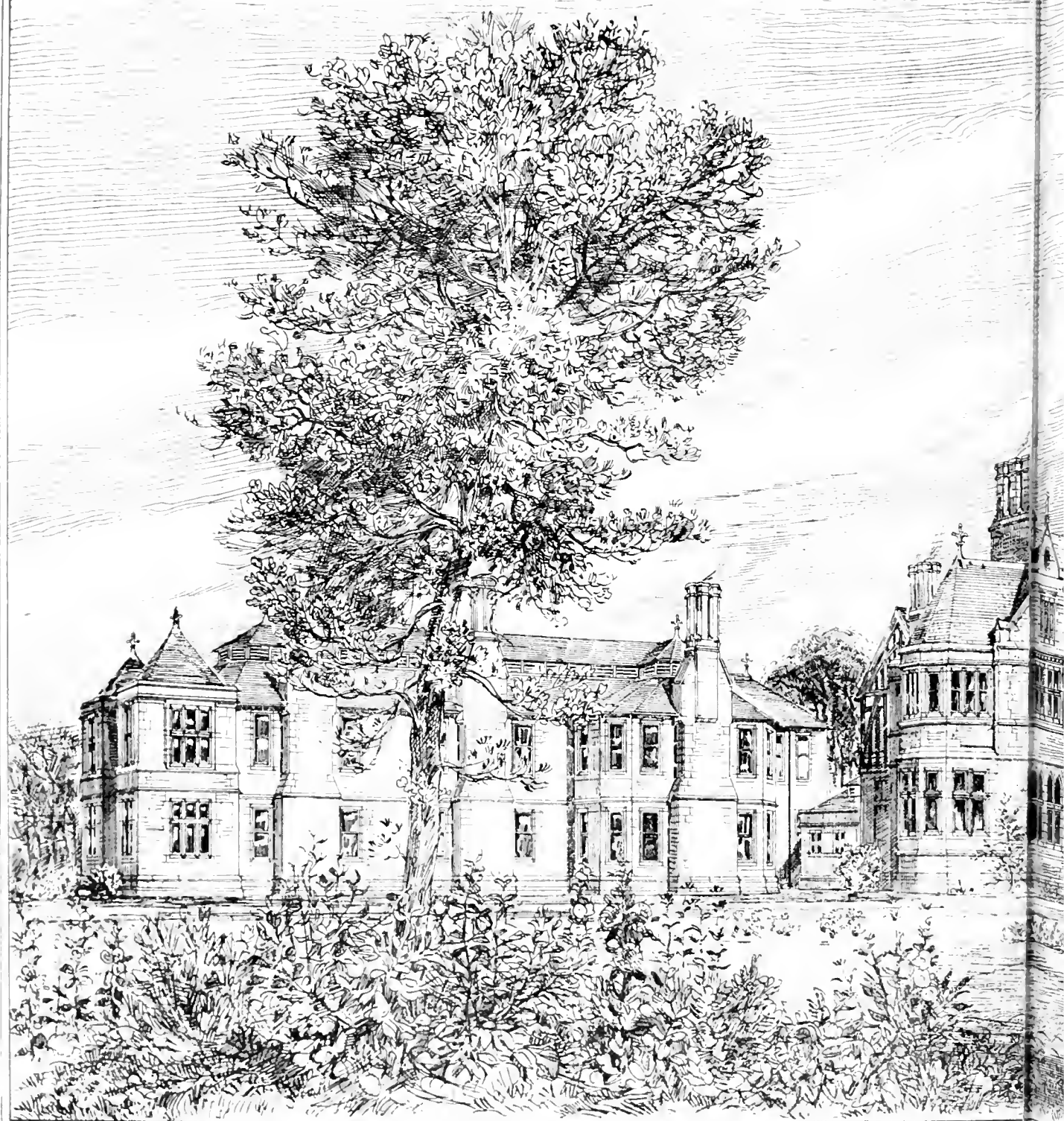
To Francesco Tomasoni.

S. Maria sopra Minerva, Rome.



NEW INFIRMARY, CARDIFF.

MESSES JAMES SEWARD & THOMAS
ARCHITECTS



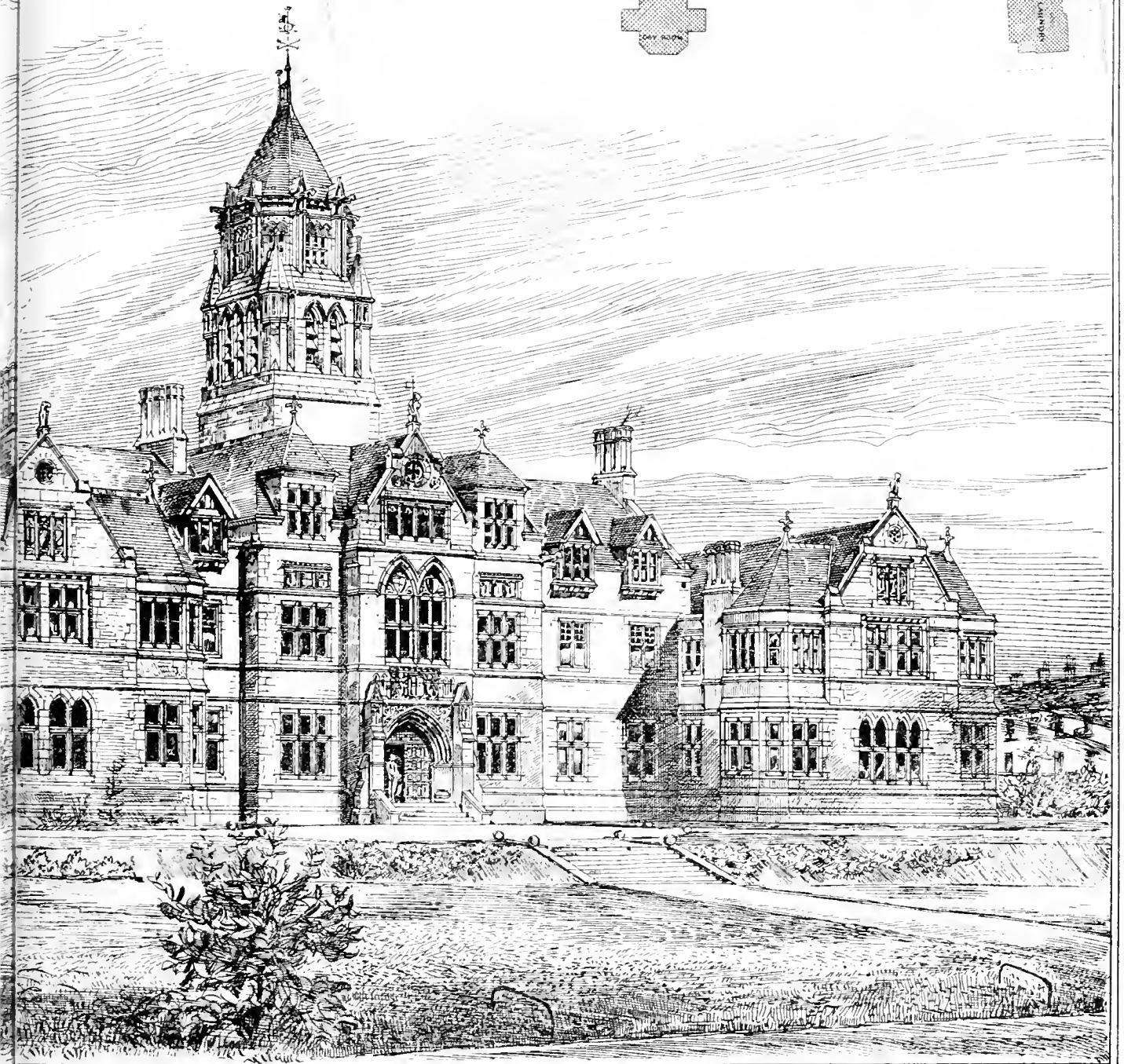
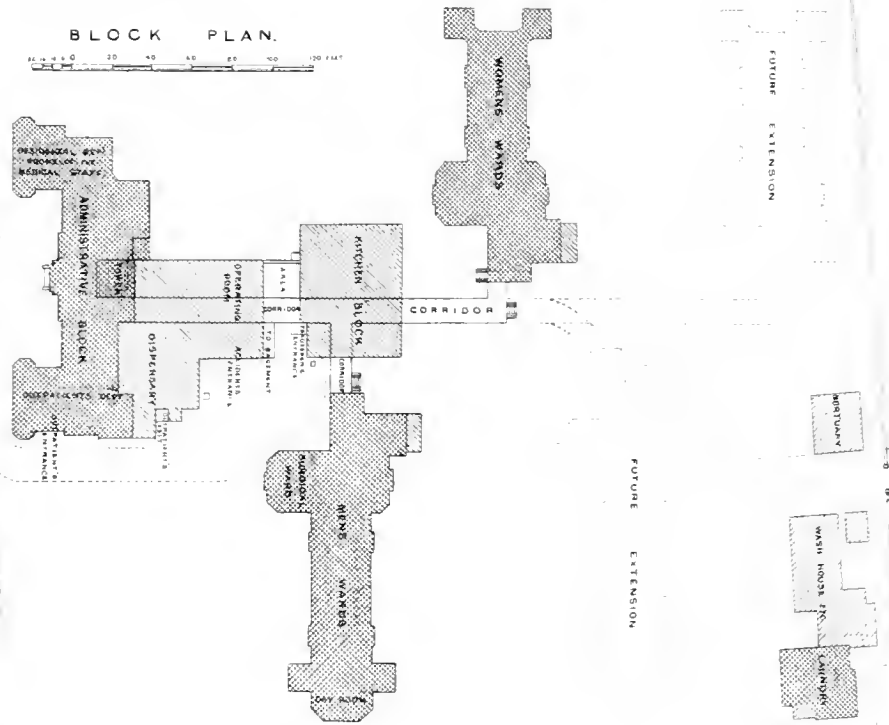
NEWPORT ROAD

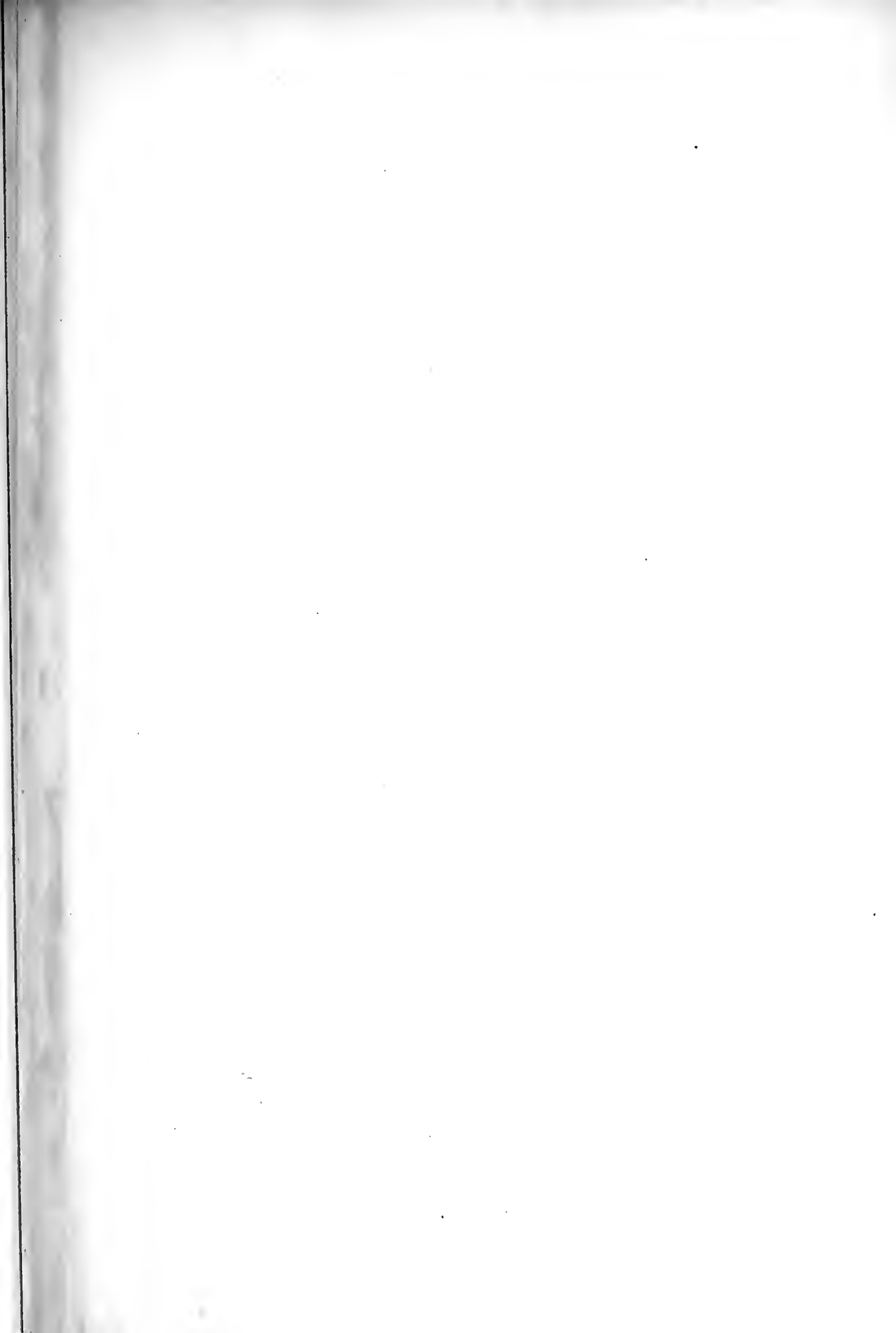
BLOCK PLAN.

0 20 40 60 80 100 120 FEET

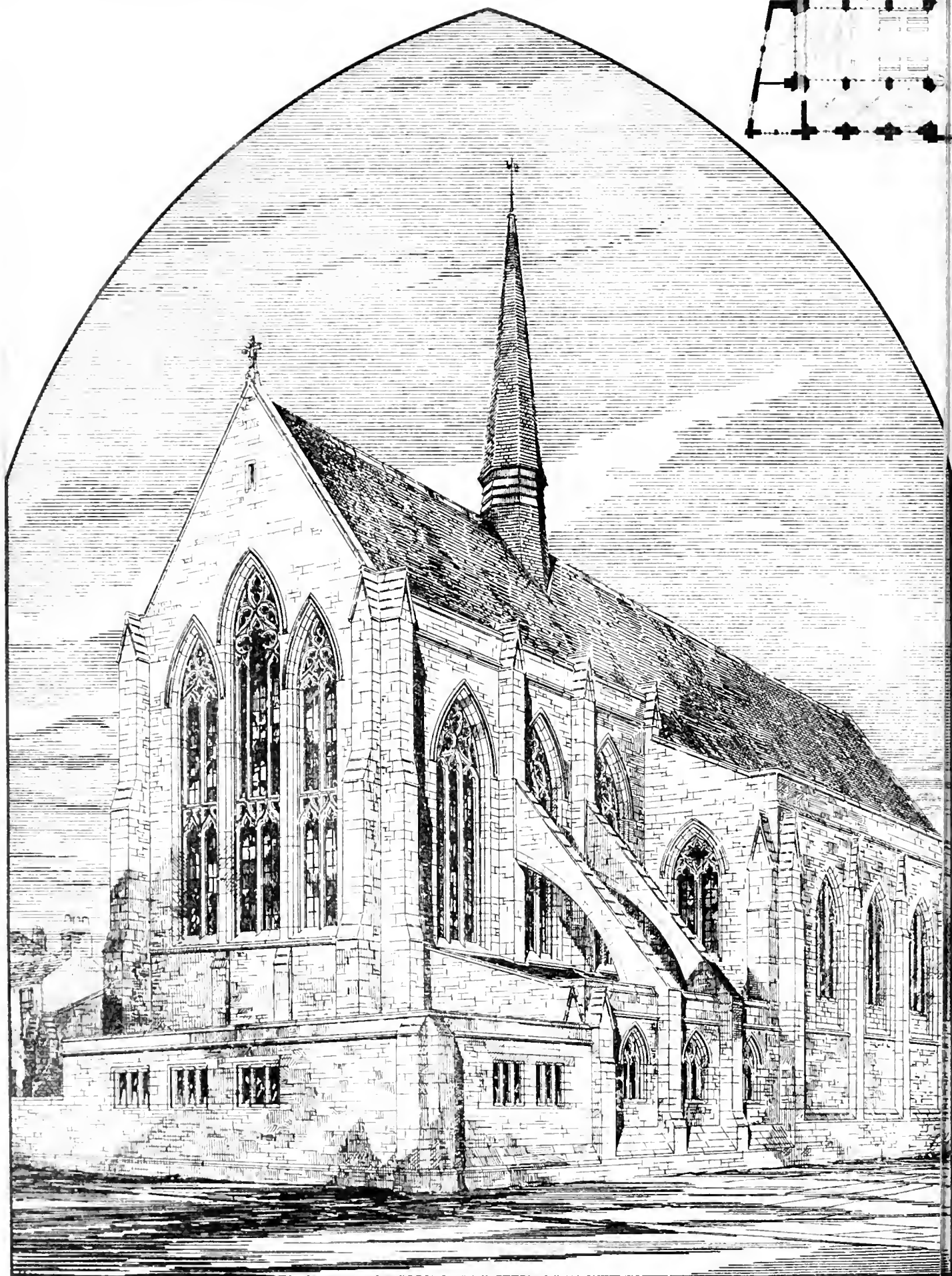
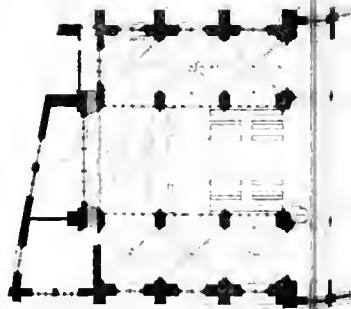
ADAMS DOWN

S. H. N. W. T.



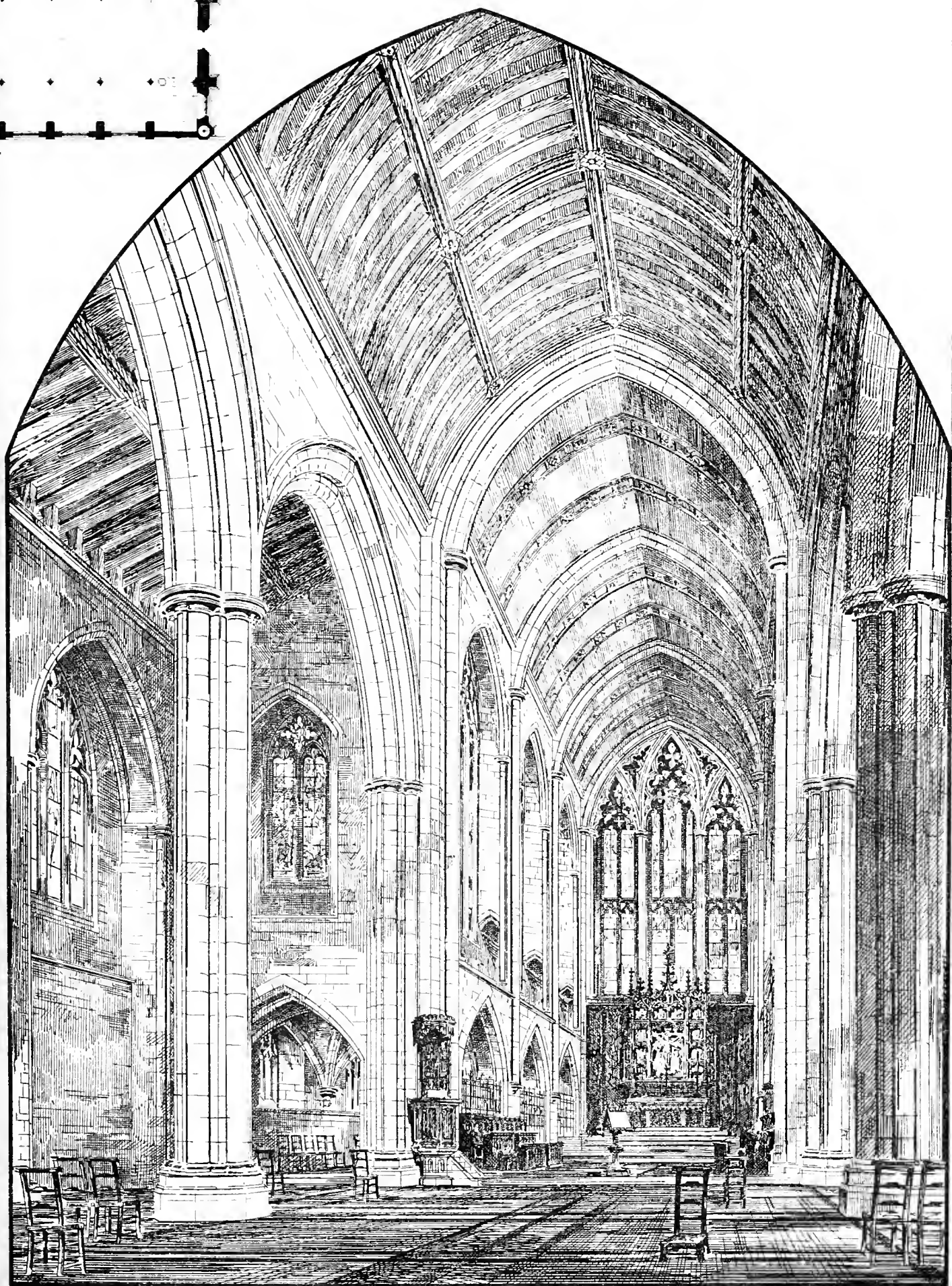


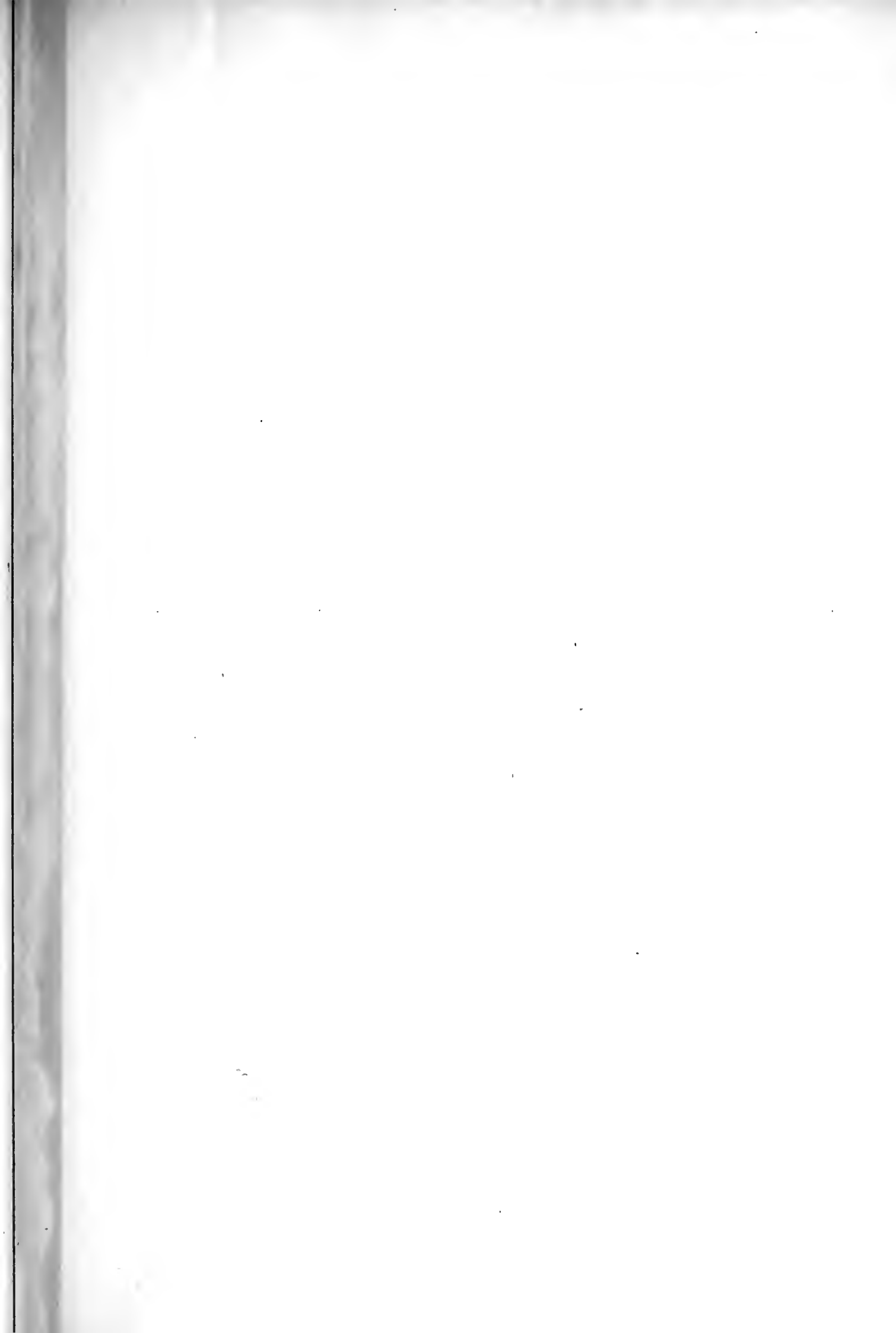
NEW CHURCH OF
ST. GERMAINS, CARDIFF.



Ms. DEC. 23. 1881.

C. F. BODLEY & T. GARNER.
14 SOUTH SQUARE, GRAYS INN.







PAGE WELCOMING SHALLOW AND EVANS

M. W. OF W. ACT I. SC. I.



SLENDER AND ANNE PAGE

M. W. OF W. ACT I. SC. I.

THE
MERRY WIVES OF
WINDSOR
DINING ROOM
WINDSOR
G. R. ROGERSON
H. W. LONGFORD



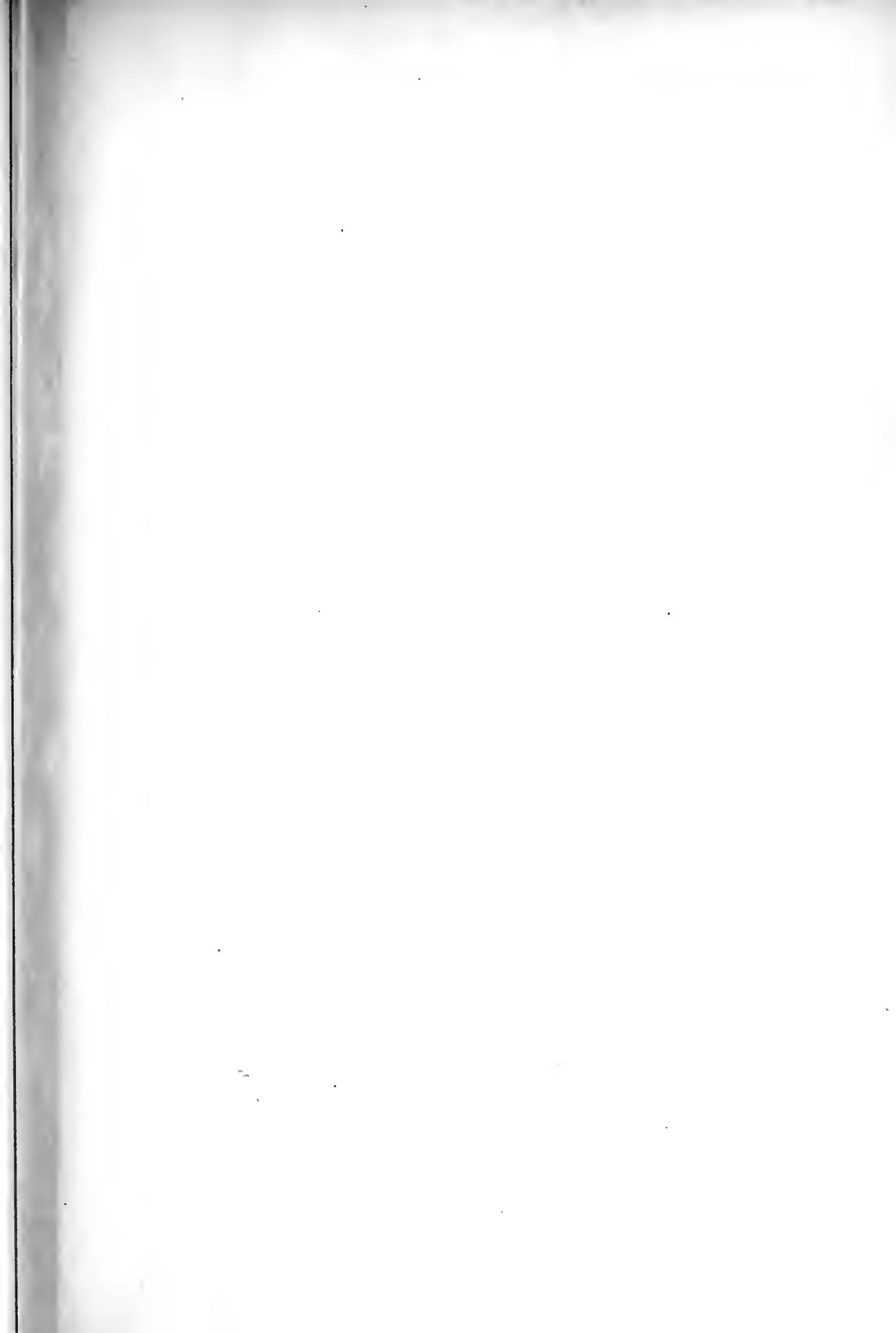
"WIFE BID THESE GENTLEMEN WELCOME"

M.W. OF W^R ACT I. SC I.



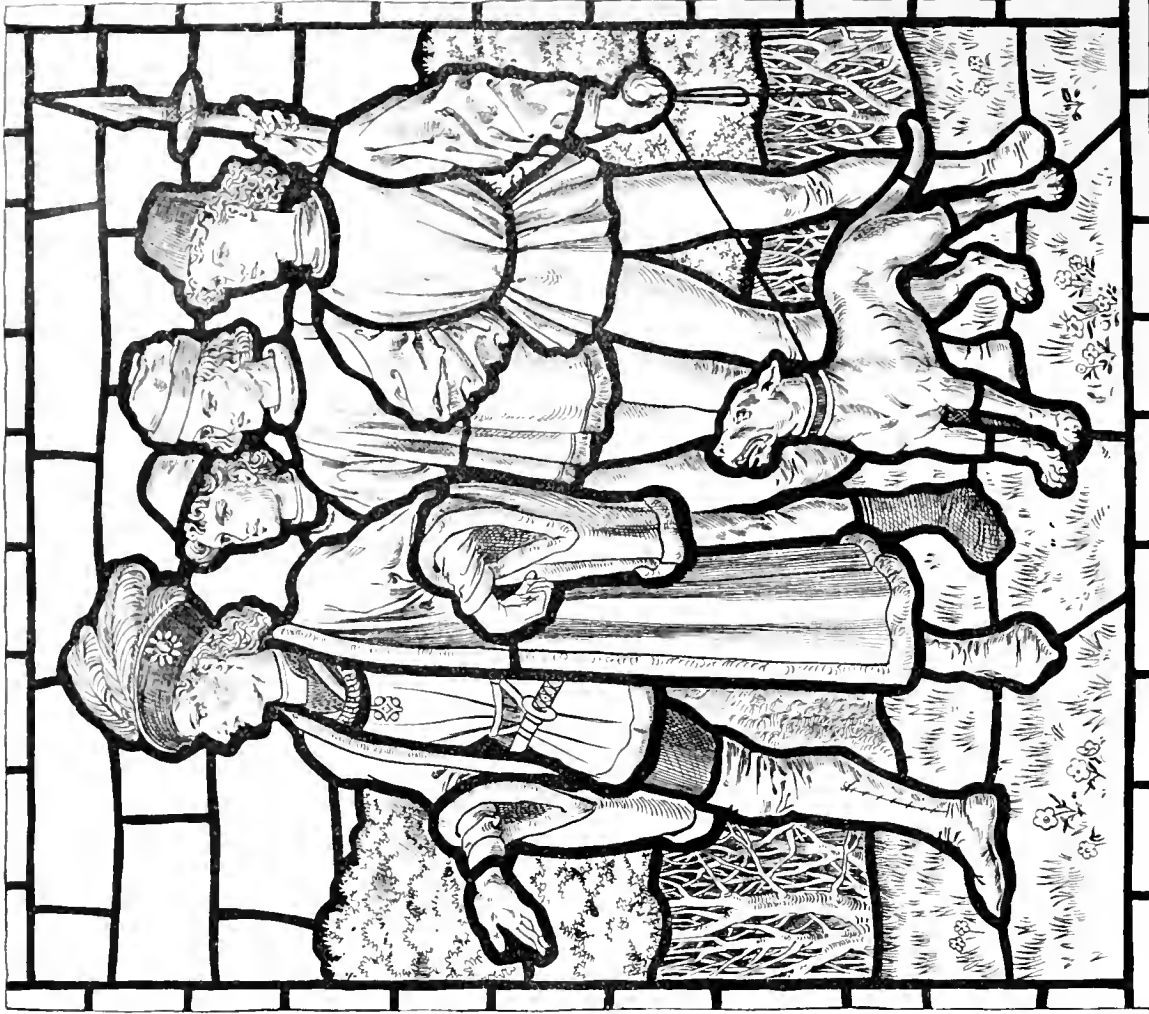
"WE HAVE A HOT VENISON PASTY TO DINNER ... " "I HOPE WE SHALL DRINK DOWN ALL UNKINDNESS." ACT I. SC I.

THE
WIVES
AND SOR:
ROOM
AND OW
SON ESQ
LSDALE



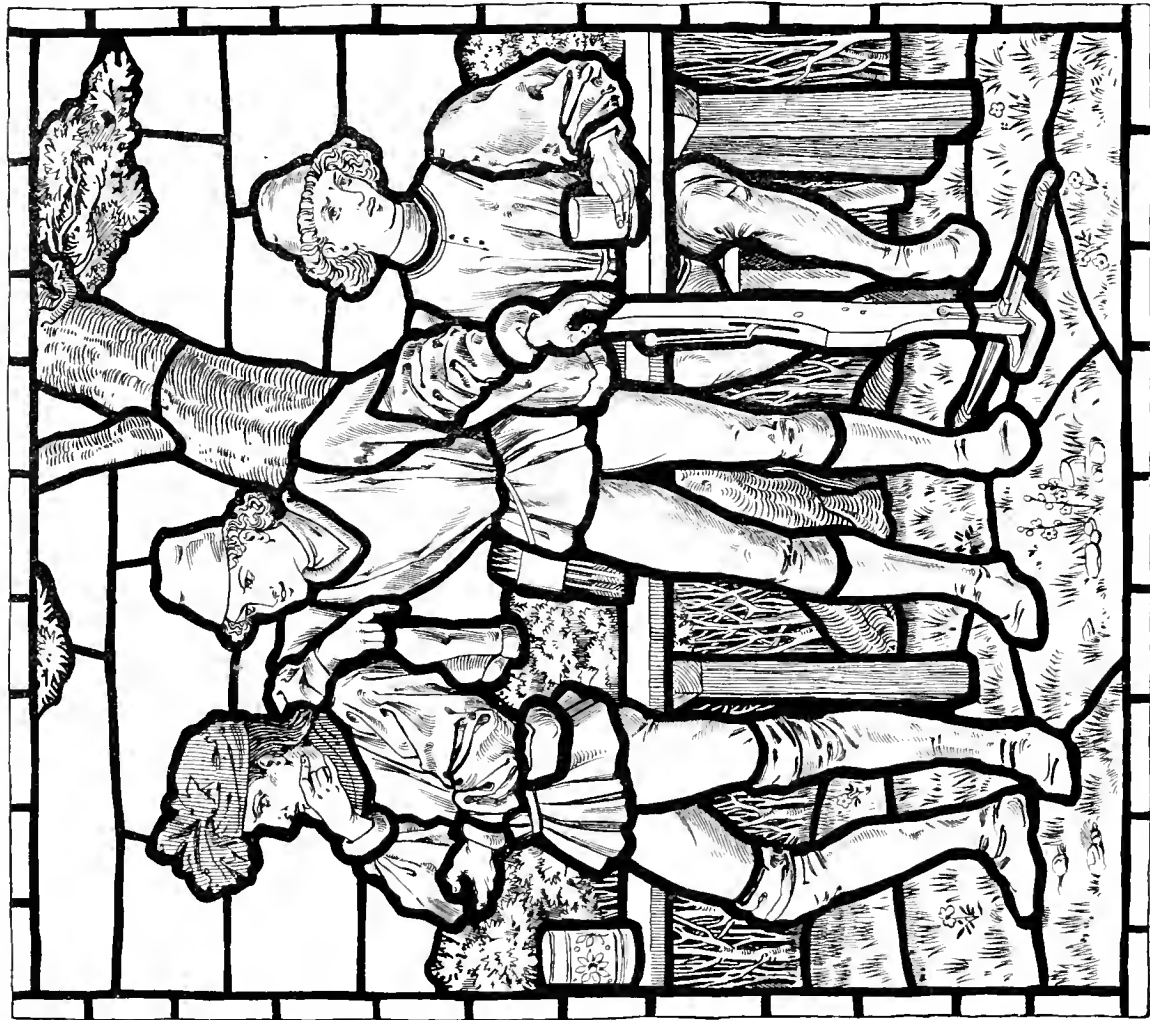


"AS YOU LIKE IT" ACT 2. SC. 7.
ADAM AND ORLANDO



"AS YOU LIKE IT" ACT 2. SC. 7.
DUKE AND ATTENDANTS.

BY H.W. LONSDALE 1881



MAYNICE & ADAMS DEL. (FROM THE LANTERN)

"AS YOU LIKE IT" ACT 2. SC. 7.
JACQUES AND OTHERS



"AS YOU LIKE IT" ACT 2. SC. 7.
AMIENS AND OTHERS.

LITHOGRAPHIC ILLUSTRATIONS—

(Continued.)

SOUTHWELL MINSTER.

THE repair of the Collegiate Church at Southwell, so far as regards the walls, has been in progress for many years past, and the building in that respect has been restored to sound condition. But in the year 1873, when by lapse of time the old arrangements of the chapter ceased to exist, it was thought well, before handing it over as a parish-church, that everything necessary or desirable to be done to put the whole structure into seemly and durable condition, should be at once undertaken, and Mr. Christian was instructed to survey and report accordingly. The church had greatly suffered in the first place by the fire, which in the year 1711 consumed the ancient roofs, and, secondly, by the removal in the year 1802 of the lead-covered spires, which up to that time had terminated the western towers. The chapter-house, also, had been denuded of its conical roof. The modern roofs, substituted for the ancient ones, were all of inferior material and workmanship, and covered with slate. As regards the nave and transepts, this was no doubt the consequence of enforced economy, but in respect of the spires and conical roof of the chapter-house there must needs have been a considerable gain from the sale of the lead. Mr. Christian advised that the roofs of the nave and transepts should be restored on the old lines, of which the central tower gave indisputable evidence, and that the roof of the chapter-house, and the western spires should be also restored, and this advice was adopted and has been followed throughout. The new roofs and spires have all been reconstructed with very substantial timbers of English oak, and covered throughout with cast lead on a double thickness of boarding. In designing the spires, every possible care was taken to ascertain as nearly as possible the ancient outlines, as to which a considerable amount of evidence was obtained by a comparison of old prints and documents relating to the building. Also before the work was actually commenced, Mr. Christian was fortunate enough to secure an original and evidently very accurate water-colour drawing, believed to be by Turner, probably made only a very short time before the spires were removed. The exact point from which this view was taken was easily ascertained, and it is believed that in respect of height, leading, &c., the restored spires must very closely resemble the ancient ones, and whatever differences of opinion there may have been as to the propriety of attempting the restoration, there can be little doubt now but that the right course has been adopted. The only roof that has not been touched is that of the choir; but as there was not the same necessity for renewing this, the whole choir being groined in stone, it has been left for a future generation. Neither has any change been made in the covering of the central tower, respecting which there is no evidence to show that any spire ever existed. The removed roofs were flat-ceiled. Those of the nave and transepts are now open to the rafters, and the additional height thus gained is deemed to be of considerable advantage to the effect of the interior. Other works, including the re-fitting of the choir, the restoration to the ancient levels of the 13th-century chapels on the east side of the north transept, the general re-flooring, &c., will shortly be proceeded with, but up to the present time these have not been finally contracted for. In the flooring of the nave it is intended to preserve exactly the ancient lines, and as many as possible of the old stones, only making the necessary provision against damp.

SUBJECTS IN STAINED GLASS BY H. W. LONSDALE.

"MERRY WIVES OF Windsor." These panels form the upper portion of the dining-room windows at Beech Cottage, Allerton, recently enlarged for Mr. J. E. Rogerson, by Messrs. Aldridge and Deacon, architects, Liverpool. The first subject illustrates the scene in Act I., where Anne Page invites the reluctant Master Slender to enter the house and join the rest of her father's guests. The two centre panels represent the scene which we are to suppose is taking place in Page's dining-room during the foregoing conversation, Justice Shallow and Pastor Evans, entering shortly after the others, are welcomed by the master of the house. In the fourth panel, a serving-man is carrying up the

promised venison-pastry, while a maid goes to the cellar to draw the wine wherewith the company is "to drink down all unkindness."—"As You Like It." The subjects for the upper lights of the drawing-room windows at Beech Cottage are furnished by Act II., Scene 7, of this play. The four panels illustrate the incident of Orlando introducing his old servant Adam to the Duke, who, with Jacques, Amiens, and other followers, are living in banishment in the Forest of Arden. A fifth panel, completing the series, with Rosalind, Celia, and Touchstone wandering in another part of the forest, will be given in an early number of the BUILDING NEWS. The glass was executed by Messrs. Heaton, Butler, and Bayne, from cartoons by Mr. H. W. Lonsdale.

COMPETITIONS.

BLACKFRIARS-BRIDGE SCULPTURE COMPETITION.—Early in the present year, some fifty designs were submitted for the first of the groups intended to be erected on the four pedestals of Blackfriars-bridge, and, at the time (April 1st), we gave a review of the models contributed. At the last sitting of the Court of Council of the City of London, the award of Sir Frederick Leighton, P.R.A., the referee who has adjudicated on the designs, was read, though the final award has not yet been actually determined upon. Sir Frederick Leighton, it is stated, has selected six designs which he has grouped in three divisions. In group A, No. 11 is placed first, the subject being the "Triumph of the City of London," representing Britannia drawn in a car of rich design by lions, driven by a boy, the whole composition being good, if not strikingly original. Mr. Fabbrucci is the author. The second in group A is No. 22, "Queen Boadicea," we believe the design of Mr. W. S. Firth, of the Lambeth School of Art. Group B, No. 3, "India visits Britain," and No. 9 "Progress"; Group C, No. 19, "Queen Elizabeth"; and Nos. 43 and 44 "Memorial of the World." This selection has, we learn, been referred to the committee for further consideration. More than nine months have already elapsed since the designs were received, further delay, therefore, should hardly be necessary. All the premiated designs will become the property of the Corporation. The prizes are two of £250, two of £150, and two of £100.

EXETER.—Professor T. Hayter Lewis, F.S.A., was appointed last week by the Town Council of Exeter as official assessor in the open competition for the proposed new asylum at a fee of 100 guineas. The town council decided on Professor Lewis's recommendation that the competition be initiated by inviting preliminary sketches and ground plans, and that the committee, with the advice of the assessor, then select a certain number, not less than six or more than ten, for the final competition.

St. PANCRA'S WORKHOUSE.—At a special meeting on Monday last, the St. Pancras guardians selected the following five architects for a limited competition for the extension of the workhouse buildings—viz., Mr. Elijah Hoole, Messrs. Young and Hall, Messrs. J. Saville and Sons, Messrs. Wilson and Aldwinkle, and Mr. Bridgman. The gentlemen who were nominated, but not chosen, were:—Mr. R. Norman Shaw, Messrs. Isaacs and Florence, Messrs. Giles and Gough, Mr. Verity, Mr. John S. Quilter, Mr. Gaudry, Mr. J. P. Seddon, Mr. Waldron, Mr. Davids, and Mr. Young. It is proposed to divide £300 amongst four of the five competitors, and to give the work to the fifth. This arrangement, however, has to be confirmed by the Local Government Board before it can be carried out.

THE VICTOR EMMANUEL MONUMENT.—On Friday the exhibition of plans for the Victor Emmanuel monument at Rome was opened by the King and Queen of Italy. The models and drawings sent by the competitors of all nations occupy three stories of an extensive building in the Via Santa Susanna. Several artists propose to utilise the ruins of the Baths of Diocletian and the church of Santa Maria degli Angeli, built by Michel Angelo out of some of the halls of that ruin. Others project terraced gardens with colonnades and a colossal statue on the Janiculum Hill. Others again giving a utilitarian turn to the national gratitude, would have a monumental bridge on the site of the ancient Pons Sublicus.

TIDES AND TIDAL SCOUR.

AT the 13th meeting of the session of the Liverpool Engineering Society, held recently, the second part of the paper on "Tides and Tidal Scour," by Mr. Joseph Boulton, was read by the author. In the discussion which followed the paper, Mr. A. G. Lyster observed that the two chief instances of the formation of bars occur (1) in the case of rivers highly charged with detritus, which is held in suspension so long as the velocity of the river is maintained within its natural channel, but which becomes deposited when the force of the stream is dissipated by the waters of the ocean and the opposing action of its waves; (2) where the tendency of prevailing winds is to sand up the mouth of a river, which again works for itself a passage through the opposing barrier, and eventually brings about a balance of forces which develops a so-called bar at its mouth. The action and treatment of both these instances largely depends upon the fact that water flowing at a certain velocity produces considerable mechanical effect, so that in the condition described it is capable of abraded and holding in suspension solid matter in proportion to its velocity, and when fully charged its effective or abrading powers vanish, and any subsequent diminution in its velocity is attended by a corresponding deposition. The Mississippi is a river of this class, which has been deepened by the skill and energy of Mr. James Eads, whose advice was only recognised and carried into effect after a lengthened struggle, and the execution of which was attended by complete success. This river, highly charged with detritus, terminates in three mouths or passes, and the plan of operations consisted in selecting one pass, and constructing jetties on each bank, the entrance of the other passes being secured from scouring action by sills across their beds. By this means, the outflow in the one pass was confined within narrower limits, a higher velocity resulted, and the deepening of the channel took place. The jetties were so arranged as to determine the course and action of the river current at an angle with the littoral currents, the effect of which was to largely reduce the bar, and cause the detritus to be deposited to leeward instead of forming a fresh bar further out. On the correct determination of the external or counteracting forces depends almost entirely the success of such a scheme. The means adopted to carry out the work were specially suited to the circumstances and locality of the undertaking. No stone was handy, but in the neighbourhood of the pass there were large fields of rushes, which were plaited into wooden frames, so as to form mattresses, and these were subsequently floated out and sunk in position in a sufficient number of layers to attain the required height. After a lapse of time they became silted up, and formed a very cheap and effective form of jetty. The result accomplished by these jetties may be described as follows:—A channel was scoured throughout their length into deep water of 31 feet in depth, where before there existed in places only 10 feet of water, and a removal of 7,607,151 cube yards of material was effected. When we look at the enormous tract of country—24 times the size of England—which depends on the Mississippi as the natural outlet for its trade, we shall be able to form some idea of the magnitude and importance of the result obtained. Among other striking instances of the improvement of rivers by artificial means may be mentioned the mouth of the Danube by Sir Charles Hartley. An entirely novel theory in this direction is that advanced by Mr. Knapp, of New York, which is now being carried into effect for the removal of the bar at Sandy Hook. On the supposition that the bar is caused from the neutralisation of the river current by the wave action in the open sea, and the consequent deposit of the detritus held in suspension, he suggests the destruction of the wave force by building an artificial bar to a convenient height for the passage of vessels. The detritus, he argues, will thus be borne forward past the bar, and carried away by the littoral currents. Without the data to criticise in detail the theory advanced, it is probable there will be a tendency for the bar to re-form outside the false bar, in addition to which a construction of this class in deep water, and in an exposed situation, must necessarily be attended with serious difficulty and expense. The interesting phenomena offered by the river Mersey cannot now be discussed, but this

river may be considered to come under the second class of bar formation referred to.

Building Intelligence.

BODMIN.—Important additions are about to be made to the Cornwall pauper lunatic-asylum at Bodmin, which will supply additional accommodation for 170 patients. The main building will be two stories in height, and will exceed 250ft. in length. It will be planned with 10ft. wide corridors extending the length, opening on the ground-floor into day-rooms, and above into dormitories. At one end will be an epileptic ward, with attendants' rooms in close proximity. In the central portions spurs will be thrown out for both bathing-rooms, lavatories, and closets. All the drains will be extra-mural and ventilated. Detached for the most part from the new block, but connected with it and the main asylum by corridors, will be a dining-hall seated for 140 patients, with kitchen and offices in the rear, and in front of this detached building will be apartments for the assistant medical officers. The building will be erected and faced with a free-stone quarried on the estate, and now being raised by the patients. The plans, which have been approved by the commissioners in Lunacy and the Home Secretary, have been prepared by Mr. Norman and Messrs. Hine and Odgers, of Plymouth, as joint architects.

CHRIST COLLEGE, BRECON.—Some considerable additions to the school buildings have been lately completed from the designs of Mr. J. Bacon Fowler, architect, of Brecon. They are so arranged as to form, with the old school buildings and the fine thirteenth-century chapel of the college, three sides of a quadrangle. On the ground-floor are a range of class-rooms with a long corridor giving access to the chapel, lavatories, &c. Above are the large schoolroom, 75ft. by 25; science class-rooms, and studies. The walling and dressed work are in the local old red sandstone, and the style a simple Early English, intended to harmonise with the old work in the chapel and old monastic buildings. Forest of Dean stone has been sparingly used in mullions where necessary. The contractor was Mr. Wm. Bowers, of Hereford.

GLAMORGAN.—St. David's Church, Ystrad Rhondda, Glamorganshire, has lately been opened for service. It has been built at the sole expense of Mr. Crawshay Bailey, a large owner of property in the neighbourhood, at a cost, including approaches, levelling, and boundary-walls, of about £6,000. Seats are provided for about 560 persons. The church consists of nave with south aisle of equal span, chancel, vestry, organ-chamber, N.W. tower with small spire. The cost of the building itself has been about £1,500. The materials are the local Pennant stone walling, with Bath-stone dressings and green Whiteland slates. The work has been carried out by Mr. C. Shepherd, of Cardiff, from designs by Mr. J. Bacon Fowler, architect, of Brecon.

LEATHERSELLERS' HALL.—This Hall in St. Helen's-place, Bishopsgate-street, which has lately been rebuilt, has been fitted up from the designs of Messrs. A. T. Arrowsmith and Co., of 80, New Bond-street, London, who have completed the following works:—In the livery hall, 72ft. by 37ft. with a large bay window, an elaborate carved oak dado, 10ft. high, has been introduced, with parquet panels; pilasters with ornamental caps, festoons of fruit and flowers, and other decorative features. This fine hall, which is 35ft. high, has a plaster ceiling and cornice to an Elizabethan design, and this style has been adhered to throughout. A massive oak screen across one end of the hall, embodying the details of the dado, forms a prominent feature in this room. The reception room, 34ft. by 27ft., has a handsome oak carved and panelled dado, 1ft. 6in. high, with a bold chimney-piece and overmantel to correspond, and a solid parquet floor of the pattern laid by the same firm in the green drawing-room, Windsor Castle. The tiled hearth, sides, and back in this room and the hall have been specially designed, and the company's crest introduced with very good effect. The dog-grates have also been specially designed. The ceiling and cornice are in plaster, and harmonise well

with the other details of the room. The entrance-hall, 58ft. by 12ft., has an oak carved and panelled dado, with chimney-piece in the same character. The floor is paved with encaustic tiles, and the ceiling and cornice are finished in plaster. The above works have been carried out under the superintendence of the company's architect, Mr. G. H. Wilson, of 2, East India-avenue, E.C.

MEASHAM.—A Roman Catholic church has been opened at Measham, in Derbyshire. The chapel is built of red pressed brick, with stone dressings. The nave is also to be used as a school. The altar and reredos are of Caen stone, and stand some distance in front of the rear wall of the chancel, so as to allow a passage between them. The work has been executed by Messrs. W. Beckworth and Sons, of Whitwick, and carried out under the superintendence and from the design of Mr. C. G. Wray, F.R.I.B.A., architect.

ROUSDON.—The mansion, lodges, farm-buildings, church, and school, which have for many years past been in course of erection for Sir Henry Peck at Rousdon, near Seaton, on the eastern coast of Devon, have just been completed. The group was illustrated in the *Building News* for June 26, 1874, and the schools in the issue for May 12, 1876. The church is in the Decorated style, and consists of nave, short transepts, and chancel. The mansion is Late Tudor in style. From the chief entrance the centre hall opens on the left into the great hall, which has an open-timbered roof and ceiling, panelled walls, and parquet floor—all of oak; the windows, six in number, have been filled with stained glass representing historical scenes connected with Devon, and have been executed by Messrs. Lavers, Barrand, and Westlake, of London. To the right of the ante-hall is the morning-room, where the fittings, including parquet floor and mantelpiece, are of oak and walnut. At the rear of the hall is a quadrangle, of which it forms one side, the south wall being faced by the drawing-rooms and dining-hall; the east by the library, Sir Henry Peck's private rooms, and an invalid's suite of rooms; and the fourth side by the domestic offices, a projecting wing being thrown out for the kitchen, housekeeper's room, still-room, &c. In the basement under the great hall is a bowling alley, and under the south frontage a well-appointed dairy, besides various cellars. The principal bedrooms are placed on the first floor, and, like the lower rooms, have carved oak or teak fittings; the corridors have oak panelled walls and ceilings, and the floors are composed of mosaic work. On the attic floor are more bedrooms, and in the west wing is a large museum. To the west, and separated from the main building by a paved yard, is another huge block, including stables, workshop, offices, lofts, and stores. The original architects were Messrs. Ernest George and Vaughan, of London, but on the death of the latter the firm became George and Peto. From the first, Mr. George Moass, of Exeter, has been the builder. In the erection of the mansion, Mr. Moass has been joined by Mr. Redway, of Exmouth. Of the carved work, some has been executed by Mr. Harry Hems, of Exeter, and the rest by the firm of Smith, of London. Mr. W. Prosser has acted as clerk of the works.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—The first ordinary meeting of the session was held at the Association Rooms, Queen's College, on Tuesday, the 6th inst., under the presidency of Mr. H. H. McConnell, Chairman of the Association. Reports from the class secretaries and the librarian were read by the hon. secretary, who also presented a report on the visits which took place during the past session. After the business, the Chairman delivered an address, which was of a very interesting character, and at the close of which a hearty vote of thanks was accorded to Mr. McConnell. On Saturday last, the 17th inst., a visit was made to the new public buildings at Aston, which are now almost completed. The party included Messrs. T. F. Proud, E. Wood, W. H. Kendrick, J. P. Osborne, J. Ellis, F. G. Hughes (hon. secretary), &c.; also Mr. John Rodd's, who is a member of the local board. Mr. Wm. Henman, the architect of the building, conducted the party.

"To a practical man with a taste for mechanics, and the bump of construction fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is, in concise information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion."—*The Troughtonians*. Price Two-pence of all newsmen, or post free 2½d.—31, Tavistock-street, Covent Garden, W.C.

TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.

All letters should be addressed to the EDITOR, 31, FAVISTOCK-STREET, COVENT-GARDEN, W.C.
Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph advertisement inserted for less than 5s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in series advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold); for France or Belgium, £1 6s. 6d. (or 33f. 30c.); to India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL., Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—C. G.—L. T. S.—J. B. and Co.—G. T. D.—H. H.—H. B.—E. P.—R. D.—M. D. Hy. Co.—W. B.—J. M.—J. W. and son.—R. R. G.—R. I. B. A.—B. of S.

A READER. (Yes, but not separately to the extent it is here.)—D. CURRY. (We think to you should be strictly in outline only, but other competitors will doubtless read the conditions as you seem inclined to, and it is quite probable, judging from recent instances, that the arbitrators, even if professional men, will not trouble themselves to see that the uniformity which alone ensures fair competition has been observed.)—B. D. (Batten's Sewer Ventilator is as simply as any; see advertisement on p. xiii., last week.)

"BUILDING NEWS" DESIGNING CLUB.

VIGNETTE. (It was impossible to notice every design owing to the large number sent. Your plan has the following defects: Larder faces entrance, hips to roof too steep. The details of staircase are not good.)—N. (Your entrance is wasteful, and the stairs ill lighted.)

Correspondence.

FULHAM INFIRMARY COMPETITION.

To the Editor of the *Building News*.

SIR,—In your notice of the designs submitted in competition for the above infirmary, the following paragraph occurs:—

"It is alleged that one of the conditions has not been strictly complied with by a certain fortunate competitor, and there seems to be a just ground of complaint, urged by some, that a few of the best plans have been overlooked, while others, which have been tinted in direct violation of the instructions, have been favourably viewed by the board."

As there are only two premiums, the second of which has been awarded to us, and as, in a subsequent paragraph, you describe our drawings as "a neatly-prepared set of plans, coloured," it seems impossible that by "a certain fortunate competitor" can be meant anyone but ourselves.

We shall therefore be obliged if you will allow us, in justice to ourselves, to state that our drawings are in no sense of the word coloured. They are finished in black and white throughout, and are, we think, and as Mr. Curry ex-

pressly stated in his report, in strict accordance with the instructions issued to competitors.—We are, &c.,

KEITH D. YOUNG,
HENRY HALL.

17, Southampton-street, Bloomsbury, W.C.
December 19.

SIR,—You were good enough in your last week's review of the competition plans for this Institution to say, that those signed "Desideratum" were well considered, but that you "objected to the position of the day-rooms which are placed between each pair of pavilions and are entered separately from the corridor, also the medical superintendent's house at the back of the administrative block."

Will you allow us to say, that we think you have overlooked the fact that, instead of the medical superintendent's house being placed at the back of the administrative block, we consider that side the front? We have studied, carefully, "aspect" in the arrangement of our plans, and have looked upon the south as the front, and not the back, of the institution. We have placed the doctor's house in the centre of this front, in the middle of its own grounds, and sufficiently far from the south boundary to leave a spacious garden round three sides of it. The patients' day-rooms are placed, as you say, between each pair of pavilions, entered, not directly from the corridors, but through lobbies, and we claim for this position the best that can be had. Like the wards, these rooms face the south and overlook and communicate with the large airing-grounds between the pavilions. They are sufficiently far from the wards to afford a complete change to the patients, and being placed on the same side of the main corridor as the wards themselves, the "clumsy" arrangement alluded to in a contemporary of last week of "driving the main passage of the interior between the wards and these rooms," as is done in the plans selected, as well as in nearly all the other plans exhibited, would be thus avoided.

We cannot but think the majority of the competitors have thought too much of the Margrave-road, and have, in consequence, sacrificed the comfort and convenience of the officers and patients to the idea of presenting an imposing front to that road.

In arranging our designs, we looked upon this institution as separate and distinct from the workhouse proper, as though it were 20 miles away; and we believe it is a rule with the Local Government Board, in all cases where practicable, to entirely separate the two establishments; and that it was the intention of the Guardians to do so in this case, is borne out by the instructions which they issued for the guidance of competing architects, which provide for a separate management and distinct staff. We, therefore, have provided but one entrance, though which everything for this institution, and every person having business with it, must pass; in the selected designs, however, the main entrance through the adjoining workhouse is intended to be used for all administrative purposes, while the entrance next the Margrave-road would be used for all other purposes; an arrangement, we venture to think, that will cause a divided management between the medical superintendent of the infirmary and the master of the workhouse.

We have also placed all our buildings well within the boundary lines of the site, and have allowed a distance of 70ft. between the pavilions; but in the chosen plans, the main wards are shown to extend to the south boundary line next the workhouse premises, and the patients using the balconies at the ends of the wards would be able to shake hands with the paupers in the workhouse airing-grounds. The distances between the pavilions are only 48ft., and at the narrowest end, between the water-closets and bathroom turrets, only 26ft. The open spaces around the main wards are further curtailed in these plans by the laundry buildings, which are placed on the ground in the centre of the south front, where they would discharge steam and stench around the wards, and probably into them through the windows.

It seemed to us far better to place the laundries at the top of the north end of the administrative buildings, where any nuisance arising from laundry operations would pass away far above the wards; and this arrangement has the additional advantage of being more economical, as well as avoiding the crowding of buildings on the site around the wards. It appears to us also

objectionable to place the deadhouse in front of the wards, as is done in the selected plans; and we cannot but think that it would have been better to have arranged the 10th and Lock wards in a manner to have precluded them from commanding a view of the main wards of the infirmary. The larder, too, the only one for the establishment, and which has to serve as larder, pantry, and dairy, and measures only 17ft. by 14ft. 6in., is placed at the south-west angle of the administrative block, where neither meat nor milk could be kept wholesome for three hours on a hot summer's day; neither does it seem to us right or convenient to place the larder on one side of the administrative block and the officers' messroom on the other, with no means of communication between them except by passing through the kitchen or scullery and crossing two corridors, and both so far away from the matron's and assistant-matron's apartments, as to preclude them from exercising the supervision and control pertaining to their offices.

All these points were carefully considered by us, and possibly by others (we had only time to examine the designs placed first and second); and if the referee had had fewer plans to examine and report upon, we are persuaded his award would have been very different from what it is.—We are, &c.,

WATKINS AND SCORER,
Architects, Lincoln, Authors of the design
signed "Desideratum."

Dec. 20.

SIR,—As one of the competitors for the proposed infirmary, allow me to take exception to a few points in your leading article of last week, and to express some opinion on the competition and the designs sent in. The writer of the article rightly says of the drawings, "many of which are hung so high as to make examination difficult or quite impossible." This was especially to be noted as to the ground-plans, half of which were in this position—viz., those under the mottoes M.D., Plan, The House of the Sick and Poor, Apropos, Economy, Sanitas, Beacon, Sic Omnes, Albion, Fit, L'Esperance, Home of Plenty, and Kirby Pedon. The ground-plan being the most important drawing of each design, and in the above mentioned cases it being impossible to see the relation of the several rooms to each other, &c., criticism becomes impossible, and I felt constrained to leave the exhibition, owning that it was an impossibility to form any correct judgment on the designs, owing to the hanging. The critic of the *Builder* owns the same, and does not attempt to compare between the several designs, giving reasons for his inability to do so, and expressing an opinion only on a few of the designs in proper view; the design "M.D." even is left out for this reason.

As to the design "Experience" in circle, it is not noticed that the ward bath-rooms and w.c.'s open into the balconies only, so that patients must go out into the cold air to make use of them, even in winter time, the balconies being without glazing, as they should be. These balconies would not be cheerful, since they are to overlook the workhouse grounds, while they add to the expense. In my opinion, the receiving-rooms are badly placed, being separated from the administrative block; the ward store-rooms and lift accommodation are insufficient. The flues from stoves in the wards are shown to cut obliquely through the floors, this being very expensive in construction, especially in fireproof work, whilst being weak. The accommodation in the male and female wards being equal, is against the conditions, and extension is provided for one sex only. The question of cost will, however, be the most important objection to this design; in the opinion of many it being impossible to carry it out as it should be, within the 10 per cent. prescribed by the conditions.

I believe if all the designs were estimated for, there would not be a difference of more than £10,000 between the cheapest and the most expensive sent in; yet, according to the estimates of the authors, there would be a difference of over £46,000. I estimated my design at a rate of at least 50 per cent. above that of "Experience" in circle, and many of the competitors at 40 per cent., including the authors of "Simplicity"; they should all be estimated at about the same rate. This question of estimated cost still remains the most important for the Royal Institute of British Architects to decide on concerning competitions.

Your critic makes a great mistake as to the design marked "Simplicity," when he says it is "shown by a neatly-prepared set of plans coloured"; there is no colour whatever on the drawings, and no objection could be taken to them, unless it may be the slight etching. The worst fault I find with this design is that whenever the extension-blocks would be built, the infection-wards would be done away with, and have to be rebuilt elsewhere.

"M.D." must be chiefly objected to on the score of too low an estimate, the plan I was unable to criticise; I also object to a letter by the authors in the *West London Observer*, endeavouring to prove that the design could be carried out for their estimate, and saying that the expense of parochial buildings is bringing a "scandal on the profession." These gentlemen should be careful they do not. I believe their design to be one of the most expensive. The design marked "Plan" has coloured drawings. The elevations of the design "Quod Petis hic est," should be objected to as against the spirit, if not the letter of the conditions, on account of the elaborate etching, imaginary shadows, curtains in windows, and such-like trickery. "Hôtel Dieu" has a long front building as administrative, blocking out for half of one side of corridor the light and air. "Experience" in oblong, coloured, is considered by many as one of the worst plans sent in, the blocks being so crowded together that light and air insufficiently surround the wards. Several designs are lumped together at the end of the article, as not meeting so fully the requirements as the designs previously mentioned. This is unfair to two or more of these, which, in the opinion of many well qualified to judge, would be far before some of those previously mentioned. It would appear that in this competition, as in others, designs badly hung or represented plainly and fairly are, therefore, bad in themselves.—I am, &c.,

HUGH M'LACHLAN.

45, Fenchurch-street, London, Dec. 21.

THE INSTITUTE v. THE PROVINCES.

SIR,—In some communications to the *Building News* on topics which I know to be of great interest to the profession, I have tried to lay down some definite propositions for discussion—viz., that the R.I.B.A. is not at present constituted on the best lines to consolidate the profession, acquire a legal status for architects, and put an end to unqualified persons assuming the title of architects, &c. In arguing these points I have ventured, as a vast number of provincial architects take the liberty to do, to question the policy of the uniform high rate of subscription and other details of the constitution and "reconstitution."

Mr. William Woodward retorts in a letter last week in which I find no argument, nor any proposition other than this—viz., that I am a "querulously expository" person, a "vague and unpractical" person, a "scarcely accurate" person, a "sneering" person, and an "unwise" person.

It is a matter of as little moment to the profession that Mr. William Woodward should thus have arrived at the personal opinion that an obscure person like myself is a fool (which it amounts to), as would be my still more definite personal opinion formed about Mr. William Woodward if I intruded it. This is argument after the fashion of old women.

Of one thing those who share the happy satisfaction as to the perfection of the "reconstructed" constitution with Mr. Woodward may be assured: that no amount of lofty and dignified "setting down" of querulous and irreverent persons, without condescending to reasons and arguments, will put down a widespread feeling of dissatisfaction that exists among a very large body of architects outside the Institute; and, as we are aware from the unheeded remonstrances offered, within the Institute also.

The lamented loss, since the above was first written, of a practical and vigorous president who at least recognised that provincial architects did not join the Institute as was desirable, will not, I venture to hope, be an end to the encouragement given to ventilate and discuss this question. I and others, I am sure, are prepared to be quite as definite and practical about details as anyone could desire when we find the fellow-architects associated in opinion with Mr. William Woodward willing to withdraw their heads from "the condition of comparative security"

afforded by hiding them in the sand, and condescending to join issue on general principles.—I am, &c.,

THOMAS DREW, R.H.A.

SIR,—I have read the correspondence on this subject with great interest; but throughout it seems to have been implied that the by-laws of the Institute are, like the laws of the Medes and Persians, unalterable. This of course, however is not the case, and if the provincial Fellows should consider certain specific reforms or amendments necessary, they could have a special meeting summoned for their full consideration. If the proposals were reasonable and likely to tend to the general well-being of the profession, they would, I believe, be supported by a great number of the Metropolitan Fellows, including our able President himself.

I hold myself that, at present, the membership of the R.I.B.A. is of very considerable advantage to a provincial architect—and feel sure that it would be for the great benefit of the profession at large, if every competent and respectable architect became a member. At the same time there is no doubt that the relations of the Institute with the profession in the provinces might be much improved, and I feel sure a way can and will be found to secure this end. For this reason I the more regret that Mr. Drew and some more of our friends in Ireland should have seceded when they did. If they had remained, their influence would have been of great value now that the question they had at heart having been specially referred to in their addresses by both Mr. Whichcord and Mr. Street) seems more ripe for consideration than it was a few years since.

In many ways the reorganisation carried out a few years since seems to have been very beneficial to the Institute, and I hardly think that the annual subscription should vary simply in respect of locality.

I should be very glad to see the working details of the thorough and valuable scheme suggested by Mr. Drew. In the mean time, however, it might be well to concentrate attention upon some more tangible and moderate alteration in the by-laws, and I would throw out the following as suggestions for consideration, believing that, although only comparatively slight alterations are indicated, they would, nevertheless, go a great way towards meeting the most weighty objections which have been urged against the present system.

I would, without going into minor details, propose therefore:—

Firstly.—That any provincial architectural society may submit its rules and by-laws to the R. I. B. A., and if these are approved by the council, such society shall, with any other further conditions which may be necessary, be formally acknowledged by, or affiliated to, the Institute.

Secondly.—That any architect being a subscribing member of a provincial society, so affiliated, shall upon his election to the membership of the Institute, pay the following reduced annual subscriptions, *viz*:—Fellows £2 2s., Associates 21 ls.—I am, &c.,

A PROVINCIAL MEMBER.

December 11th.

BUILDING-STONES OF SCOTLAND.

SIR,—With your kind permission, I would take the liberty of saying a word in Mr. Gowan's favor, in reply to letter of Mr. Trickitt of the 2nd inst., and also to give you people in London a hint as to the stone you should choose: I speak from experience and without interest in any stone for his not noticing Corsehill Stone among the many building stones of Scotland, and that is, that Corsehill stone is not sufficiently known and valued by you to be classified amongst those generally spoken of by Mr. Gowan.

Corsehill stone was only found when the Selkirk Junction Railway was made some ten years ago, and has only been used as a public quarry since then eight years. True, there was a small local quarry a short distance off, and very likely that Mr. P. had not been the agent for Corsehill stone, he might never have noticed it either. From reports I have heard, I believe a considerable quantity of Corsehill stone may have been used in London, but as this is only have been in use some four or five years, which is far from sufficient time to test a good stone, as I found when in London lately and noting how

the Corsehill stone was standing the "test of time," I did not find the result as good as I could have desired, I will name two places, with your permission, the Hand in Hand Assurance Office, New Bridge-street, and the small columns in front of the Law Courts.

In the analysis published (without signature), Corsehill stone contains too much carbonate of magnesia, being 1.23. The analysis of Pleau stone given by Mr. Trickitt at same time, will be a much better weather stone, containing only decimal 52 of magnesia. Spinkwell, Cliffwood, and Robin Hood stones in Yorkshire, contain only decimal 5 of magnesia, and those are as near weather proof as possible. The excellent red stone from Newbiggin, which Mr. Street preferred for restoring the Fraternity at Carlisle Cathedral last year contains decimal 9 of carbonate of magnesia, while a sample of old red stone (supposed to be from Newbiggin), sent from Carlisle Cathedral for an analysis by Mr. Creed, Clerk of Works under Mr. Street, contained decimal 7. The less magnesia contained in this class of stone the better weather stone you will find it.—I am, &c.,

GEO. SOMERVILLE,

Carlisle, December 14th.

CLERKS OF WORKS.

SIR,—I am somewhat taken to task in the last number of the *Building News* by "One C. W. more" for having linked builders' foremen and clerks of works together, as being by occupation and association in want of a society to enable them mutually and conjointly to gain a more liberal and extended knowledge of their duties. I think, however, if he gives the subject more consideration, he will admit that, although temporary employment may sometimes be gained by "ratepayers' representatives," yet in nine cases out of ten clerks of works are chosen on their merits. Indeed, the intelligent carrying out of an architect's design in the spirit of its author is so essential a matter that the greatest discrimination is necessarily given in the selection of a person fully capable of exercising efficient supervision; at least this is so when the architect himself has the selection, and in the interest of competent clerks of works, this is luckily the rule, and the "ratepayers' selection" the exception. It is by reason of the responsibility that attaches to employment of this kind, and the valuable assistance which architects unable to be often at their buildings may gain by efficient representatives, that I am induced to think an association of the description advocated should receive a large share of moral support from the profession. I trust ere long to find some sign of this in the columns of the *Building News*.

That clerks of works and builders' foremen must not be classed together, I submit, savours rather of affectation; the very ancient title of clerk of works has to do duty now for all kinds of offices—the inspector of some village drainage works, or the jobbing carpenter of a petty landed estate, both claim that distinction, or have it thrust upon them, while their occupations would be declined by the builders' foreman of the most modest aspirations. There being no royal road to a knowledge of the duties required by a competent clerk of works, and those duties being of a nature requiring long practice and careful observation, builders' foremen, selected by the builder himself from the more competent men in his employ, are, naturally enough, the source from which clerks of works are recruited, and no better school could be devised; but although a thorough practical knowledge of one building trade at least, and a fair acquaintance with the remainder have thus been gained, there are still other qualifications necessary to enable them to become architects' representatives, and to obtain and make use of these qualifications is the principal object an association of this kind should aim at. The positions of a clerk of works and of builder's foreman on any building need not be inimical—in fact the good feeling and earnest desire to help each other, which should and does exist where both are disposed to do their duty by their employers and their employers' client, would be vastly enhanced by the knowledge that they individually belonged to an association for mutual help.

No class of men are so isolated in their occupation, as far as their knowledge of each other extends, as clerks of works; no means exist of

obtaining employment by those seeking it, but by personal application on the chance of a vacancy, or by advertising their wants, and no source is available for architects requiring the services of a competent man, except by inquiries from fellow practitioners or the advertising columns of the trade journals.

A society of the kind sketched would be able to remedy these difficulties to some extent.—I am, &c.,

ANOTHER CLERK OF WORKS.

SIR,—Your correspondent, Mr. Shore, wants to see clerks of works, builders' foremen, and others in the trade in friction with each other. Now, I maintain that the clerk of works is not in the trade, but of the profession. No doubt friction with the trade might brighten him up a bit, especially when, from unforeseen circumstances, he and the trade may have to change places; but the simile of friction is hardly technically grammatical. Friction against is the way I or a mechanic would express such a rubbing.

For a full-fledged clerk of works, too, it is rather late in the day, and it would be decidedly *infra dig.* for him to enter the lists with builders' foremen and others in competitive examinations upon building construction. I think his position ought to qualify him to preside as the teacher or judge, before even the builder on the one hand, or the architect on the other. A clerk of works ought to force himself to the front by his works and deeds upon tangible structures growing under his hand, and not upon sheets of paper. Neither will such papers serve him in the least when he has finished a job and is ready for another.

If he happens to be brother's sister's husband, or the forty-second cousin of a member of a committee, or if he knows a little of the ropes of some political caucus or club, he will find that his best credential. Doubtless he will sometimes have to deal with a proprietor who is spending his own money, but such a proprietor will generally leave the appointment, as he should do, to his architect, or else he will employ a *quasi* clerk of works direct, and expect him to act as a second architect, either with or without the approval or the plans of the gentleman who will hereafter have to play the second fiddle.

But, supposing the architect has the making of the appointment, if the job is near home and there is a good understanding between him and the contractor, he will push one of his elder pupils into the berth; and I do not blame him either, provided the said pupil has a reasonable aptitude for practical workmanship rather than for fine art.

But, supposing the job is fifty miles away, and the chances are that the builder will cut up a scamp, then will the architect look out for an experienced and trustworthy clerk of works. He will look for a man who can go upon the scaffolds and teach a young bricklayer, who is willing to learn, how to lay bricks, and who knows how to make it hot for an old one who isn't willing. The architect may be proud of his pupil's prowess in the competitive examinations; but in his clerk of works he will want a man who can make workable details in pencil to a big scale on the cheapest of cartridge, and which, when they have served their purpose, may be taken to wrap parcels in.

If the clerk of works can write a readable monthly report, which the architect may furnish up and transmit to his clients, then the C. W. will find himself rapidly rising in his employer's confidence, and, when the building is completed, if he has been reasonably cute and discrete in measuring up the extras, the architect will give him another job if he has it in his power to; but, if he be not a Street or a Scott, the chances are he will not have it, and so, he will give him a testimonial. If he is a gentleman he will commence it with "My Dear Sir," and a shake of the hand, and a friendly figurative kick, and he may go and get another job as best he may.

Now the Society that will avail for a clerk of works must have for its fundamental basis—first, a registration of all such as can produce, say, three such testimonials from F.'s or A.R.I.B.A.'s. That would place it, to begin with, under the wholesome patronage of the profession, and the less the builders have to do with that society the better for the morals of the nation.

The superstructure must be a sort of Freemasonry, without the secrecy, which shall serve

a brother ship as well at home as at a hundred miles away.—I am, &c.,

ONE C. W. MORE.

INSTITUTION OF CIVIL ENGINEERS.

SIR,—The advantage or disadvantage to non-Metropolitan practitioners of belonging to the Royal Institute of British Architects being now under discussion, it may not be out of place to make the same inquiry relative to the somewhat similar "Institution of Civil Engineers."

I have been a member for a good many years, but have found little or no benefit from it beyond having a copy of the *Proceedings* every quarter (not always very interesting to the bulk of the subscribers), paying three guineas subscription, attending perhaps one or two meetings in the session when within reach of London, and having the doubtful privilege of being entitled to write "M. Inst." after one's name in addition to the "C. E." that most draughtsmen and clerks of works can assume.

Practically the whole affair is in the hands of a few London engineers. Those in the provinces, in the colonies, and in India have not the slightest voice in anything, and they represent the bulk of the members. The "Balloting List" for the president, vice-president, and council for 1882 has just been circulated; but as, by the by-laws, it must be "presented personally," the election is entirely in the hands of some 200 or 250 members and associated members, to the total exclusion of the remainder of the 2,692 "corporate members" (as per last list issued) who by reason of not living near London are unable to attend. The names, moreover, are "nominated" by the outgoing council as "suitable," and do not include a single candidate intimately connected with the Colonies, India, or the Continent, by residence in those parts.

As a proof of the local interest that actuates our council, many of us will bring to mind the storm of virtuous indignation with which they met the insinuation of the Indian Government, through its Secretary, General Strachey, R.E., in 1869, that commission was taken by engineers from both employers and contractors. Their protest elicited a qualified withdrawal of the insinuation; but General Strachey was not far off the mark in making it, as there is not the slightest doubt that such a practice, although of course not "recognised" by any one, was often carried on. In my younger days, when pupil to a well-known member in excellent practice in Westminster, it was a regular thing for me or one of my fellow-pupils to be the bearer of letters to contractors asking for the commission due, and it was so far openly done that the notes were sent into the office to be addressed, &c.

Later on, in 1864, I was assistant to a large metropolitan contractor, who was believed by his own staff to have fed the engineer, but in articles of worth, not in cash. So much for the home clique.

As a proof of the lack of interest in non-local matters by the council, the profession generally will remember that, some time in 1879, the Indian Government decided upon enforcing a wholesale exodus of civil engineers for no earthly fault of their own, but because the finances were out joint. If I am rightly informed, a full representation of the facts was made to the council by some of the Engineers and a most reasonable request made that they, as representing the profession, would address the Government on the subject (no officers in the service being permitted to combine in an address on their own behalf), but not the slightest notice was taken on behalf of more than 300 men liable to fall under the sweeping resolution, the majority of whom were, I believe, members or associates of the Institution. In this instance the only one of any position who moved a finger in favour of the Civil Engineers was that straightforward and worthy officer, Colonel Sir Andrew Clarke, R.E. So much for any good derived by non-resident members.

The "extra commission" insinuation touched the dignity of the council and elicited a furious rejoinder—the contemplated dismissal of 300 engineers did not affect the council except perhaps to overstock the English market, and so enable assistants to be obtained at a cheaper rate. Hence things were let slide.

In my opinion such anomalies should cease, and were the council representative more of the

civil engineers of the world, and less of those of the metropolis, it would be a step in the right direction. I would propose that—

(a) The balloting list should contain the names of all those "eligible," leaving the members to decide who are the "suitable" ones, not the out-going council.

(b) It should be forwarded as a stamped proxy paper to everyone of the 2,700 corporate members in time for its receipt by return mail from the antipodes before election day, and so not be left entirely in the hands of some 8 or 9 per cent. of those entitled to vote, and who alone can be present to do so.

(c) It should contain the names of any eligible (and willing) members well known in, but who have retired from, the various colonial and Indian services, who are now resident in this country, and who by their varied experience and intimate knowledge of men and work in those localities, would form an invaluable addition to the council and tend to keep up friendly feelings with those abroad. Those eligible would all be men of more or less leisure time. One might be returned as the member for the Cape, another the member for India, a third the member for Australia, &c., and each by corresponding with some of his old friendly constituents might insure a continuous supply of papers and memoranda concerning work carried on in those places which would be infinitely more interesting to the general practitioner than the interminable scientific and often very abstruse quotations from Continental papers with which the *Proceedings* are now filled up.

It may be said that the constitution of this Institution does not admit of such a plan being carried out. If so, and if the Institution is never to be of more use to the profession generally than it is at present—a reading-room and library for Great George-street engineers, and entirely managed by a party of those gentlemen nominated by themselves—the sooner the constitution is altered the better.—I am, &c.,
December 14. P. PLAYFAIR.

PUBLIC SAFETY IN CASE OF FIRE.

SIR,—Invariably, on recurrence of a calamity such as that of the "holocaust" at Vienna, we hear from all sides of the defective arrangements of public buildings, and the old fallacy is raised of the narrowness of the approaches, stairs, &c. It cannot be too often insisted on that this is all beyond the mark.

I think it may be demonstrated that in the case of actual panic, the wider the passages the greater is the crowd, and the greater the danger. The worst crush I ever experienced was in a 50ft. road, with a panic crowd of not more than 2,000 persons. It is a mere truism to say that, under ordinary circumstances, a crowd moves quicker through a wider avenue than a comparatively narrow one; but, on the actual occurrence of a panic, we do find that the width of the passage does intensify the "momentum" of the rush. Granted, it is possible to increase the width of the approaches to such an extent as to insure absolute safety; it is equally true that the limits of practical convenience would be reached long before the limits of even comparative safety could be approached.

By this time, I think, most people must be convinced that the evil can only be avoided by subjecting all "assemblages" to practical and systematic discipline, such as soldiers have to experience, and such also as the "assemblage" itself submits to when actually landed and housed inside the auditorium.

There can be but one system of absolute safety—viz., by keeping in Indian or single file, and, as in our day at any rate, this cannot be enforced on a crowd by inducement, instinct, or habit, it should be attained by artificial means.

In brief, I would insist upon the division of every passage, entry, or staircase, into parallel gangways by permanent and substantial longitudinal barriers, allowing but one person to traverse; take, say, 2ft. as a unit (possibly in some cases less may suffice), every 4ft. passage would have two lines, 6ft. three lines, 10ft. five lines, and so on. Carry this down the stairs to the entrances, and get over at once all notions of appearances and the like.

It will be objected that no concourse will submit to be drafted off or arranged in this way. Will they not? and why not? Do not assemblages submit to, and even court all kinds of

inconvenience, discomfort, and danger in getting into a concert-room or theatre, and renew the same in getting out? and when once inside a building are they not practically in the position I would assign them in entry or egress—viz., filed off and arranged artificially in single files? "aligned," as military men say. Why should one object to walk in a confined restrained row, and yet not object to sit or stand in a similar position? Is there anything more objectionable in being placed in marching order than in rank side by side?

It is worse than useless to cavil about the defective arrangements of a building (often bad enough, Heaven knows) when the remedy is so clearly in the hands of the public itself.

Our modern system of collecting a mass of people, of locating them, and dispersing them, as clearly invites disasters as ever did the unskilful dispositions of a rash or incompetent officer precipitate defeat.

The two cases are parallel; you could not get a body of troops into military formation and dismiss them like schoolboys, each man for himself, without the certainty of the corps dissolving into a struggling mob. Similarly at a theatre, what is a panic or alarm of fire but a sudden "word of command" to disperse? And if the assemblage is without discipline, and incapable of acting in obedience to systematic direction, there is but one alternative—viz., move or guide the mass artificially in a definite direction, like rail or tramcars on a fixed track. The late Mons. Jullien used to urge that a theatrical panic might be prevented by playing the people out with an appropriate march tune. I do not know if the experiment was ever tried, but there is something in it, and, anyway, it points to the application of a system such as I have herein suggested, which may possibly not be either novel or untried, but is not the less deserving of earnest practical consideration.—I am, &c.,
D. BRADY, F.R.I.B.A.

December 19.

FIRES AT THEATRES.

SIR,—In thinking over the late lamentable fire at Vienna Theatre, an idea has occurred to me which, I think, would be a means of saving both life and property when these unfortunate catastrophes take place.

I would propose that ordinary iron gas-tubing of a suitable size be fixed on the stage side of proscenium, up the angles of walls, around proscenium, and all other places where they could be most conveniently and effectively fixed; also a large rose in centre, with holes drilled in this, and pipes to discharge the water at all angles, and that these should be supplied direct from the principal main water-pipe in the street, and that the stop-tap from same should be fixed at a convenient place near the outer door, next street, so that in case of fire the water could immediately be turned on, and would then fly in all directions, and be self-acting, at the same time would not interfere with any hose being applied by firemen.

The same means could be applied to the auditorium from another stop-tap fixed near the one for stage, with proper indicator for each. The pipes for this side could be fixed to form a member of the cornice at ceiling and other convenient places, where they would be most useful.

It appears from published accounts of Vienna Theatre, that all appliances of modern invention were provided to prevent spread of fire, but in the excitement, the whole of these were of no avail; and, at the same time, the great rush of people on an alarm of fire, that naturally takes place, interferes with the duties of officials, and prevents many of these appliances being used as intended. But the arrangement of pipes, as suggested, with taps fixed, where no rush could take place, and near an exit, where fire would not interfere with the working of them for some time, it would be in every way self-acting, and, with many holes in the pipes, at least 3-16 or a 1/4 of an inch diameter, would discharge considerably more water than many fire-engines, and, with the holes drilled at various angles to cover all parts, must, I think, be most effective, and would be at work instantaneously on the water being turned on; and, should the iron curtain be let down, would not interfere with the audience, and *vice versa*, should the fire be on the auditorium side.

Of course, these pipes need not be turned on only in case of other means failing.—I am, &c.,
G. N.

A. A. LECTURES.

SIR,—There seems to prevail amongst the members of the Elementary Class of Design, a healthy uncertainty as to the kind of "basilica" that they are to submit at the next meeting.

In the lecture on Roman Architecture a *Hall of Justice* was naturally alluded to, and the Basilica of Maxentius pointed out as a type of the vaulted construction that distinguishes Roman from Greek work. The wooden-roofed and colonnaded form adapted and adopted by the Christians is, of course, equally eligible, so long as no Christian distinguishing features be introduced into the students' designs. The general subject for the class, "A Temple or Church," must in this case be construed as a "Temple of Justice."

As there is no opportunity of making this explanation at an ordinary meeting, in time for the next class, your kind publication of it will be of service to the students.—I am, &c.,
Dec. 22, 1881. E. J. TALVER.

THE LATE MR. GEO. CHILDS.

SIR,—I did not know Mr. Childs, but I was born and bred in Islington—remember Old-road being built—and, indeed, lived in it in after years, I believe, in the very house (No. 21). So, being an Islington man—although I don't seem to belong to the class of men you appeal to—there can be no possible reason why you shouldn't accept my guinea to go towards helping the widow and the orphans. Here it is enclosed, and with much personal satisfaction I send it.—I am, &c.

LARRY HEMS.

[We have also received a sovereign from "H. A. C." for the same purpose; we should be glad to add any further subscriptions to the above and to remit them as early as possible to Mr. Childs' widow.—Ed. B. N.]

THE LATE MAJOR MANT.

SIR,—I trust you will give me space to say a few words in justice to myself, as Major Mant's principal assistant for the last seven years, with reference to your report of Mr. Spiers' communication at the meeting of the R.I.B.A. on the 5th inst.

Mr. Spiers says that Major Mant trained Indian talent, and employed native draughtsmen to work out his designs, especially ornamental detail.

As a fact, Major Mant did train two men, natives of the Carpenter caste, who were excellent draughtsmen in capable of doing original work. These men, who were brothers, were employed by him up to the middle of 1875, the time I joined him in Calcutta—not 1876 as stated by Mr. Spiers.

I, indeed, took their place in his office as one of them fell ill, and returned with his brother to Bombay, where he died soon afterwards.

I managed Major Mant's office from 1875 to the time of his death; I had the assistance of the surviving brother on the Baroda and Kolhapur Palaces after we returned to Bombay in 1878; but, other than this, I had no assistance for original work from any native draughtsman.

I may also mention I have been instructed by the Kolhapur and Baroda States to complete the working drawings of these palaces.—I am, &c.,
JOHN FOTHERINGHAM.

13, Springfield-road, N.W., Dec. 21st.

TESTING TRAPS.

SIR,—Referring to the discussion on various forms of traps that has for some time past been going on in your journal, may I express a hope that the prominence which has therein been given to various forms of cast lead-traps will not eventually lead to their general use in the place of those made by hand, i.e., "bossed" out of ordinary drawn lead-pipe? I have found in practice that the cast traps are not to be relied on for perfect soundness. I have found small holes or perforations in them, resulting I should say either from the use of inferior metal or a defect in the process of manufacture. I find also they will stand little or no "bossing" without cracking, and as very few are ever fixed without requiring some alteration or a change of form, &c., to adapt them to the required position, I consider this a serious drawback. I have, therefore, quite given up the use of the larger sizes (1 in. &c.) for closets, &c., preferring to have my own

"bossed" from pipe, which any men find no difficulty in doing readily to almost any shape.

The small "O" traps (cast) 2 in. and 1½ in. I still use for lavatory basin-wastes, as they have little else to do than keep back draught, the ends of the waste-pipes being always open.

I cannot, of course, make a "O"-trap as described, but as I myself consider this form full of defects, I shall never willingly use another, and I believe a few years hence it will be a "thing of the past."—I am, &c.,
CHAS. H. RAINGER, Mem. San. Inst.
Cheltenham.

CHIPS.

Mr. Beesley, C.E., of Westminster, reported to the Redditch local board, on Monday week, that the sewerage contract had just been thoroughly completed from his plans by Mr. George Law, in less time than was specified, and at a total cost to the town of £8,545.

The Hull corporation opened in committee, on the 15th inst., tenders for the erection of a pumping-station for the west district. Twenty tenders were received, and in consequence of the large difference between the highest and lowest—upwards of £9,000—they were referred to the borough engineer and a sub-committee, to examine and report upon.

The work at the new Eddystone Lighthouse was brought to a close on Saturday week, when the large staff of workmen who had been engaged there all the summer, under the personal direction of Mr. Edmond Douglas, was brought ashore for the winter.

A new stone pulpit was last week placed in St. Mary's Church, Cambridge. It was supplied by Messrs. Cox and Sons.

A new hall for public meetings was opened at Balham last week. Mr. Kerr was the builder.

With reference to the danger of fire in theatres, the Metropolitan Board of Works received, on Friday, a report from Mr. Geo. Vulliamy, their superintending architect, recommending that the act-drop curtain of every theatre in the metropolis should be lined with very fine felt, soaked in some chemical solution, such as tungstate of soda, that it might resist the action of fire for a few minutes. The subject was referred to the chief officer of the fire-brigade, and to the consulting chemist, for consideration and report.

In response to the appeal for £10,000 to complete the restoration of the west front of Lichfield Cathedral, the Dean and Chapter have received, up to the present time £7,000, including £1,000 offered last week by one individual. The work will therefore proceed. The north transept doorway to the cathedral has just been restored, under the superintendence of Mr. J. Oldrid Scott, as a memorial to Mrs. Bickersteth. The lower portions have been cleared of earth, and the cement repairs of the last century have been replaced by sound stonework. A communion table, in Roman cement, of 17th-century date, has been removed from the tympanum and the vesica recess has been filled by a figure of Our Lord in glory, and the original small censuring angels on either side happily survive the efforts of both destroyers and restorers. Between the double doors was a second female figure in Roman cement; this has been replaced by a statuette of St. Anne, in which the features and figure of Mrs. Bickersteth are represented to future generations. The work has been executed by Mr. Bridgeman, except the figure last mentioned, which was carved by Mr. Ingram.

A handsome lych-gate has just been erected at the entrance to the graveyard of the new Episcopal church of St. Andrew's, Fort-William. Lych-gates are picturesque features rarely met with in Scotland, although by no means novel in some parts of England, especially in Kent. Throughout the country only two exist, this one at Fort-William making the third. It has been designed by Mr. Alexander Ross, of Inverness, and is of a massive character. It is made entirely of English oak, grown in Devonshire, and has been carried out by Mr. Harry Hems, of Exeter. The lych-gate has been put *in situ* by Mr. George Harrison, one of Mr. Hems' staff, and with the exception of a few tiles, is now complete. The clerk of works, who has superintended the erection, is Mr. Alexander Fridge. The work is the gift of Mr. G. B. Davy, of Spean-lodge, Kingussie, who has commissioned Mr. Hems to carve sculptured doors for the western entrance of St. Andrew's church. These doors, designed by Mr. A. Ross, are of the same class as Ghiberti's celebrated gates at Florence, and in a series of panels will illustrate our Lord as the Door and the Good Shepherd.

Mr. Edward Phillips, managing director of the Crown Porcelain Company, Derby, died on the 15th inst., at the age of 65.

Intercommunication.

QUESTIONS.

[6830].—**Book on Asylums.**—What is the best book published on lunatic asylum planning, and the price? Also, could any of your readers kindly tell me of a book giving outline drawings of the figures of Apostles, Saints, &c., with their emblems, suitable (or reference by an architect).—F. M.

[6831].—**Damp Wall.**—I have a long red-brick wall with S.W. aspect, and which catches the full force of all the wind and rain from that quarter. Is there any mixture other than paint which will render it impervious and not unsightly? Information would be gratefully acknowledged by—J. D.

[6832].—**Soil-Pipe.**—Is an external iron soil-pipe the better or worse for being galvanized? Would the sewer-gas and the soil and urine have any detrimental effect on the spelter coating of the interior of the pipe, or would they set up any galvanic action to the destruction of both metals if they penetrated any small pin-holes which might be left in the galvanizing process?—R.

[6833].—**Cleaning Old Engravings.**—Will any reader kindly inform me of the best method of cleaning old engravings, or refer me to a number in which such a receipt may have been published?—C. E. C.

[6834].—**Civil Service.**—Will any subscriber kindly answer the following queries? Is it desirable for an architect's assistant to compete for an assistant to surveyor's post in the office of H.M. works? What is about the number of vacancies and competitors per annum? Can I obtain copies of past examination papers, and where? What books are the best to study to insure a pass? Any information respecting above will greatly oblige—ALPHA.

[6835].—**Ventilation.**—I have several very large rooms to erect for public use, wherein will be many people assembled and much gas burned. I object to the system of admitting cold air into a room full of vitiated air, as it chills the same, and, falling to the level of the ionates, it is inhaled and poisons the lungs, especially when the rooms are reopened in the morning, after the air has had sufficient time to thoroughly cool. I also object to all self-acting extracting ventilators, as they are entirely dependent on the wind passing across the outlet, therefore, when most needed, fail. Should I be successful in adopting the following method—viz., small openings at upper part and lower part of walls, to be carried by shafts to sides of ash-hole under the furnace bars of the boiler, which is to be used for supplying hot water for warming purposes, and during the hot weather hot water to pipes shot off, and small fire kept up in furnace, expense of coal being very small in the neighbourhood.—A. V.

[6836].—**Damp Walls.**—I have just finished a dwelling house, the outside of which is plastered with Portland cement 2 in. thick. At times the rain beats hard against one wall, and I find the plaster on interior is quite damp and discoloured, although the wall is 20 in. thick. I thought first the rain might have made its way in through window-frames, so I had these tightly caulked, but without any good effect. The ceiling beneath where roof meets chimney is also damp, and rats must be getting in there, although there are step flashings and top flashings of 6 lb. lead. The party who had contract of roofing says the rain must be getting in through brick joints of chimney, but these are well pointed with fine mortar, and I think the damp must be getting in through some bad workmanship in slating. I would be thankful for some information as to means of remedying these defects, especially the damp walls.—NOVICE.

[6837].—**Floors.**—What weight per superficial foot is allowed in calculating strength of floor to be used for dancing? 8 lb. per superficial foot is weight of a crowd of men closely packed. Will this be sufficient? Is the weight of floor itself considered in calculating bearing power? What is the usual weight of a floor executed on the "single" or "naked" principle, not framed?—SODA PLOOMS.

REPLIES.

[6760].—**Sp. G. and Crushing Weight of Stones.**—Mr. Hugh McLachlan falls into a curious error in supposing that two of his own native Scotch stones, known technically in the market respectively as "Corsehill" and "Dumfries," are one and the same material. There is no more likeness between the two than exists between Ancaster and Ketton, Boxground and Corsham, or Aubigny and Caen. Corsehill is a fine-textured material, not at all unlike, but much harder worked than, Mansfield. Dumfries, on the other hand, is coarse grained. Upon Corsehill the shrapnel arms may be easily obtained; but delicate moulds or carvings are not pleasantly worked in Dumfries stone. Mr. McLachlan, after referring to the crushing weight of Portland as 14, and that of Corsehill as 531, says, "the expense of working stones, I believe, generally increases with the strength and hardness of stones." By this theory Corsehill would involve more than three times the labour that Portland does, yet every practical reader knows, as a matter of fact, that the labour in Portland and Corsehill is about the same.—HARRY HEMS.

[6761].—**Chimney.**—"B. S." though giving much useful information, and having a practical knowledge on what he writes, omits to answer the question put by "A. Young Builder," who asks whether a chimney 10 yards high with an inner casing will not give a better draught than one without? In my opinion it would, for the following reason, that the inner casing would prevent the air and smoke inside the flue being so quickly cooled as would be the case without it, and the warmer the air inside, the greater is its velocity and therefore the better the draught. Further, the air inside the chimney with the inner casing would be lighter than inside the other without. "B. S." fairly questions whether "lining" is not a better term than "inner casing." In my opinion both are incorrect, and I do not know of a suitable term. "B. S." questions whether the "inner casing" is to be recommended unless there is a large space between it and

the wall, because it would get filled with soot and dust; the reason appears insufficient; first, would it matter were it so filled? I think not; second, would it be filled? If properly built it should not, as soot and dust could not make their way through the brickwork. Also, the furnace should be smoke consuming, therefore no soot should find its way into the cavity over the top of the lining, neither should it succeed better when a shaft is over 8 ft. high. There is much to be said both for and against iron casings, but the best argument would be found in one of ultimate cost. In other particulars I agree with "B. S."—HUGH MACLACHLAN.

[6765].—**Glazed Earthenware Flue Lining.**—"Smoke" by his question brought out useful information, from which I believe much may be learnt. "Satisfied" says that in his experience of glazed drain pipes no fall of soot occurs, whilst "B." says the objection holds good with unglazed pipes. I would have thought that the unglazed would have been better, but this experience says quite opposite. Possibly the reason is to be found in that the glazed retains no soot, letting any little which does not escape fall at once, whilst the unglazed retains it until it can hold it no longer or a storm loosens it, when all comes down together. It is the same with brickwork, only that the pores being larger, so much soot adheres that it is generally swept away before it falls. If glazed pipes are used, they should be most carefully jointed, that the joint's retain as little soot as possible; as to the question of "C. F. M.," I do not think so, it might occur if the pipes were too tightly built in. If the flue retained hardly any soot it could not catch fire and for general use the pipes would expand as the heat increased.—HUGH MACLACHLAN.

[6770].—**California and Colorado.**—California is as well settled, and the competition among workers as great, as Eastern States. Consequently that State does not offer the best inducements to emigrants. A gentleman who, like the querist, has had architectural training, and is well up in construction, &c., would do better in one of the middle States. Colorado, being overrun with silver seekers rather than by men engaged in the less risky work of farming, does not offer the chances that are offered by Missouri, Kansas, Minnesota. Let not the querist expect to make a fortune quickly. Professional men are very abundant, but there is always room at the top. But whatever is done, let my friend avoid Texas and emigration sharpers. If he is active, energetic, and willing to do whatever comes to hand, he cannot fail.—R. M. TUTTLE, Providence, R. I., U.S.A.

[6771].—**Deadening Sound.**—Sound will even penetrate 14 in. walls of brickwork, and if house-builders considered it a *sine qua non* that all party walls should be sound-proof, as they undoubtedly should, they would build all party walls of at least 15 in. brickwork or of hollow walling. "Mancuman" may try either of two plans, both of which I believe are effectual, or nearly so; the first is, cover each side of the brickwork with felt, batten over this, and then lath-and-plaster; the second supposes the wall plastering and papering untouched, it is simply to hang that side of each room next the party wall with batten or some heavy woollen material from ceiling to floor; the worst of woollen curtains is, they harbour dust.—HUGH MACLACHLAN.

[6772].—**Timbers in King Post Roof.**—In the case given, 4 in. The scantlings given are correct, but all the timbers are often made of the same width to have an even appearance on face, or, in other words, to be flush at the joints, hence the struts and sometimes the king post are made stronger than is constructionally necessary, thus in the case given the struts would often be made 4 in. by 2 in. or even 4 in. by 3 in., instead of 3 in. by 2 in., for appearance sake; this is what is meant by the note.—HUGH MACLACHLAN.

[6776].—**Moss on Wall.**—See my answer to No. 6345 in BUILDING NEWS, May 20 last. Several years ago a correspondent recommended a weak solution of sulphate of copper, also known as bluestone.—HUGH MACLACHLAN.

[6777].—**Measuring Chimney Breasts and Stacks.**—In London these are measured solid, the fireplace openings alone being deducted. In Manchester also solid, the fireplace openings and flues being deducted, extra lineal allowance being made for labour in the latter case. I find the following answer in the BUILDING NEWS, October 5, 1877:—"There are different methods of measuring chimney breasts in Yorkshire—1st, by the lineal yard, each toe measured. 2nd, by taking the girth of breasts—face and projections only—by the height up to roof, calling it all 9 in. work, if built 4 in. 3rd, width of breasts by height by projection, brought into cube yards, as high as roof, above roof girth round, and charge whatever thickness it is, 5 in. or 9 in. Take 5 in. mid-fathers to separate flues above roof, yards superficial. The latter I consider to be best. If the breast is in a 9 in. wall, the wall is measured behind the breast as 9 in."—HUGH MACLACHLAN.

[6778].—**Drain.**—The method proposed would probably effect only a partial relief, as the well would only tend to drain from all the surrounding area. Try method proposed by "Lewes" in answer to No. 6313 in your issue of the 16th inst.—HUGH MACLACHLAN.

[6779].—**Measuring and Charging.**—It is unnecessary to prepare a fresh bill of quantities. The best method is to prepare a separate bill of extras and credit for the "provisional items," setting one against the other, and allow extra or deduct as the case may be. Sometimes when the extras and deductions pretty well balance, a system of "give and take" is carried out; this, though simpler is not so business-like. If the total amount of variation is very small, no notice is generally taken of it.—HUGH MACLACHLAN.

[6780].—**Extras.**—If the contract required a "written order," I do not believe "Ignoramus" could claim under it, but I do not think it would prevent his claiming and successfully any orders given before witnesses, as outside the contract.—HUGH MACLACHLAN.

[6781].—**Lager Beer Breweries.**—As far as I know there are no books on these special breweries, though there are one or two works on breweries. Scamwell's "Breweries and Maltings," for instance. Perhaps it might pay "A Young Subscriber" to visit a few of the named breweries abroad.—HUGH MACLACHLAN.

[6782].—**Architects' Charges.**—Charge for time used in preparing drawings and tracings. "A. Benton" would, however, be ill-advised, were he to charge for the time occupied in preparing unsatisfactory plans. Work of the kind named is often done by pupils on their own account, it being simple in character: it is therefore better to make the charges light than heavy.—HUGH MACLACHLAN.

[6783].—**Builders' Estimates.**—It would be difficult for a builder to sustain a charge for estimating, especially when he has had work to carry out.—HUGH MACLACHLAN.

[6794].—**Problem.**—W. S. Daws was quite correct when he said all three answers were wrong; but that he himself gave the correct answer is another question. His sweeping assertion led me to examine the question more closely, and before seeing W. J. Christy's reply in issue of 16th, I came to the same conclusion as it contains, viz.: that £157 2s. 10d., my previous answer, was the proportionate price paid by A, at the first for the last three years, but, as the amount has been idle for 10 years, A is entitled to compound interest, which at 4 per cent. equals £75 9s. 2d., making the total sum to be paid by B, £232 12s. It stands to reason that B should pay less purchase money proportionately than A, as he has to pay an increased rent per annum "G. B. L.," "J. R. R.," and "G. B. Lincoln," ignore this, and their replies are, like my first, wrong.—W. U. O.

[6794].—**Problem.**—"Coker" has now 12 replies, all different. This is astonishing! My way of looking at the matter is very simple. A. paid £1,050 out of pocket, and was entitled to receive from B, 4-14ths of this, equal £300 plus compound interest for ten years at the standard rate of 5 per cent., which would bring it to £488 or thereby. The increase of rent to £300 after A. retired should not affect A., because he gets no benefit. The property, after 10 years' occupancy by A., will have increased £50 per annum in value, and I cannot see why he should pay to B. any part of this increase; if he did, B. would be sitting at the same rent as A. was, which would obviously be unfair. But assuming it to be the case that A. is agreeable to pay this proportion of the increased rent, then A. would deduct 10-14ths of £200; the increased rent equal £142 17s. 1d. from above, making net amount £346, or thereby.—EDMUND.

[6805].—**Bath.**—I recommend "Alba" to hack over present face of his swimming-bath and lay over and well trowel in a coat of Parian cement. I have little doubt but that this will be found effective.—OLD BUILDER.

[6805].—**Bath.**—I have found floating with good plaster of Paris very effectual in a similar case.—W. P. R.

[6813].—**Water.**—In a somewhat similar case, where the basement floors of a store were rendered useless by the surface-water soaking into and lying to a depth of 2 ft. on the pavement, I had a trench dug all round outside walls, to a depth of 2 ft. below floor-level. I then rendered the outside of the walls in half Portland cement, half sand, and laid 4 in. agricultural drain pipes, with a regular fall in the trench, which I continued to deep pit, which I had dug at a distance of 30 ft. from store, over the pipes I packed in rubble stone for a depth of about 2 ft., and then covered in the earth as before. This experiment was tried three years ago, and at a recent inspection, after three weeks' continuous rain, I found the place so dry that floor was stored there in sacks. I should have mentioned that the floors are of brick-on-edge in mortar, and that I also ventilated this by putting in air bricks close to ceiling, and by admitting fresh air. If "Urgent" will try the above, I am sure he will have no more trouble.—W. P. R.

[6813].—**Water.**—To "Urgent," I should reply that no plan such as he suggests for asphaltizing or cementing will permanently answer in keeping back the water. I have frequently experienced the difficulty he names. For the use of water from land springs there is no remedy but drainage—best with loose cobbles or an open stone drain on one or more sides of the buildings. But if the water is 12 in. above the cellar-floor level it may be necessary to raise the floor. This is evidently an instance of hurry and imperfect acquaintance with the ground. It seems very strange that the springs should not be discovered till now. I have often hailed the occurrence of water this way as a perfect "godsend," it being sometimes the only way of obtaining any water at all. Cellars should, in country places, be always made of good height, not less than 8 ft. 6 in. from floor to ceiling, to allow for drainage. You may often get a good cistern tank or well when there are land-springs. The occurrence of water this way frequently arises from cross cutting of some old land-drains, which should be noted during progress.—B.

[6816].—**Cracked Sewer Pipe.**—In a position where some 15 in. pip. s were laid 2 ft. below surface, heavy artillery waggons and guns had to cross almost daily, and the pipes were smashed. I had concrete laid down in bottom of trench 1 in. thick, and laid the pipes (at same level) thereon. I then had rubble walls 18 in. thick built and turned a 9 in. brick in cement arch over, so as to allow 6 in. between top of pipes and intrals of arch. This was a success. Concrete would have been used for walls and arch, but I could not give it time to set.—W. P. R.

[6821].—**Colour on Parchment.**—As the quality and grain of skins differ, so will be the result of your work, but having had a large experience in putting plans, &c., on deeds, I will endeavour to instruct "An Old Subscriber," at the same time advising him to procure some old piece of parchment and experiment on them first. Over the part to be worked upon rub a little test dry whiting, and with a soft cloth rub it all off again. This will take out the greasiness of the skin. I then generally draw my plan in pencil, and with a brush and clear water go over the parts to be coloured, blotting off carefully the surplus moisture; then proceed to colour as required, and when dry ink in, and with the majority of cases you will be successful. Another way is to cut out in tanning paper a pattern of each tint and stencil in; but this requires great practice to make the colour lie evenly. Let your skin dry gradually and naturally, never putting it by the fire, or it will wrinkle up. A little gall with the colour greatly assists the drying, and if there is a large surface to get over, mix up enough so that it may be

taken from the top; the heavy particles settle at the bottom, and your plan will not appear patchy.—LEWES.

[6821].—**Colour on Parchment.**—Allow me to give "An Old Subscriber" some information, arrived at after colouring several hundreds of skins. First line in and put all writing on with Lion ink, mixed thinly, but not brown; then clean the plan thoroughly and well rub French chalk into the skin, but not so thickly that it can be scraped off with a knife. Mix colours thinly, and allow the grosser part of the sediment to settle. Do not use earthy colours if possible, and never burnt sienna. Lay on the full strength at once. Tilt your drawing-board on an easy inclination, and work with a full camel hair brush, allowing the colour to flow over the surface, but not to stay for any length of time whilst colouring another part. I never use gall—it is too searching. I find the perspiration of the hand sometimes affects the skins. With every precaution some skins turn out speckled; the surface seems gone, and the skin absorbs the colour in places like a sponge. I think it is sometimes caused by a rough chalk the solicitors use when engraving the deed, but more generally by irremediable defects in the skin itself.—C. M.

[6821].—**Colour on Parchment.**—Edge the boundary with border pen, taking care that the colour does not go over the line, so as to have the effect of adding to the area concerned. For portions built upon score finely, say 30 to the inch on property concerned, and 20 to the inch on that outside and adjacent. Rubble water with writing pen and let the text of deed refer to portions "edged" one colour or another; thus ditto tints are un-called for. Roads, streets, or thoroughfares are best left untinted, as the printing on them explains their nature, independently of colour.—ASOTUR SUBSCRIBER.

[6821].—**Colour on Parchment.**—A bad skin will never take the colour evenly, however carefully laid on. The mark of the brush on a large surface may be caused by going over work partially dried, or by using too much gall in the colour. If "An Old Subscriber" will rub the skin gently with soft indiarubber on the parts to be coloured, I think he will find the colour lie evenly, if the skin be a good one. A little touch of gall will assist.—W. J.

[6821].—**Colour on Parchment.**—"Gall and other little things usual in general work" are quite unnecessary in colouring on parchment. Rub well all over with indiarubber before commencing work; a Wolf's paper-cleaner, large size, I find best, refreshed on a sheet of coarse sandpaper when it becomes glossy. Do not attempt to colour across ink lines, but up to them on each side. Keep the skin at a good inclination, say 30°, and work the colour downwards with rapid and short strokes of the brush from alternate ends of its lower edge, using plenty of colour. Surfaces on parchment will always have a patchy and uneven appearance if not properly coloured; but it is only a small percentage of skins which finish "speckled," and for this I know of no remedy. "An Old Subscriber" gives no idea of the actual dimensions of the surfaces the colouring of which gave him trouble; but it might be possible for him in future to suggest to solicitors that instead of the words "thereon coloured red" they might insert "thereon surrounded by a red line," thereby reducing the draughtsman's labour and adding to the neat appearance of their deed.—C. R.

[6822].—**Making New Pavements.**—The owner of house-property must conform to the by-laws of the district, and only a fair and reasonable charge can be made for the paving. I presume he would be only responsible for paving to length of his frontage, unless the house abuts on to two roads.—LEWES.

[6823].—**Width of Roads.**—The local road surveyor is right if the fence shades the road. See 5 and 6 W. L. 4th, cap. 50, section 74; and again sections 69 and 80, section 82, deals with the compensation. Country lanes are highways, and are, under this Act, streets, generally under local boards.—ROBERT PHILLIPS, Surveyor of Main Roads for Gloucestershire.

[6825].—**Surveyor's Licence.**—The law says, "If any person effects an appraisement which is liable to stamp duty, in consideration of any fee or reward, direct or indirect, without being duly licensed as an appraiser, he is liable to a penalty of £50." The licence is issued by the local Excise officer of the district, and costs £2 per annum. It is, therefore, always advisable for a surveyor to have a licence.—LEWES.

[6825].—**Surveyor's Licence.**—This question has been asked several times through your columns. "Every person who values or appraises any estate, real or personal, or property for, or in expectation of hire or reward, without being licensed, is liable to a penalty of £50, and he must set down in words or figures every valuation made by him on paper duly stamped, under a penalty of £50—i.e., if the valuation is to be binding between two parties with opposing interests. Persons calling themselves surveyors who act as valuers require a licence. It costs £2 a year, and is obtainable at the office of Inland Revenue. The licence expires 5th July after its issue.—J. SMITHCOCK, Hitchin.

[6826].—**Heating Apparatus.**—I have in several cases used "Grundy's" system with perfect success. The apparatus is the less costly, produces more heat, and consumes less fuel than any other plan, and there is no risk of fire, and easy to manage. The air is heated in an air-chamber, usually constructed in a vault under or near the church or under vestry floor, and passing through a flue comes in through an iron grating in the floor of the church. At the same time the apparatus draws out through another grating the cold air, and, heating and purifying it, sends it back again. By this simple plan the entire church is brought to an even temperature. Mr. Grundy's address is Tyldesley, near Manchester.—LEWES.

[6826].—**Heating Apparatus.**—Write W. Porritt, Dixon Green, Bolton, Lancashire. The apparatus is used for large as well as small churches, successfully. Chamber 11 ft. in length, including stove-hole, covered by grating 11 ft. by 2 ft. Flue must be carried up above highest ridge, say, in gable end-wall. In cases of very long dues a pilot stove is employed to create draught. The apparatus is on the warm-air principle, and the risk none. Costs from £7 10s. to £15, and fixing should not exceed £12 to £15 approximately.—W. U. O.

[6828].—Granite Pavements.—"Pegasus" wants a paving stone that has not "a tendency to wear smooth or become slippery." I have found the Irish and Scotch granites to keep their roughness, but they wear away very quickly under much traffic. The Portland stone is also a better wearing stone, so also is the Cleve Hill stone, than either the Irish or Scotch granites. The Portland stone retains its roughness better than the Cleve Hill. The hardest and most durable stone is the Welsh granite "Sydney," from the Great Mountains, and the grey variety of trap rock from Penn-y-nnar; but these, like all hard stones, have a tendency to become smooth, but for durability they are excellent, and none better. I therefore recommend "Pegasus" to try the Portland stone.—*Experienced.*

[6829].—Concrete Roof. "C" notices appears the only cause of your dampness. There will be no objection to your ceiling with lathed out, or painting the exterior surface. I doubt, however, if you will find any benefit therefrom.—*Lawyer.*

LEGAL INTELLIGENCE.

WEBBER V. THE LONDON, BRIGHTON, AND SOUTH COAST RAILWAY COMPANY.—(Supreme Court of Judicature: Court of Appeal.—Sittings at Westminster, before the Master of the Rolls and Lords Justices Brett and Cotton.)—This was an application on the part of the railway company for a stay of execution pending an appeal to the House of Lords. The plaintiff, an architect, alleged negligence on the part of the defendants six years before action, in consequence of which an accident occurred, the results of which to the plaintiff were at first not serious, but that afterwards locomotor ataxy supervened. The defendants denied the negligence, asserted the plaintiff was not suffering from locomotor ataxy at all, and declared that the injuries sustained by the plaintiff were of a trifling character. The jury found a verdict for the plaintiff for £500, being of opinion that, although there was a gap in the plaintiff's evidence which prevented him from proving that locomotor ataxy was occasioned by the accident, yet he was entitled to those damages on the ground that the injuries caused by the accident, though not locomotor ataxy at all, were still serious. A Divisional Court granted a new trial on the ground that the verdict was unsatisfactory as regarded the amount of damages. The plaintiff appealed in person to the Court of Appeal, urging that the damages were not excessive, and the Court came to the conclusion that the damages were not excessive irrespective of the locomotor ataxy. The plaintiff, therefore, succeeded in his appeal. Mr. Murphy, Q.C., on behalf of the defendants, now applied for a stay of execution pending an appeal by the railway company to the House of Lords. The Master of the Rolls refused the application. Lord Justice Brett was of the same opinion. Lord Justice Cotton concurred.

LIEKELLING A DISTRICT SURVEYOR.—(Before Mr. Justice Mathew and a Special Jury.—Knightley v. Lett).—This was an action for libel, in which the defendant pleaded justification and privilege. The plaintiff, Mr. Thomas Edward Knightley, is the district surveyor for Hammersmith, and has held that position for the last 19 years. Defendant, Mr. Edward Lett, is a retired solicitor and copyholder of certain property, including 25 cottages, known as Montpelier-row, Hammersmith. Some question had arisen as to the condition of the property, and the plaintiff held a survey, and directed that repairs should be executed upon three chimneys and an out-house. The defendant subsequently took proceedings against the lessee of the property, and subpoenaed the plaintiff to appear as a witness. The plaintiff did not attend the trial, and the defendant, after asking for and failing to obtain an explanation from the plaintiff, wrote to the Metropolitan Board of Works, complaining that the plaintiff had attempted to extort money from him by refusing to appear at his subpoena unless he was paid three guineas, and also stating that the plaintiff neglected his public duties by attending to his private business in Cannon-street, and only having a clerk to represent him at Hammersmith. In consequence of these communications the plaintiff was summoned before a committee of the Metropolitan Board of Works, but after an inquiry into the circumstances the case was dismissed. The plaintiff explained that he had not attended the trial owing to the advice of the defendant's solicitor that his evidence would rather injure than assist the defendant's case against the lessee, that the fee of three guineas had reference to an application by the defendant to survey the premises in a private capacity, which he was anxious to avoid, and that by the regulations of the Board of Works he was allowed to carry on his private business out of the district; but he was always in attendance at Hammersmith every Tuesday for ten hours, and every Friday for eleven hours, while his clerk was in attendance in the office during the whole week. The jury gave a verdict for the plaintiff, with £100 damages, and judgment was given accordingly. Mr. Justice Mathew, on an application by the defendant's counsel, and there was no ground whatever for a stay of execution. On Wednesday, however, a rule was granted for a new trial.

THE FALL OF HOUSES IN THE HAYMARKET.—*PERCIVAL V. HUGHES.*—(Queen's Bench Division. Sittings in Banc, before Mr. Justice Grove and Mr. Justice Bowen.)—The following considered judgment was delivered on Wednesday morning by Mr. Justice Bowen. The action was tried in December, 1880, before Mr. Justice Manisty, when a verdict was found for the plaintiff. A rule was subsequently obtained for a new trial, and was twice argued, the second time in June last, before the Lord Chief Justice, Mr. Justice Manisty, and Mr. Justice Bowen. The facts of the case will be found in the judgment, it being only necessary to add that the house in question was one of those that it will be remembered, fell in the Haymarket during last year. Mr. Justice Bowen: The question raised in this case is whether the defendant is liable to the plaintiff for damage done to the plaintiff's premises through negligence on the part of a contractor's man during the operation of rebuilding the defendant's house. It was admitted at the trial that the wall which divided the two houses was a party-wall, and that by the fall of the defendant's new house the party-wall was damaged, and injury caused thereby to the house of the plaintiff. It appeared that the defendant's new house was one story higher than the defendant's old house, and one story higher than the plaintiff's. The defendant employed competent architects and builders. In the course of the work the defendant's new house had to be carried down lower than the plaintiff's house, and the party-wall accordingly was under-pinned. A portion of the party-wall was taken down as far as the first floor. Upon the day of the accident the contractor's men were setting the steps of the staircase, and they, without authority, cut into the portion of the party wall that had not been removed. The architect, on discovering what was being done, and seeing the danger, ordered measures to be taken to prevent a settlement; but while these measures were being carried into effect a settlement took place in the plaintiff's house. In the evening the defendant's house collapsed and fell, doing the damage to the plaintiff's house which is complained of. Upon the above facts, Mr. Justice Manisty, before whom the case was tried, ruled that the plaintiff was entitled to the verdict. The question for this Court now is whether such ruling was correct. It appears to us that the learned Judge was right in his view of the law. The defendant had employed a contractor to perform work involving the disturbance of the plaintiff's party wall, and dangerous, therefore, to the support of the plaintiff's house. The defendant, in other words, being bound to do nothing to deprive the plaintiff's house of its support, had employed a contractor to execute works which might endanger it. The defendant could not relieve himself of the responsibility arising from such an operation simply by employing a competent contractor. It still remained the defendant's duty to see that effectual means were adopted to prevent any damage arising to the plaintiff's premises during the progress of a work which was likely to be injurious unless sufficient precautions were adopted, and for which he himself had given the order. It was urged upon us that the mischief was caused by a negligent act of commission on the part of the contractor's men, done without orders. But this distinction cannot avail the defendant in the present instance. If the only duty cast on the defendant had been the negative duty of abstaining from all acts which would damage the plaintiff's premises, it might with reason be argued that an act of commission done by workmen in violation of their instructions rendered neither the contractor, their immediate master, nor the defendant himself liable. But the duty of the defendant went further. It was to see that at all times, during a hazardous operation, set in motion by his orders, effectual support was given to his neighbour's house. This was a positive obligation, not a negative one. He was bound not merely not to sanction injury, but to prevent it. For wilful acts of mischief he might not indeed be responsible; but it was his duty to hinder negligence whether in the shape of acts of commission or omission. As the defendant has failed to fulfil this duty the plaintiff is entitled to succeed. The case appears to us to fall within the principle of "Bower and Peake" (1, "Q. B. Division," 7) which must now be taken to have superseded "Butter and Hunter," (7, "H. & N." 826), so far as the cases are in conflict. (See "Dalton v. Angus," 6, "Appeal Cases," 11, L. J. 89.) The rule must accordingly be discharged, with costs.

Extensive improvements are being made in the Baptist chapel at Maesummer, including alterations to seats, building of baptistry and new vestry. The contractors are Messrs. Yeo Brothers and Mr. Evan Davies.

The great demand for the Ligna Company's joinery goods, and the increased business with which they have been favoured, has necessitated the requirement of more extensive premises, at 31, Eagle Wharf-road, New North-road, London, N.

Our Office Table.

In the Elgin room at the British Museum there has just been set up for public inspection an interesting attempt at the restoration of the missing portions of the famous statue of Hermes, by Praxiteles, found at Olympia. The restoration is on a reduced scale, and is the work of Miss Halse, the daughter of a sculptor, and herself, as this work shows, giving high promise in the art. The action adopted for the right arm of Hermes, which is missing in the original, is that of holding aloft a bunch of grapes to attract the attention of the infant Bacchus, whom the god carries on his left arm—a motive which had already suggested itself to archaeologists, although not generally accepted by them.

An art treasures exhibition in the Town-hall, Ryde, was opened yesterday. The Queen has contributed to it many works of art from both Windsor Castle and Osborne. The Ex-Empress Eugénie has also sent for exhibition a collection of water-colour drawings, and some of her private jewels. Lord Tweedmouth, Sir Richard Wallace, Sir Henry Daly, Baron F. de Rothschild, and other well-known collectors are also contributors. Among other attractions are collections of Wedgwood, some china, bronzes, miniatures, and articles of *virtu*, and a gold vase which was purchased at the last Paris Exhibition for the sum of 150,000*fr.* The collection of oil-paintings by old and modern masters, several of which are sent from the South Kensington Museum, is large and valuable.

A TRIAL of a newly-designed machine for scattering sand or salt in the public streets, with a view to the prevention of people and horses slipping and falling in wet or frosty weather, was made on Saturday afternoon last, at Camden-town, at the request of the London Street Tramways Company. The machine is invented and manufactured by the firm of Ben. Reid and Co., of the Bon Accord Works, Aberdeen, and consists of a modification or adaptation of their broad-east artificial manure distributor, which was tried at the recent show of the Highland Society, at Stirling. The apparatus is composed of a hopper, that may be easily affixed to the end of any sort of cart, and into this the sand or salt is filled as required by the driver. The action of the machine is both continuous and automatic. The conditions under which it performed its work on Saturday were unfavourable, a drizzling rain falling all the time; yet the distributor did good service and earned the encomiums of its judges. As the result of this trial, the London Street Tramways Company have determined upon the adoption of Messrs. B. Reid's invention for use in the thoroughfares traversed by their cars. In addition to the more effectual work, it was stated that a saving of at least 25 per cent. may be secured by the use of the new machine, compared with the methods hitherto employed.

A LECTURE on Tuesday evening in connection with the Leeds Philosophical and Literary Society was delivered by Professor Colvin, M.A., on "Raphael and Rembrandt: a Comparison." The lecturer, in the course of his remarks, said that it was impossible to look at the pictures of these two masters without immediately recognising what had been the chief aim of each. The three great elements in art were lines, light and shade, and colour. Of these three elements, Raphael had chosen the first, and made it his chief aim to portray in his pictures the distinctions of lines. Rembrandt, the greatest of a number of Dutch painters who had made it their object to delineate the distinctions of light and shade, had succeeded in that object to a further extent than all his competers. For an illustration of the third element, we should have to go to Venice, to the school of Titian, &c. Raphael is the master in whom all the efforts of his predecessors culminate. Rembrandt, living in a totally different era, has no past to look back upon, but looks to the future in his representations of the ugly and uncouth figures in which the variety of light and shade is so definitely and skilfully shown. Limestick illustrations taken from some of Raphael's and Rembrandt's greatest works were shown.

THE BUILDING NEWS.

LONDON, FRIDAY, DECEMBER 30, 1881.

THE PAST YEAR.

THE year which is fast hastening to its close has not been remarkable for the initiation, commencement, or completion of any great architectural work—it has rather been one especially marked by the loss of some of the most eminent members of the profession. It is, unfortunately, no new experience for those who, like ourselves, have depended so long on the cordial help of the best in the ranks of those we represent, to miss year by year old friends and faces; but never before in our recollection have so many seemed to go from us as it were almost at once, as during the last twelve months. Their work, however, is yet with us, and those of us who value it rightly will best interpret its highest lessons by a renewed determination to work as some of those worked who have left us, and to leave behind in our turn, if not such mighty works as they wrought, something that may not altogether shame the art whose achievements are among the most lasting monuments of human endurance and energy.

Mr. Street's greatest work has been left unfinished. The progress that has been made during the past year at the Royal Courts of Justice has indeed been considerable, and it is satisfactory to know that the design has been so far completed in its main features as to make the task of Mr. Street's successor comparatively easy. The great central hall and its surrounding courts have been carried out in all their main details, the public entrance and octagonal staircases have been nearly finished, the roof of the great hall is on, and the central flèche has made considerable progress. The numerous and carefully-prepared working drawings Mr. Street has left, and which formed so marvellous a display of handiwork on the occasion of the last visit of the Conference to the new building, leave really little but scrupulous supervision and the exercise of a faithful interpretation necessary. As the vast edifice has advanced step by step, we have noticed its salient points, all tending to confirm our previously expressed opinion of the wealth of resource and detail lavished by its author on every member and ornament of this complex structure. No Gothic building certainly of our time has exhibited to so great a degree the individual impress of the artist on its minutest detail.

Another great building, the progress of which we have watched from time to time, has been completed—namely, the Natural History Museum at South Kensington, and its architect, Mr. Alfred Waterhouse, A.R.A., has disproved the popular idea that the leading members of the profession have shown themselves unequal to the requirements of the age and in the design of buildings depending on skilful planning. Mr. Waterhouse's design for the Central Institution of the City and Guilds of London Institute, a perspective of which we gave in our Christmas number, is another notable instance of the use of red brick and terra-cotta on a large scale, and as a building of Renaissance character, it will rank as one of the most successful of its author. The first stone was laid by the Prince of Wales in July last. We may here also casually allude to the completion of the quadrangle of the New Court Chambers, in Carey-street, by the same architect, in which we discern some skilful handling. The New Town-hall, Hove, near Brighton, is another

work approaching completion by Mr. Waterhouse, in which the Gothic style has been adhered to, a central tower forming the main feature, and the progress made with the new Church of the Oratory, South Kensington, from the designs of Mr. Gribble, is worthy of record as an example of the application of marble bonded with the brick-work, instead of being used for a veneer merely, as practised in Italy. A detail of one bay of nave we recently published, Sept. 30, 1881.

During the year we have illustrated two theatres from the designs of Mr. C. J. Phipps: one the new façade of the Princess's Theatre in Oxford-street, and the other the new theatre recently completed in Beaufort-buildings, Strand, the front of which faces the Embankment, and is executed in red brick and stone. Both are designed in a free sort of Italian style (see illustrations, p. 360, Vol. XL). The Alexandra Theatre, in the Haymarket, is another addition to the number of new theatres which have been erected, from the design of Mr. T. Verity, architect. We noticed it in a recent number, on account of the improved provision made for entrance and exit to the chief parts of the house. The calamitous and melancholy destruction of the Ring Theatre at Vienna, resulting in the burning and death of over 808 occupants, has already stirred the authorities in England and the Continent to do something to avert such terrible and wholesale sacrifices of human life. The theatres of Paris have already been the subject of inquiry by a commission. M. Andrieux, Préfet de Police, has reported upon the topic at length, and his observations are worth the notice of all architects. The fitting up of an iron curtain which shall fall automatically by combustible cords in case of fire, the use of separate meters for each of the three divisions of a theatre, and the use of some solution, as tungstate of soda, to render the drop-scene and drapery less inflammable are among the points considered. Confining our attention here to buildings in the metropolis, we remark the progress that has been made at the City of London Schools by Messrs. Davis and Emanuel, on the Embankment, and near it the erection of Sion College Library, by Mr. Blomfield, M.A., will, when carried out, fill up the valuable frontage towards the river. These buildings are typical of the styles which just now seem to be in most request for educational purposes. Mr. R. W. Edis, F.S.A., has lately been engaged also in this part in enlarging and remodelling the Inner Temple Library, in King's Bench Walk—a plan and illustration of which we have recently given with a notice of the new building, and we can say the work is a successful adaptation of Late Gothic.

In the City a few important works have been either completed or are in progress. We must mention the completion in part of the new Fruit and Vegetable Market, and the opening of the first section of new Leadenhall Market, both for the Corporation, from the designs of Mr. Horace Jones, the City architect. We have only lately noticed the architectural features of these large public undertakings, and so need not say more now. The Standard Insurance Office, in King William-street, by Messrs. Boulnois and Warner, a building we have also referred to, is one of the best recent examples of Classic design applied to business uses, though the shape of the land has rendered the treatment of the main façade at one angle extremely difficult. The Law Courts Chambers, by Mr. Wimble, ought not to be overlooked. The offices of the London and Lancashire Fire Assurance Co., Cornhill, by Mr. Chatfield Clark, just finished, is a pleasing instance of French Renaissance: the front is of stone, and freely relieved by deep bands with carved orna-

ments between the coupled orders of columns which break the façade. Though not strictly within the category of architectural buildings, we must not omit to mention the enlargement of the Fenchurch-street Station, as a work of some magnitude.

At the West End, also, structures with some pretensions to architectural merit have been completed. We may refer to the new premises for the Life Association of Scotland, in Pall Mall, by Mr. Alex. Peebles, in which a Classic façade of one order has been employed, with an entresol arrangement in the ground-story. Messrs. Howell and James's new façade in Regent-street is a clever adaptation of English Renaissance features to business premises, in which red brick and terra-cotta have been introduced. In Pall Mall we must record the progress of the picture galleries, by Mr. E. R. Robson. Several buildings have been erected for charitable and benevolent uses. Among these we must mention St. Peter's Hospital, Henrietta-street, from Mr. J. M. Brydon's design, in which red brick has been used, and the style adopted is 17th-century Classic freely handled; we have given an illustration of it (p. 740, Vol. XL). The new Hospital for Consumption in Fulham-road, opposite the old building, has been completed, and was the object of a visit during the Conference week. The design, in a free brick style, was prepared by the late T. H. Wyatt, and the works have been carried on under the supervision of Mr. Matthew Wyatt. Another hospital for Consumptive Patients has been in progress, and is advancing towards completion, at Vernon Hill, Hampstead, from the designs of Professor T. Roger Smith; and in the same class of erections we must include the recently-built Hospital for Sick Poor in Marylebone, from Mr. Saxon Snell's design, which we have already illustrated (Vol. XL., p. 309). The building was opened a few months ago, and its chief peculiarity is the adoption of double pavilions of wards. The Holloway College, now erecting at Mount Lee, Egham, for the higher education of women, is a work of individual munificence not to be overlooked, and we cannot speak of this building without referring to the other great edifice undertaken by Mr. T. Holloway, the Sanatorium for Mental Diseases in course of erection, both having been designed by Mr. W. H. Crossland, and intended by their benevolent founder to be presented to the nation.

Many large residential blocks have been erected in different parts of London; chief among these is the Albert Hall Mansions, South Kensington, by Mr. R. Norman Shaw, R.A., recently illustrated (Vol. XL., p. 526), remarkable for its vast size and height, and as being one of the first instances of the use of Queen Anne features for buildings of this class. In Victoria-street, Westminster, another instance may be noticed; but the most prominent architectural work which has been in progress here is the large Army Hotel, from Mr. Pilkington's design, a structure we thought worthy of a special notice when reviewing this thoroughfare. It is sufficient to say here that the architect has boldly introduced a style of trabeated Greek detail little practised in London.

Numerous buildings of a commercial class have been erected in various parts of London. We can only point to the warehouses in Great Eastern-street, Shoreditch, from the designs of Mr. Aston Webb, which we illustrated in Volume XL., p. 294. New Schools of Art have not been few; we can only name in passing the West London School of Art, by Mr. R. W. Edis; and the Chiswick School recently opened, from the design of Mr. Maurice B. Adams. Amongst buildings of a domestic character, the mansion in Park-lane for Mr. Leopold de Rothschild, by Mr.

W. R. Rogers, architect, is conspicuous. Architectural progress in the provinces has not been distinguished by any very great undertakings. The University Buildings, Edinburgh, from the designs of Mr. R. Anderson, have made progress during the year, and are a group we have illustrated. Mr. A. W. Blomfield, M.A., is engaged in erecting from his designs, Selwyn College, Cambridge, an edifice in a Late Gothic style, and the same gentleman has recently carried out a new Training College (St. Katherine's) at Tottenham, in the same spirit, both admirably fitted for their respective purposes. The Exeter Grammar School, by Mr. W. Butterfield, is another educational work of an excellent type, also Gothic in style.

Of the few municipal buildings erected, that at Hastings, from the design of Messrs. Ward and Andrews, in a Gothic style, must be noted; but the greatest work of the kind still in contemplation is the Glasgow municipal buildings, for which the second competition among architects was invited at the beginning of the present year, and will shortly be under consideration.

In the batch of new provincial buildings, the Liverpool School of Art and the Newbury Grammar School must be named; the former design, by Mr. F. Cook, architect, we gave on Feb. 4, 1881, a work conceived in a rigid Palladian style, and worthy of a high place. The second premiated design we have also illustrated (March 11, 1881). The Newbury Grammar School, the competition for which was decided at the beginning of the present year in favour of Messrs. Power and Hughes, is one of the few works to be recorded as strictly belonging to the year's progress. We have illustrated the design. A college at Ellesmere, by Messrs. Carpenter and Ingelow, must be cited also; and Mr. Stuart Colman's Trade Schools, Bristol, must rather be placed in the list of competitive designs of the period we are reviewing. Illustrations have already appeared in our pages of the Bolton Infirmary and the Chadwick Museum, both by Mr. R. K. Freeman, in the Gothic style; the former was opened recently. Messrs. Mawson, Bradford, have finished the University College Buildings, Nottingham, which were opened last June, and among other large educational structures must be mentioned the Handsworth Theological College from the designs of Messrs. Dall and Goddard.

One very good example of Late Gothic, applied to a post-office, has been furnished at Hereford, and another attempt to use the style for secular uses has been made at Sheffield in the new Corn Exchange, by Messrs. Hadfield and Son, in course of erection, where a large rectangular hall has been introduced. At Ipswich, the new Post-Office and the School of Art, both of which we have illustrated, have been opened, and the new Corn Exchange, also illustrated in our pages, is being roofed in. New offices have been erected in Glasgow, West George-street, by Mr. J. McLeod, architect, in an Italian style, showing a rather richer treatment of the style than is generally found in that city. We can only enumerate here the erection of the Hereford County College, an illustration of which has appeared in our pages; the Northern Assurance Office, Newcastle-upon-Tyne; the High School for Girls, Manchester, by Messrs. Mills and Murgatroyd; a School of Art in the same city; the Devonshire Hospital, Buxton, by Mr. R. Rippon Duke, lately opened—a building with a circular domical centre. Markets have been erected at Dublin by Messrs. Lockwood and Mawson; and at Chester by Mr. W. H. Lynn; and Messrs. Paul and Bonella are engaged in building a Convalescent Home at Southport, Gothic in style, with terraces largely introduced.

We must notice, among secular buildings of the year, the Preston Railway Hotel, by

Mr. T. Mitchell, Oldham; important additions to Arundel Castle, for the Duke of Norfolk; Derwent Hall, Derbyshire, for the Duke of Norfolk, by Messrs. J. A. Hansom and Son; and Barrow Court, Chester, by Mr. J. Douglas (illustrated), in Late Gothic, with brick Flemish features, are noticeable works of the year, among which must be placed the re-casting of Eaton Hall, Cheshire, by Mr. Waterhouse; a large R. C. College at Weybridge, by Messrs. Hansom and Son; and additions to the Lancaster Asylum (a memorial wing), by Messrs. Paley and Austin.

A few buildings have been erected, or are in progress, at Brighton. We may mention the Hospital for Sick Children, by Messrs. Lanson and Son, and some large corner premises between West-street and King's-road, in a Renaissance style, by the same architects; and the new Town Hall at Hove, by Mr. Waterhouse, nearly finished. A grand hotel is about to be built at Aldershot, near the South Camp, from designs by Mr. G. Edwards; at Rotherhithe, Messrs. Elkington and Sons have been engaged in new baths and washhouses; Messrs. Perkins and Bulmer are carrying out their plans for the Pontefract Town Hall; and at Birmingham the new premises of the Midland Institute and the Central Fire Brigade station have been carried out.

The number of churches and ecclesiastical buildings is too large to allow us to mention even the more important of them. We may just, however, refer to a few important edifices of this class. The restoration of Lichfield Cathedral west front, and of St. Giles Cathedral, Edinburgh, have advanced a stage. The new cathedral about to be erected at George Town, Demerara, from the designs of Mr. A. W. Blomfield, M.A., is a bold adaptation of Gothic or Romanesque features to the climate. Mr. Butterfield is the architect of a cathedral at Melbourne in progress, and Messrs. O'Neill and Byrne are the architects of a new cathedral at Drogheda; and the new Truro Cathedral, now building, from the designs of Mr. Pearson, R.A., must be again noticed. We have illustrated churches at Devonport, by Mr. J. P. St. Aubyn; St. Peter's Church, Plymouth, by Mr. G. H. Fellows Prynne; a church at Camden-town, by Messrs. Bodley and Garner. Mr. J. Oldrid Scott is the architect of Lahore Cathedral, previously described in our pages. Mr. E. Ingress Bell has in progress a Catholic church and schools at Bromley (illustrated), and Mr. J. P. Sedding has just finished in Late Gothic the unique building St. Mary's-at-the-Cross, Shoreditch, we have described. Mr. Street restored the body of St. Peter Mancroft, Norwich, and the completion of its tower is still in progress. At Ipswich St. Lawrence's Church steeple, a lofty structure, is being clothed in masonry and flintwork, to a rich Fifteenth-century scheme, by Messrs. Barnes and Gaye. Messrs. Pugin and Pugin are the architects of a church and convent at Dumfries we illustrate this week, and a large church at Bayswater by Mr. J. Johnson is being carried out.

In the list of competitions or works recently commenced, we must name the Glasgow Municipal Buildings already alluded to; the Selby schools; the Harrogate Conservative club, determined in favour of Mr. A. Hiseox; the Cardiff infirmary, just illustrated by us; an infirmary at West Bromwich; workhouse at Burton-on-Trent, the Suffolk and Gloucestershire Lunatic Asylums, by Messrs. Giles and Gough, who have also just won the Fulham infirmary competition; the Burton-on-Trent market-hall, Mr. Dixon, architect. Competitions for the Rowland Hill statue and the sculpture for Blackfriars-bridge have taken place this year, but the work is still in abeyance; while the award of Sir Frederick Leighton,

P.R.A., in the last case, has been only tardily adopted, and, as we hinted last week, the selection of designs has been again referred to the committee for further consideration. Professor Hayter Lewis has been appointed assessor for the competition designs for a proposed asylum at Exeter; and a competition for St. Paneras Workhouse has been instituted on a liberal scale of remuneration, the names of five architects having been selected for the contest. The Birkenhead town-hall competition is another instance where the recent regulation in respect of a preliminary sketch test has been resorted to. The Brighton clock-tower competition has been abandoned, and some others are undecided.

Our rapid and imperfect sketch of the year's work would not be complete without making a reference to a few events of general import. The year 1881 will be remembered for another conference, in which the questions of quantities and competitions were discussed with a result, in the last instance, of something being done to promote fairness in conducting public contests between rival competitors. The principles and rules there laid down, the adoption of preliminary sketches, the promotion of properly prepared instructions, and the guarantee that the designs shall be examined by qualified judges of merit, are steps in the right direction. The commencement of tests of professional competency by the Institute, marks an eventful period in the progress of architecture which may lead to a change in the personnel of the profession in course of time. In matters of style little change has taken place, the Queen Anne or 17th-century revivalists still hold a prominent position among the profession, and a purer phase of Classic design is likely to be inaugurated. Gothicism has lost its great master and champion in the death of Mr. Street, and it reflects credit to the honesty of his convictions that he never pandered to fitful changes of style, but persistently followed the Gothic of his choice. Mediaeval art has, however, many able exponents and disciples left among the profession, who will honourably carry on a revival which has made the nineteenth-century in England a conspicuous one in the art-history of other nations.

THE NEW ACT ON CONVEYANCING.

WITH the New Year there comes into operation a very important statute relating to the law of real property. In its full title it is described as "an Act for simplifying and improving the practice of conveyancing," and for various other purposes. But the words we have quoted give the key-note of the whole measure, and fairly describe its aim and object. That our law of real property, especially in its practical details, needs a great deal of simplifying, and will stand any amount of improvement, is a fact that admits of no question. In going through this lengthy statute of 73 sections, many of which are in themselves very long, we find much that can only be fully appreciated by the legal student and practitioner. But still it is possible to pick out a few of the important changes made in the law and practice of conveyancing, and to present them in such a form that they may prove generally interesting to men of business who are often obliged to deal with land and houses, and to come in contact with the mysteries of the law of real property.

It is a common truism to say that the transfer of a piece of land should be as short, as simple, and as cheap a process as is the transfer of a ship. Yet, while no one disputes the theory, those who understand the question will doubt the possibility of putting it in practice. If we could get every piece of land in the country registered somewhere

as belonging to somebody, then the difficulties of title would be at an end, and the problem would be solved. But that great "if" stands, and has now for many years stood, right across the path of progress. Before a title can be registered by an authorized officer, it must first be examined by those who are skilled in conveyancing. But at whose expense is this vast work to be undertaken? Efforts have been made by various statutes, the last being in 1875, to get parties to register their titles; but the end has always been found in failure. The mere registration of transfer is of little or no avail; registration of title being, indeed, the one thing wanted. While we are waiting for this wide measure of reform there are, however, many things that can be done meanwhile towards making our system of conveyancing at once simpler and sounder, and cheaper in its practical working.

The main points upon which this reform is possible may be shortly stated; and they have been borne well in mind by those who framed the new Act. The existing blots upon the present system of conveyancing are mostly to be found in its prolixity and complication, and consequent expense. Upon each sale or mortgage of land or houses, whether freehold or leasehold, it is necessary to provide for every possibility. Thus the documents used are extremely lengthy, and are full of old forms and endless repetitions. Yet, unless the proper covenants and provisions are always duly inserted, harm may be done, and loss result to the parties concerned, by the happening of some event for which the deed has not provided. The only way to get rid of these needless forms is to enact that they shall *ipso facto* apply to every sale or mortgage, and, be considered as included in every deed, although they are not set out therein. It is upon this principle that the Legislature has often proceeded in the many statutes that have been passed during the present reign to patch up the law of real property, and the same idea has been followed in the Act now under our notice. The Vendor and Purchaser Act of 1874 did a good deal in this direction by providing that certain conditions of sale should be always applicable, and by other similar clauses; and in the latest measure of reform this plan is carried out much further and more fully.

Passing over the definitions, every one of which in its every line bristles with points of law to be settled and construed at the expense of future suitors; we come to some important clauses upon contracts for sale. Builders and others who buy or sell land or houses, know well the importance of the contract; which, though it is only a preliminary, requires to be carefully drawn, to prevent, or rather to anticipate, every possible dispute. It is obvious that if it be enacted that all the common clauses shall apply, as of course, to every such contract, the document actually required will be greatly shortened. Speaking broadly, and without going into details of too technical a nature, this is what the new Act has done. Independent of statute, a purchaser of real property has a right to a good marketable title, and the vendor is bound, at his own expense, to make out such a title. In order to get over this difficulty, no wise vendor ever sells without having a written contract in which he stipulates as to the kind of title he shall be bound to furnish. By the operation of the new Act most of the common clauses now put in these contracts by way of precaution will become needless, being applied thereto by the statute. So with regard to what are known as "general words" in deeds and documents. It has hitherto been essential to set out every possible right or easement that might be on or over the land sold: and for this purpose a long rignarole of words has been employed for

generations; adding greatly to the length and complication of every deed of transfer. For the future, the conveyance of land will carry with it all that can be covered by, or included in, these general words that have hitherto been used, and thus the mere piling up of words will become unnecessary.

Passing on, we find clauses dealing with covenants for title, which again are of the utmost importance, and cannot fail of having a widespread effect in shortening and, so far, in cheapening the usual deeds and documents. Upon every sale the vendor now covenants that he has good right to convey, for the purchaser's quiet enjoyment, that the property is free from incumbrances, and that he will execute any further assurance that may be necessary. These covenants are all set out at full length in the same form of words that has been used for centuries, and it is clear that as they are invariably inserted they may just as well be implied. This is the view taken by the new statute, and so it provides that in a conveyance of sale these four covenants for title shall be understood and implied, in the same way as if they were set out in the deed itself. Where the property sold is a leasehold it will further be assumed that the vendor covenants that the lease he sells is valid and subsisting. Upon a mortgage of leaseholds by the beneficial owner, the usual covenants for title as to good right to convey, quiet enjoyment, freedom from incumbrance, and further assurance, will be implied, and so need not be stated in the conveyance. With regard to other forms of transfer, there are similar provisions, into the details of which we have now no space to enter, while there are further clauses as to the production and custody of title-deeds which are of great practical importance.

The large question of leases is dealt with in a separate part of the new Act, which provides that the rent and benefit of lessee's covenants shall run with the reversion, as also shall the obligation of the lessor's covenants; while it is enacted that all conditions may, upon severance, be apportioned; and there are other like provisions too technical to be here considered. But the most important branch of the subject is that dealing with forfeiture. Under the present law, if a lease be once legally forfeited, no Court, even in Equity, can afford any relief, except where the forfeiture has arisen for non-payment of rent, or by default in the insuring. If, therefore, any lessee breaks a covenant to repair, for instance, the lessor can, if he chooses, take advantage of this breach and forfeit the lease: nor will any relief be afforded, even though the repairs be done and all damages and expenses fully paid. For the future, this summary system, which, though theoretically very hard, is, it must be admitted, seldom put in force practically, will be much modified. No forfeiture is to be enforced unless and until the lessor serves notice of the breach upon the lessee requiring compensation, and the lessee fails within a reasonable time to make such a compensation. Then, again, when a lessor is proceeding to enforce a right of re-entry or forfeiture, the Court before which the case comes may refuse or grant relief to the lessee, and may do so upon such terms as it thinks fit. These sections, in short, give the Court a general power of discretion in dealing with cases of forfeiture, such as have long been wanting, though it has been demanded by law and other reformers. But these clauses are not to affect the right of forfeiture for breach of a covenant not to assign, underlet, or part with the possession of premises, which, therefore, remains of the same absolute legal effect as before; and as against which there is still no relief if the lessor insists on his legal rights. Neither does the Act in any way affect the law relating to re-entry for non-payment of

rent, upon which is based the lessor's or landlord's right of ejecting a tenant who is in arrear. But it must be borne in mind that all these clauses relate to leases made either before or after the passing of the Act, and shall have effect notwithstanding any stipulation to the contrary. The result is that all existing leases, old and new, come within the provision of the last statute, and that by no means can the parties to any future lease contract themselves out of its provisions.

The broad subject of mortgages is dealt with in some important particulars by the new Act, a few of which only can we here touch upon. At present a mortgagor has no power to compel the mortgagee to give him inspection of the title-deeds. For the future this is to be altered, and a mortgagor will be entitled, at his own cost, and on payment of the mortgagee's costs, to inspect, and make copies of, or extracts from, any of the title-deeds to the property. Again, by what is known as the power to consolidate, a mortgagee having several mortgages from the same mortgagor, can refuse to allow one to be redeemed until all are satisfied. By the new Act this very great privilege is restricted, and a mortgagor wishing to redeem one of several properties, is to be able to do so separately from the others, by which the old doctrine of consolidation of mortgage will be greatly cut down, to the general benefit of purchasers and all who are concerned in the freer transfer of landed property.

We are compelled to pass over a vast number of clauses of great and varied interest to the profession, and of much importance to everyone, in so far as they tend to simplify the practice of conveyancing, but which could not here be briefly explained. There are several sections dealing with what is termed a statutory mortgage, and which may become of great practical importance as being based upon a simpler system than that now in use. The Act itself contains a schedule of forms, which are certainly short enough, though to what extent they will be adopted, time alone can tell. There are also other forms of Deeds of Mortgage, Further Charge, Conveyance on Sale, and Marriage Settlement that seem to contain all that need not be set out in writing. But here, again, the question arises, Will they be used by the profession or the public? It must not be forgotten that the same experiment has often been tried before, though with little success, the whole practice of conveyancing being in the hands of those who are most conservative in their habits and modes of thought. Neither ought we to overlook the fact that it is often easier to draw a long deed containing all usual clauses, and providing for every possibility, than to set out only what is really needed, for this latter requires a wide knowledge of the real property statutes. For the rest, the new Act is a step in the right direction, but its success will be found mainly to depend upon the way in which solicitors' costs and charges are dealt with under the recent statute passed for that purpose.

FIRES IN PUBLIC BUILDINGS.

THE terrible calamity which has befallen the people of Vienna, and which has converted a large theatre into a furnace of human victims, has been the means of calling out a variety of suggestions for the security of our places of amusement, which may be worth an attentive ear at this festive season. Three correspondents have addressed us on the subject, and numerous hints have been given in the public press. Much as the authorities in the Vienna catastrophe were to blame for remissness, we have to consider the chances of successful administration at the moment of a panic. All is confusion,

and the best regulations are rendered perfectly imperative. The recent inquiry undertaken by the *Préfet de Police*, Paris, and the report submitted to the Minister of Public Instruction on the regulations to be carried out by managers and proprietors of theatres, are worth the attention of all connected with buildings of the class we are now referring to. We have on previous occasions referred to the rules laid down by the Board of Works and the Lord Chamberlain respecting the area of buildings intended for public assemblies, their isolation from others, and other internal arrangements. These points have been made the subject of inquiry by the French Commission, and are worth mention. In the case of old theatres, there is a difficulty in securing separation of the theatre from adjacent buildings, and the suggestion that an independent brick wall be added to the theatre to protect the party-walls of houses is a good one. Separation also by thick walls of the stage, auditorium, and administrative offices is insisted upon, as well as the total isolation of all store-rooms from the part occupied by the audience. A very useful suggestion is that balconies for the use of firemen be erected above the stage, and commanding it so that they should have control over the combustible apparatus and scenery. The employment of an iron curtain suspended by combustible cords, which would fall when a fire broke out, may be adopted without much hesitation. The curtains used in Paris are of trellis-work in an iron frame, or of a metallic gauze with a small mesh. This gauze is made so as to stop the passage of flame, and some improved curtains have stout iron wire trellises on both sides of the fine gauze to protect it, so that the curtain is made up of three thicknesses. Yet these open curtains have certain serious objections: They allow the fire to be seen through them by the spectators in the auditorium, causing panic; they allow air to feed the flames and smoke to pass through. In many Continental theatres the curtains are made of sheet-iron, the sheets being hinged together, which secure all the advantages of shutting out the fire from the eyes of the spectators, separating in a more air-tight manner the stage from the auditorium, and effectually shutting off the smoke. The curtains can be raised by hydraulic power, and counter-balanced by weights.

With regard to the question of lighting, the subject is yet in too uncertain a state to admit of a solution of all the difficulties in the way. The lighting of theatres, especially the stage, is a complex matter. The "flies" and scenery have to be lighted so as to be capable of being modified, sudden transformations have to be produced, and movable gas-burners become necessary. The importance of having a separate meter for the main divisions of a theatre cannot be doubted, and the recent order of the Lord Chamberlain will add to the safety of many London theatres. The Report of the French Commission enforces a similar precaution, and to insure sufficient light in the auditorium in case of a sudden extinction of the light of the chandelier, oil-lamps accessible to the public are to be provided; the use of iron instead of lead pipes is another condition required which, however, may not be found of great service, as the defects of pipes and escape of gas generally occur at the joints. The employment of some means of movable lights; the use of improved floats protected by an outer covering, and of regulations to insure steadiness of the jets of the burners, are matters which should receive the attention of all proprietors and managers. The recommendations we have been discussing have also in view the introduction of electric lighting. The isolation of all wires for the transmission of the electric current and their protection by casing, and

the adoption of some method to prevent the fall of the incandescent carbon, are referred to in the report of the *Préfet de la Seine*.

In the planning of corridors and entrances architects have a distinct means of reducing the effects of a panic, and some of these we have pointed out in previous articles. Capt. Shaw's little book, "*Fires in Theatres*," furnish useful hints in providing the necessary areas for corridors, staircases, and gangways. But the hint thrown out by Mr. Brade, F.R.I.B.A., in our last issue is rather at variance with existing notions upon the desirability of wide passages and staircases. Mr. Brade says, and to some extent with justice, the "wider the passages the greater is the crowd, and the greater the danger;" in fact, the gist of the remark is that by increasing the width we increase the "momentum of the rush." If a number of people find a wide open passage in such an emergency they will all rush to get into it, whereas a narrow gangway can only be occupied by one at a time. By keeping the audience in single file danger is avoided, and our correspondent accordingly suggests that every passage and staircase should be divided into parallel gangways of about 2ft. wide, by substantial barriers along them so as to allow only one person to pass at a time. We believe there is a good deal in thus limiting to a given unit the entrances. By giving every individual a means of entering one of these gangways, and of preserving the line, the chance of confusion is obviated; but there is the rush and sudden impulse of panic to fear, the breaking down of these artificial barriers, and the anxiety to move quicker than the single file would permit. If we could discipline our assemblies like bodies of troops, the plan proposed would be effectual; at any rate, the idea uppermost in the mind of every spectator that he would have to fall into line in a certain prepared course, would tend to lessen the chances of being driven into wild panic and despair by not seeing a distinct passage of exit. The suggestion made by another correspondent, of having iron tubing fixed in the angles and walls of stage and auditorium, with roses for the discharge of water, is one that has been partially carried out in some theatres. The ill-directed and promiscuous cold water shower-baths, to which the terrified audience might be exposed, would, we fear, rather increase than quell the excitement of a panic-stricken assembly, and to be of any use, the water should be made to play on that part of the stage or building where a fire existed, and on no other; to do which a number of taps would be required in, possibly, inaccessible parts of the interior.

THE WATER QUESTION.—XXIII.

CONDUITS.

WATER may be very well conveyed along a hillside in an earthenware pipe, in moderate quantities. A 24in. pipe running half full, with an inclination of 5ft. in a mile, will carry a million-and-a-half gallons a day, and 2½ millions when running two-thirds full. But to go to a smaller size, a 12in. pipe with the same inclination would carry 300,000 gallons a day, half full, and 450,000 gallons if running two-thirds full. A 27in. pipe will carry, at the two degrees of fullness mentioned, 2,300,000 gallons, and 3,400,000 gallons, respectively. A 30in. pipe, nearly 3 million gallons a day half-full, and 4½ millions if running two-thirds full. The carrying capacity of any circular pipe may be found for any degree of fullness from the following considerations. If full, or half-full, the hydraulic mean depth is half the radius. This is evident, because the cross sectional area of the pipe is equal to that of a triangle, the base of which is equal in length to the circumference of the circle, and the

height to the radius, half of which, multiplied into its base, is the area. The hydraulic mean depth is the area divided by the whole circumference when the pipe is running full of water, and is, therefore, half the radius; and it is the same when the pipe is running half-full, for, in that case, it is half the area divided by half the circumference; but, at any height, H , above or below the centre of the pipe, it is as follows— D representing the diameter, and R the radius:—The width at the surface of the water (see Fig. 1) is $W = \sqrt{R^2 - H^2} \times 2$.

The width V is $\frac{D - W}{2}$. From H and V find the length of that part of the circumference in contact with the water above the centre of the pipe, and add it to the lower half of the circumference, thus procuring the wetted border of the section. The length of the two arcs above the centre is the same as that of a single arc the chord of which is $2H$. Find the chord of half the arc = $\sqrt{H^2 + V^2} = C$. Then $\frac{8C - 2H}{3} =$ the length of the two arcs above the centre, to be added to that of the lower half of the pipe, to find the wetted border, which, being multiplied into half the radius, gives an area, to which is to be added $W \times \frac{H}{2}$ for the whole sectional area of the stream, and this divided by the wetted border gives its hydraulic mean depth.

For example, in a pipe 24in. diameter running two-thirds full, the height, H , is 4in., and the width $W = \sqrt{12^2 - 4^2} \times 2 = 22.62$. The width V is $\frac{24 - 22.62}{2} = .69$. The chord of an arc above the centre is $C = \sqrt{4^2 + .69^2} = 4.05$. The length of the two arcs is $\frac{8 \times 4.05 - 2 \times 4}{3} = 8.13$. The lower half of the circumference of the pipe is $\frac{3.1416 \times 24}{2} = 37.70$, and $37.70 + 8.13 = 45.83$ in. = 3.82ft., the wetted border. The sectional area is $45.83 \times 6 + \frac{22.62 \times 4}{2} = 320$ sq. in. = 2.22 sq. ft., and the hydraulic depth, or mean radius, is $\frac{2.22}{3.82} = .58$ ft.

If Eytelwein's rule be adopted, in which h represents the hydraulic mean depth, and f twice the fall per mile, the mean velocity of the stream of water would be $\frac{10}{11} \sqrt{hf}$ = $\frac{10}{11} \sqrt{.58 \times 10} = 2.18$ ft. per second, or 130ft. per minute, and the area being 2.22 sq. ft., the quantity is 288 cubic feet per minute, or 2,592,000 gallons per day, as before stated.

Larger pipes than those of about 24in. diameter are difficult to handle, require heavy tackle to lift about, and are liable to split longitudinally with external pressure, unless the pipes are evenly bedded all round the lower half, and the haunches of the top solidly filled in between the pipe and the sides of the trench.

At what diameter, exactly, a brick or stone conduit becomes cheaper than a pipe, depends upon the local materials; but, usually, about 20in. becomes the turning-point, in respect of expense, between an earthenware pipe and a culvert of masonry. The pipe has some advantage in being glazed, but for clear water this is not of much importance. A circular conduit, 2ft. diameter and half a brick thick, would usually be laid at less expense than a pipe of the same size. Very excellent conduits are made of square shape, with flag bottom and covers, and sides of clean bedded stones with squared joints. A larger quantity of materials is required for this form than for

a circular one, because, to carry the same volume of water at the same inclination, a larger sectional area is required, and the walls, being straight, need to be thicker.

The question arises, when considering the advisability of adopting a square or a circular form, what are the comparative carrying capacities of the two forms, the more immediate question being what dimensions of the square form carry the same quantity of water per day or per minute, as a circular conduit of given diameter. This may be seen from the following considerations:—In rectangular channels the best proportion of width to depth of the stream of water is width 2, depth 1. That proportion is the best which gives the greatest hydraulic mean depth with a given quantity of materials used in the construction of the channel, because, the greater that depth, the less need be the sectional area of the stream, the carrying capacity of all conduits having the same inclination being as the area multiplied into the square root of the hydraulic mean depth. A rectangular conduit may be compared with a circular one in the following manner:—Let them both run half full; then, if the height of the rectangular conduit be the same as its width, the width of the stream will be twice its depth. Let h represent the hydraulic mean depth, as before, W the width, and D the depth of the stream (see Fig. 2). If the width be twice the depth, the area is $2 D^2$, and $h = \frac{2 D^2}{W + 2 D} = \frac{2 D^2}{4 D} = \frac{1}{2} D$; that is, in a rectangular stream in which the width is twice the depth, the hydraulic mean depth is half the simple depth, as, in the circular form, it is half the radius. Then $\sqrt{h} = \sqrt{\frac{1}{2} D} = \cdot 707 \sqrt{D}$.

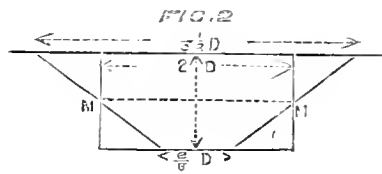
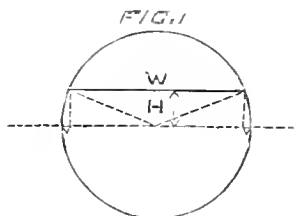
The sectional area multiplied into the square root of the hydraulic mean depth thus becomes $2 D^2 \times \cdot 707 \sqrt{D} = 1\cdot 41 \sqrt{D^3}$, and this quantity must be the same in the square as in the circular form, to satisfy the conditions.

For example, in the case of a rectangular stream, in which the width is twice the depth, what would be the dimensions to make the carrying capacity equal to that of a circular conduit 3ft. diameter running half full? In this latter form the hydraulic mean depth or mean radius is $\cdot 75$ ft. The area of the lower half of the conduit is $\frac{3\cdot 1416 \times 3 \times \cdot 75}{2} = 3\cdot 53$ sq. ft., and the area multiplied into the square root of the hydraulic mean depth is $A \times \sqrt{h} = 3\cdot 53 \times \cdot 866 = 3\cdot 05$. Then in the rectangular channel $A \times \sqrt{h} = 1\cdot 41 \sqrt{D^3} = 3\cdot 05$. $D^3 = \left(\frac{3\cdot 05}{1\cdot 41}\right)^2 = 4\cdot 66$, and $D = \sqrt[3]{4\cdot 66} = 1\cdot 36$ ft., the depth, and the width is 2\cdot 72ft., the area being 3\cdot 70 sq. ft. The border is $W + 2 D = 5\cdot 44$ ft., and the hydraulic mean depth is $\frac{3\cdot 70}{5\cdot 44} = \cdot 68$ ft., being half the depth, as before stated. If the quantities of water carried by the two conduits be calculated from these data, they should be the same.

Small conduits are more liable to freeze than large ones, and should be covered, to protect them from freezing as well as from dirt. Snow is troublesome in an open conduit, whether large or small; it clogs the run of water; but the freezing over of the surface of a large body of water is not of so much importance as in a small one. In either case it reduces the sectional area of the stream, and at the same time increases the solid surface with which the water runs in contact, but the effect of this in reducing the quantity of water carried is but little in a large conduit, while it is very considerable in a small one. In respect of protection from

dirt, fencing may be sufficient in the open country, but the expense of fencing bears a greater proportion to the whole expense in a small than in a large conduit, and is almost as much as that of covering a small conduit. If the line of conduit is not subject to contamination by dirt it may be open, though it be not large, if the inclination is sufficient to cause a velocity of about 3ft. per second. This would wash away earth if not protected by a facing.

In an open conduit cut with side slopes at which the ground will stand without slipping, so that the facing is for the purpose of protecting the earth from the wash of water rather than for keeping it up by its weight or lateral resistance, the side slopes would usually be flatter than those which coincide with the best form in respect of carrying capacity. They would usually be $1\frac{1}{2}$ to 1 or more, but side slopes of $1\frac{1}{2}$ to 1 are best in respect of carrying capacity, which, with these slopes, is the same as that of a rectangular channel of a width equal to twice its depth, and of the same sectional area. The peculiarity of this slope is that the length of the two slopes and bottom is the same as the length of the two sides and bottom of a rectangular channel of the proportions mentioned, the area of the two forms being the same; consequently the hydraulic mean depth is the same, and, therefore, the discharging capacity. If the slope be drawn through the point M in Fig. 2, it will leave the area of the section the



same as that of the rectangular channel, whatever the slope be, but there is only one slope which will leave the length of border the same as that of the rectangular channel; that slope is $1\frac{1}{2}$ to 1, and the length of the two slopes is equal to the top width, being $3\frac{1}{2}$ times the depth, the bottom width being $\frac{2}{3}$ of the depth. Referring to the figure, the area is $\frac{3\frac{1}{2} D + \frac{2}{3} D}{2} \times D = 2 D^2$, and the border is $1\frac{1}{2} D + \frac{2}{3} D + 1\frac{1}{2} D = 4 D$. Hence, the hydraulic mean depth is $\frac{2 D^2}{4 D} = \frac{1}{2} D$, the same as that of the rectangular channel, and also of the circular one.

But sometimes practical considerations have greater weight than the best deductions, and the sides of an open channel would generally be less troublesome to keep up with slopes of $1\frac{1}{2}$ to 1 or more. Frost is the great disturber of the upper part of open channels, whether large or small, although the covering of water prevents it from reaching the bottom. The sides above the water should be porous—the facing, that is to say, should not be close-jointed—so that water may not accumulate behind it, for when it does so, it swells when frozen and disturbs the facing. But when the facing is thus open-jointed it would be the means of introducing mud into the conduit from behind it in long-continued rains upon clayey ground;

to prevent this, the facing should be laid upon a bed of sand.

Through loose ground the making of the conduit watertight must always be one of the chief difficulties—a difficulty of course to be overcome. For this purpose puddle, to be used with all materials except concrete, is perhaps the least expensive material, and gravel puddle is better for the purpose than clay puddle. A foot is an abundant thickness for small conduits, and if well made, 8in. ought to be a sufficient thickness for the bottom and slopes of the ground, and 2ft. above-ground in the embanked portions of the line of conduit. In these the hardest of the excavated earth will be placed along the central portion, and brought up to the level of the underside of the puddling, as far as the height above-ground is but a few feet. Probably the best material for conduits is concrete, made with Portland cement of good quality. It forms at once a watertight channel and one which needs but little protection of the surface, a facing of cement being sufficient for all that part under water, but above the water, in an open conduit, it would be preferable to face the concrete with brick or stone, and indeed for some little depth below the water surface. A covered conduit may equally well be made with concrete, both bottom and top, and the thickness need not be more than about half as much more as would be the proper thickness of brickwork.

Beyond the several points in a long line of conduit at which slight cutting should end, or the height above-ground would be but a few feet, and where it would be economical to cross straight over low ground rather than extend the line far up the hollow and back again on the other side; the aqueduct is best carried on piers and arches, but economy points to girders, which can be made to carry the water between them on a floor laid upon the lower flanges, or in the form of a wide box-girder; but if the water runs in contact with the iron the conducting property of the metal quickly draws heat from the water in winter. If it be lined with a non-conducting material, which is at the same time brittle, the difference in the rate of expansion by heat of the metal and the lining tends to destroy the adhesion. This may in some measure be prevented, and perhaps entirely, by sinking the aqueduct bodily as far as is necessary to completely immerse it, so that it may preserve a nearly uniform temperature both top and bottom; but this, of course, somewhat adds to the retardation of the floor by increasing the wetted border. To prevent contact with the metal altogether, by substituting an independent carrier for the water within and clear of the girders, would be expensive, but such a carrier might very well be made in earthenware, either rectangular or circular, and of any size by being jointed crosswise. The least expensive aqueduct would be an earthenware pipe—of stoneware or fireclay—carried on a single girder in saddles upon the top flange. An open girder, continuous over the piers, with wide flanges both top and bottom, would resist the wind, and as the pipe and the water together would be of considerable weight, it would not be likely to be blown off the girder, especially if tied down with a strap over all, every 10ft. or so.

LIFE AND WORKS OF MICHEL ANGELO.*

AN interesting volume on the life and works of this great Italian master, compiled chiefly from the unedited documents preserved in the Buonarrotti archives and from the Life of Michel Angelo written by

* Life and Works of Michel Angelo. By CHARLES HEATH WILSON, K.C.I. 2nd edition. London: John Murray.

Commentatore Gotti, has been brought out by Mr. John Murray, the author being Mr. Charles Heath Wilson, K.C.I. The second edition of this work is now upon a noble, and is illustrated by drawings of sculpture and descriptions of the frescoes of the Sistine chapel, which have been carefully examined by the author. The drawings have been executed by Signor Filippo Leonardi, and reproduced by Signori Pietro Smarini & Co., and the whole of the letter-press printing has been the work of Italians. Mr. Wilson acknowledges his indebtedness to the Commendatore Aurelio Gotti for the courtesy of being allowed to retain the documents which, as the director of the Royal Galleries and Museums of Florence, he had selected for his own work; and in presenting those unpublished documents in an English garb, the volume of Mr. Wilson is enhanced greatly in value and interest. The author had rare opportunities afforded him for closely examining the frescoes of the vault of the Sistine chapel, and a movable scaffold 5ft. in height was erected for his purpose. It is satisfactory to know that recent restoration, carried on during the late Pope's life, has preserved the frescoes from further maltreatment, to which they had been exposed, not by enemies or revolutionary mobs, so much, as from the Sacristan spirit, the clumsy and ignorant church officials and decorators. It is a well-known fact, that much of the fresco of the Last Judgment has been scratched and obliterated by ladders placed against it to erect clumsy and gaudy decorations for modern ceremonies, and even nails have been driven into the painting. We are glad to find the author speaking out freely on this spirit of modern destructive decoration. "The love of altar illumination, so wide spread in Italy, has done more to destroy pictures of every description than any other cause whatever," says the author. Again, we are told, "The frescoes of the Sistine, like those in many other chapels, are so darkened by the effects of the smoke of tapers, that, seen from the floor, the real colours are imperceptible. The veil of soot has been increased, it is said, by the burning of documents connected with each conclave, so that every election of Pontiff, since the death of Julius, if the custom is so old, has contributed to the obscuration of these great works." Cobwebs hang from the ceiling, and numerous cracks of the plaster, filled with dust and dirt, show a want of stability in the brick vault. Portions of the plaster have even given way, and one of the figures on the cornice has disappeared.

So much incidentally; we must now glance at the volume and its plan. The birth, parentage, and education of Michel Angelo form the subject of the first chapter, here the author quotes many interesting documents, such as the register of the birth of the great artist made by his father, Ludovico, who was podestà or chief magistrate of Caprese at that period, as well as a letter written to Michel Angelo in 1520, by Alexander, Count of Camossa, showing the family relationship to the noble line of Camossa. The father, Ludovico di Leonardo Buonarroti Simone, was poor when his son, Michel Angelo, was born. The memorandum of apprenticeship, made by Ludovico, when his son was placed with Dominico and David Ghirlandino for three years to learn painting is instructive as recording the early training of the great artist received, and the fact that he had already attained some progress in drawing, a compensation for which his masters paid him the first year of his apprenticeship "six golden florins," according to agreement. Several anecdotes are told by Vasari, showing the rapid progress made by the youthful student. The frescoes in the choir of Sta. Maria Novella, executed by Ghirlandino, were painted during the first year of Michel Angelo's apprenticeship, so it

was not to be wondered that he made early acquaintance with the technical processes of an art in which he attained such eminence. The preparation of the lime, the laying on of the coats of plaster, the grinding of colours, and the enlarging and drawing of cartoons fell to his share, as well, no doubt, as some of the decorative portions of the frescoes.

The youthful pupil is said to have, at one time corrected the outline of one of his masters' sketches; and it appears he sometimes excited the jealousy and anger of his instructors. His talent with the pen and crayon is pointed to as one of the neglected studies of the present day, and those who had the good fortune of seeing the exquisite pen and chalk sketches by the old masters in the Grosvenor Gallery sometime ago, must have noticed how important and effective a part such drawing for decorative subjects played in the work of great artists of the Italian school. Michel Angelo was soon transferred to the Academy of St. Mark, and placed under Bertoldo, who instructed him in modelling. His first work in marble was a mask of a fawn, in a Late Roman style, now in the museum at Florence. A drawing of this mask is given by the author. Lorenzo the Magnificent became struck by this work of the youth, and subsequently took him under his especial notice as an inmate of the palace, and a student of the sculpture in the Medici garden. The low relief Madonna and Child, after Donatello, is another illustration. The drapery is certainly clumsy, and the feet and hands large, and Vasari's admiration of this early work is, as the author observes, greatly exaggerated. Michel Angelo's dispute with Torregiani, which led to a blow which disfigured the great artist's nose, the death of Lorenzo, and the return of Michel Angelo to his father's house at the age of 17; his subsequent study of sculpture and anatomy, form other incidents in his early career, which Mr. Wilson recounts in a fair, though critical spirit. The young artist was not the model of amiability some biographers would make him. He was hasty and inclined to quarrel, yet he proved himself a good son and citizen; and in spite of the age and society—not the purest—in which he lived, he was unspoiled by the surroundings of Medicean luxury. So, at least, we must infer, if we accept the author's account.

We have no room here to trace other events. His connection with the Medici brought him many ill-friends and enemies, and foreseeing the danger which threatened them, he went to Bologna. Here he sculptured several statuettes, especially a figure of an angel for the altar of St. Dominic. Returning to Florence, he executed the statue of St. John, a work lately discovered in an old art-dealer's shop, a drawing of which is given.

The first visit of the great student to Rome in 1496, whither he had been invited by Cardinal San Giorgio, who had accidentally purchased a recumbent cupid by him, reputed by the dealer to have been an ancient work, is fully narrated. Michel Angelo's letter to his friend, Lorenzo, giving his impressions of the cardinal's statues, and the commission to carve a marble statue for him, add to the interest of the narrative, and throw light upon the society of the day. The chapter embraces the history of the great sculptor from this period to 1498, when he returned to Florence at the pressing request of his father, then in ill-health and poverty. The letters to his father show the filial affection of the young artist, and the harassing nature of the claims made upon him by his family on account of the deprivation of office on the expulsion of the Medici. The marble Piera was a group which brought into play the power of the sculptor, as Mr. Wilson remarks, "the taste of Michel Angelo re-

volted against the methods usual with the medieval artists of exciting feeling in agonised or emaciated forms, and we see in this group a loftier ideal of art." We skip over other of the early commissions entrusted to the artist—his execution of the colossal statue of David for the cathedral at Florence in 1501, and his invitation to Rome by Julius II., who employed him to sculpture his monument. The rough bistre sketch of this monument is reproduced, and shows a sort of podium, with pedestals and niches, &c., adorned by figures carrying a cornice and groups in two stages; the architecture being indicated in a rough manner. There is, perhaps, a lack of religious feeling in the composition which received the approval of the Pope, who provided money and instructed the artist to go to Carrara to purchase the necessary blocks of marble. After spending much time, the work was proceeded with till the Pope's sudden change of conduct induced Michel Angelo to leave Rome. The story of Bramante's perfidy in this matter is discredited, and the author thinks it more probable that the pontiff had seen the desirableness of less expenditure on works of art. The Pope's intimacy with the great sculptor led to a strong enmity between Bramante and himself, however, and this lasted during the life of the latter. Every reader of Michel Angelo's life knows of the flight of the great sculptor after this event, the sending of papal couriers after him, and his refusal to return. The letter of Michel Angelo to Giuliano explanatory of his conduct, and the letter from Pietro Rosselli as to Bramante are valuable contributions towards clearing up certain misapprehensions of his career. It is quite clear that the sculptor's confidence in Julius was shaken by the insulting treatment he had received at the Vatican; but he was wrong in his estimate, as was proved by the after reconciliation between the sculptor and the pontiff, when Julius II. ordered a statue of himself to be made in bronze at Bologna. The year 1508 was eventful in the career of the sculptor. He again settles in Florence, and is summoned to Rome by the Pope, to paint the vault of the Sistine chapel. He reluctantly undertook this work, as he considered painting was not his profession. The account given of the suspended scaffold constructed by Bramante for this purpose, and the doubt raised by Michel Angelo as to its adaptability is interesting, as it affords evidence of the skill of the great artist in construction. A new scaffolding was devised by Michel Angelo, which was a model of its kind. A detailed description is given by the author of the celebrated chapel, and the subjects painted in the compartments, comprising three hundred and forty-three figures. Those who have seen this miracle of decorative composition can alone estimate the life and action and expression of the colossal figures painted upon the vault and its pendentives. The artist's ideas were embodied first in sketches to a small scale in red or black chalk; afterwards drawings from the model were made; and finally the cartoons or working drawings were prepared. These were chiefly transferred to the plaster by "pouncing," and Mr. Wilson furnishes interesting details of the process. This part of the work is illustrated by outline sketches of the recumbent figure of Adam, which took, it is thought, only three days to paint. Outlines are also given of one of the sitting young men on the cornice, exquisite examples of powerful design and expression. The remarks on the style, drapery, light and shade, and colour of these figures, the contrast between the treatment and that of the realists, the payment of Michel Angelo, and the time occupied by him are instructive and interesting. Only twenty months were occupied in accomplishing the work, according to some biographers; but as Mr. Wilson

observes, the frescoes were not completed till 1512, and occupied nearly four years.

Another chapter describes the artist's work on the monument of Julius, and the new design during the pontificate of Leo X., his employment in the marble quarries of Carrara, and also his design for San Lorenzo. His design for the Laurentian library; the work on the tombs of the Medici; the painting of the Last Judgment; the Pauline chapel; his appointment as architect of St. Peter's; the scheme for the cupola and the model for its construction are the subjects of the concluding chapters. We cannot enter into these interesting topics. Elevations and details of the Laurentian library, and the cupola of St. Peter's, besides many illustrations of sculpture will be found in the pages of the volume. The copies of important letters bearing upon these and other commissions lend authenticity to the narrative of the author, and the work, in its scope and details, must take its place among the most reliable of biographies of this great master of one of the most eventful periods in the history of art.

THE WATER SUPPLY OF ENGLAND AND WALES.*

ONE of the most valuable contributions that have been made on the subject of water supply, and its underground circulation and surface distribution, has just been published in a bulky octavo volume, by Mr. Charles E. De Rance, Assoc. Inst. C.E., F.G.S. Mr. De Rance's qualifications for such a task as that which he has undertaken have well fitted him for it; and the statistics and data which he has obtained as secretary to the Committee of Inquiry into the underground circulation of water, appointed by the British Association of 1874, enable him to present a work fully up to the time. As our readers know, the Council of the Society of Arts in 1878 convened a Congress to consider the question of water supply, and the subject was discussed at the Society's rooms on this and the following year, when the author read papers bearing upon the questions. These and other lectures of the author, have furnished the basis of the volume now before us. The author describes all the river-basins of England and Wales, and the maps given, showing the annual rainfall in different parts of the country, the underground circulation, the catchment-basins, the growth and water supply of London, and the density of population in England and Wales, are particularly useful additions.

The rainfall has been based on Mr. G. J. Symons's returns, and the area of the chief geological formations defined, for the purpose of estimating the volume of water available. It seems certainly a matter of surprise, that although the rainfall of England exceeds 25in. per annum over the whole area west of a line drawn from Shields to Reading, and is more than 75in. per annum over a considerable part of that area, such as the Lake Districts and west part of Wales, there should be a scarcity of water in many of our cities and rural districts. Much information of value will be found in the first chapter, which treats of rainfall and the percolation of rainfall, and furnishes a number of average gaugings in the Lake districts, the Pennine chain, the millstone grits, &c. For instance, in the Loch Katrine district and in the Welsh hills round the sources of the Severn, Mr. Bateman takes 60in. as the available average of the estimated rainfall of 75in. Not less than 12in. of this would be lost by evaporation,

being a mean between 9in. and 16in., leaving a net available produce of 48in. This estimate accords with that gentleman's evidence before the Royal Commission of Water Supply—namely, that the available rainfall must be calculated on the average fall over a district for a long period of years. The amount of rainfall of course varies—the declivity and geological formation of the country, its cultivation, and amount of vegetation having much to do with the quantity. The vegetation takes up a great deal of the rainfall, and the rivers help to drain it off, and these and evaporation make from 9in. to 16in., the rocky and steeper surfaces giving the smallest quantity.

According to Mr. Bateman, the dry-weather flow of streams due to springs only amounts to one-fourth of a cubic foot to three-fourths of a foot per second from each 1,000 acres of area drained, or an average of half a foot per second for a dry season, while the volume of floods varies from 200 to 500 cubic feet per second, or 500 to 1,000 times the dry-weather flow. These figures relate to high, impermeable districts, and show the value of impounding reservoirs, which increase the useful volume of the stream by returning a large percentage of water.

Several facts, not well known, are furnished. In mountain districts the rainfall steadily increases up to an elevation of 2,000ft.; the fall is chiefly towards the side of mountain exposed to the prevailing rain-wind—thus the wet winds of the Lake districts are the dry of Northumberland. When hills rising to an elevation of 3,000ft. are breached by valleys of lower elevation than 2,000ft., the rain-clouds pass through and discharge on the lee slope of the hills, as is found to be the case at Westdale Head and Beddgelert. The gaugings of Mr. Bateman go to corroborate this phenomenon. A mean of several observations at different heights, taken along a line from south-west to north-east, show on the westerly side of hill's an increasing amount of rainfall as the elevation increases, and a less amount eastwards. These observations also have clearly shown the effect of a range of hills on rainfall in abstracting moisture. The average figures indicate an increased fall at certain heights in the vicinity of hills.

The variation of rainfall in different localities has made it difficult to determine any fixed data as to the minimum supplies of water in certain cycles of years; and greater experience is demanded before we know what part of the minimum quantity is available for gravitation waterworks. "When they are mainly dependent on springs, the winter's rain is of the most importance, and even though the year's fall may be above the average, if the winter is dry the springs will fall off, especially when two or three dry winters succeed each other." The author quotes several authorities: Mr. John Taylor, Mr. Hassard, Mr. Robt. Rawlinson, C.B., and others, in this part of his subject. "Basing calculations on average falls of rain is erroneous; the minimum quantities only should be depended on," says Mr. Taylor, and complete security against want of water can only be attained by storing all the floodwaters of two or three successive winters. Waterworks ought, therefore, to be made to supply in average years twice the quantity of water required. Large pipes for discharge are no doubt more economical, as the velocity with which water flows through a large pipe with a small fall can be made as great as that of water flowing through small pipes at a greater fall. The importance attaching to the geological conditions of a site before constructing a reservoir embankment, has been amply illustrated of late years. The banks should be carefully compacted every foot in height, as water, like the arch, "never sleeps." Outlet culverts should be built of brick or rubble with one-third of mortar,

not with hewn ashlar, as the joints are liable to leakage. Many interesting experiments and results regarding percolation of rainfall are recorded, which detail the contrivances used by various observers, also with respect to the "saturation plane" in different soils. Porous soil underlain by impermeable deposits, or by fully saturated subsoils, have the water-line a few inches or feet from the surface, while in sandstone and limestone hills intersected by valleys, the water-plane is found to be "slightly above the lowest level at which the deepest valley intersects an impermeable stratum forming the floor on which rests the water-bearing rock."

The upper Thames basin, sections of which have been made and published by Professor Prestwich, shows underground sheets of water, formed in the permeable rock between impermeable strata, these having a "dip" and alternating with the porous ones. The author alludes to other well-known phenomena, more particularly the difference between the rest-level and the pumping-level of wells; the capillary attraction exerted by grains of sand in sandstone and grits; the amount of absorption of various stones; the filtration of sea-water through sandstone; the storage capacity of given thicknesses of rock, and other data of much value. It is useful to know that 1in. of rainfall equals one gallon falling over two square feet, or 22,427 gallons per acre, and during a whole year such a rainfall gives a daily average of 62 gallons per day per acre, or 40,000 gallons per square mile. The remarks on the effect of drainage, and its effect in lowering the outfall; the composition of rain-water; filtration of Thames-water; and the tables of analyses, &c., are exhaustive of recent researches in these directions. It is stated, on the authority of Dr. Frankland, that the water from the lakes of Thirlmere, Hawes-water, and Ulleswater contains not more than 0.194 in 100,000 of organic carbon.

The great river-basins are described with much detail, and occupy the bulk of the volume. Beginning with the river-basins of the north-east of England, the great central watershed separating the Severn, Dee, Mersey, Ribble, and Lake district streams from the Humber, the Tees, and the Tyne, is noticed. This watershed hugs the western coast. The geological structure is the chief clue in making a division of basins. It is found, indeed, that the direction of these watersheds is governed mainly by geological peculiarities, such as tilt or dip of strata, the anticlinal and synclinal curves in the rocks produced by subsidence and elevation. The river-basins are separately considered, with the area of each, the towns and tributaries belonging to them; the particulars are given from the Ordnance Survey. The basins of the Humber, the Wash, the Thames, and east-coast streams, the south-coast streams, the South Cornish basin, the Devon basin, the Severn and West Wales basins are all detailed in this manner, and, to facilitate reference, the main rivers are printed in italic capitals and the tributaries in small italics. All the urban sanitary authorities are also clearly distinguished by small capitals, and under each we find the acreage, number of inhabitants, the source of supply, daily quantity, the means of storage, filtration, &c. The geological formation of each basin is minutely detailed, thus furnishing to the engineer engaged in the construction of new waterworks essential data only afforded by a variety of otherwise inaccessible publications and papers.

Speaking of the Thames basin, the author points out, the central anticlinal axis of the so-called Weald Valley defines the southern limit. To the west the watershed runs from Selborne to Marlborough, along a line coinciding (the author observes) "with the axis of movement that has thrust into sight the

* The Water Supply of England and Wales: its Geology, Underground Circulation, &c. By CHARLES E. DE RANCE, Assoc. Inst. C.E., F.G.S., &c. London: E. Stanford, Charing Cross.

greensands of the vale of Pewsey; and it is worthy of note that this natural line closely corresponds to the boundary between the counties of Berks, Surrey, and Kent on the one side, and Wilts, Hants, and Sussex on the other—a fact of importance to those who are anxious that watershed areas should be as far as possible coincident with County Boards in any scheme of national water supply."

We may add the Thames basin includes 170 square miles of lias; 231 of oolites; 5 of Hastings sand; 13 of would clay; 453 of greensand and gault; 2,096 of chalk, and 915 of tertiary deposits. The map given of the metropolis, showing the areas built upon at different dates from 1560 to 1881 is interesting as indicating the rapid growth from 1867 to 1881. Another map defines in colour the boundaries of the water companies supplies, or the superintendent registrars' districts. Those interested in the London water supply, and all who are engaged in works of supply; officials of urban sanitary authorities, and students of hydrogeology, will find Mr. De launce's work a valuable aid. The statistics are compiled from the most reliable sources.

ST. ALBAN'S ABBEY.

TAKING the world's history as our guide, the conquering legions of Rome after landing from Gaul on what we now know as the coast of Sussex, advanced northwards until the whole island was subjugated. About 20 miles north of the river Thames they founded a city, on the ruins of a British town called Verulam, which was composed of rude huts and sheds, protected by palisades and a ditch, and after they had brought the people under subjection they conferred upon this place the term of dignity, "municipium." The late Dr. Nicholson states "When Aulus Plautius first commanded in Britain (A.D. 42) Verulam had the pre-eminence of a municipium conferred upon it; the native inhabitants enjoying the rights and privileges of office and government of law and property, equally with the Romans themselves. By the way, I will mention that this honour was enjoyed by the citizens of Verulam before it was conferred on those of Londinium, the modern London; Eboracum, or York, being the only city having a similar privilege. The fidelity of the inhabitants of Verulam to the services and interests of the Romans brought upon them the anger of Boadicea, Queen of the Iceni, who A.D. 61 avenged the bitter wrongs of herself and her people by the slaughter of many thousands, Romans and Britons indiscriminately. Dion Cassius writes that 70,000 were hanged, crucified, or cut to pieces without mercy." The city was soon afterwards retaken by the Romans with great slaughter to the Britons. It is also a matter of accepted history that the Christian faith continued to gain ground until the time when its maintainers throughout the Empire suffered dreadful persecution under the edict of Diocletian A.D. 303, when there was great persecution of Christian people, and in this same time St. Alban was martyred. The St. Alban's Chronicle, a MS. in the Archbishop's Library in Lambeth Palace, makes mention of this. There can be little doubt that the story of the martyrdom of St. Alban had become enmeshed with much that is "imaginative" before it assumed the complete form in which we find it recorded by Bede. The first mention of the martyr is in the life of St. Germanus of Auxerre, written by Constantius at least 150 years after the date assigned for the death of St. Alban. It is clear, too, that when Offa II., King of Mercia, founded his church here about A.D. 793, the exact place of the martyr's tomb was forgotten. Gildas, the Ven. Bede, and Matthew of Westminster concur in the fact that a church was founded in honour of Alban on the spot where he suffered, within a very few years after the martyrdom. Bede states that the church was existing in his day A.D. 731. The story of Offa's foundation leads us somewhat into the region of the marvellous, but we cannot reject altogether the account in Bede. The evidence for the ex-

istence and martyrdom of St. Alban is tolerably sound, and we may claim him, not indeed as the "Protomartyr Anglorum," since the Angli were not yet in sight, but as the first recorded sufferer for the Christian faith on the soil of Britain. Where his relics really repose is quite uncertain. The remains preserved in the great shrine were possibly his, if we believe the story of the discovery of his coffin by Offa. Probably they have mingled with the dust of the hill on which he suffered and on which his great church rises. There is a shrine to the honour and in memory of St. Alban in the Schmorgasse at Cologne, where some relics are shown as those of the martyr, but their identification is a matter of doubt. Offa journeyed to Rome to obtain consent of Pope Adrian to the building and endowing the church and monastery. This was granted; together with the canonisation of the martyr, and especial privileges to the contemplated establishment. The Peter's pence which had been originally levied in A.D. 727 for the maintenance of a Saxon college in Rome, were appropriated to the Abbey of St. Alban. It is believed that Offa did not complete his purpose of constructing a larger and nobler church, although he began to do so, but used the church then standing for the temporary deposit of the remains of the martyr. His occupation during his life was chiefly the erection of monastic buildings, leaving to Elfric, his son and successor, the duty of building the church. But the church so designed was not finished by him for we have it on record that Eadmer, 9th Saxon Abbot, collected materials for rebuilding the church which was the edifice existing at the time William the Conqueror set his foot on these shores. At that time Frederick, 13th Abbot, ruled over the monastery. He was elected in the short reign of Harold, and was of the royal blood of the Saxons, and also next heir to Canute. Dr. Nicholson remarks that he was a principal instrument in extorting an oath from William the Conqueror, which was administered by himself, that he would keep inviolate all the laws of the realm, which his predecessors, and particularly King Edward (the Confessor) had established. But the Conqueror subsequently disregarded the engagement he had made, and the Abbot was forced to retire to Ely, where he died in great vexation of heart. With the introduction of the Norman rule in England we may date the history of the present building, for after the retirement of the Saxon Abbot, Paul of Caen, kinsman of Lanfranc, Archbishop of Canterbury, was appointed in 1077 to preside over the monastery. He pulled down the Saxon building and constructed the church entirely anew of stones and tiles taken from the ancient city of Verulam, a great portion of which had been collected by the two last Saxon Abbots. Indeed the proximity of the city in ruins was just what was required, and formed a convenient quarry for the Norman structure. Built now almost entirely of Roman bricks above the foundations, from the city which stretched along the opposite hillside—the walls and tower spoke, as the latter in its renovated condition speaks with a yet clearer voice, of the days of the Cæsars, of the early struggles of the faith, and of the changes which rendered possible the use of such materials for the construction of a great Christian church. The architecture of this first portion, comprising besides the tower, that of the transepts, choir, choir-aisles, and six bays on the north side of the nave, is purely Norman of the earliest period, begun in 1077 and finished in 1088. The peculiarity of the construction is that from the shape of the Roman tiles, about 17in. by 11in., the piers and arches all have angles of 90°, no cut stone being used, except a little in the plinth, the impost and caps of the arcades, and save and except the axed-baluster piers in the triforia of the transepts, and the tower galleries. These piers are believed to be portions of the earlier church of Offa, placed in this position where they might be used and seen with advantage. On the east face of the tower triforium is a large cap worked in Purbeck marble, being the earliest use of that material that I am aware of in this country. The architecture of this first portion tells of the years immediately succeeding the Norman Conquest, when Lanfranc assisted his friend and kinsman, the Abbot Paul, in rebuilding the church, and the heads of the Benedictine Monastery were about to become great feudal lords. The Norman abbot carried his work into execution on a scale so gigantic as even now to astonish the beholder, and for the

next four centuries and a half St. Alban's ranked among the greatest of the ecclesiastical foundations in England, her abbot during the greater part of that time not only being a peer of the realm, but taking precedence of all the other mitred abbots of England, his Abbey being endowed with vast possessions and privileges; and his church the resort of numberless pilgrims who flocked thither from every quarter to do honour to the remains of the protomartyr of Britain. The church, as built by the early Norman abbots, was, as before said, of vast dimensions; as large, probably, as any abbey church or cathedral of that period, gigantic as many of them were. It was built on a beautiful symmetrical plan. The nave, or western arm of the cross, alone measured internally 285ft. in length, and the total length of the church was then about 450ft. It had no less than six apsidal chapels besides the great apse containing the high altar and the shrine of St. Alban; and its dignity externally was enhanced by three vast towers, one at the intersection of the cross and two in the western facade. The whole edifice, in its perfect and unaltered state, must have been dignified and noble in the highest degree, though (being built entirely with Roman brick, and covered both within and without with an incrustation of plaster) its beauty was the result of outline, proportion, and vastness, rather than of architectural detail. The stern severity of the interior was, however, relieved by costly accessories, and by the enrichment of every part of its surface with painted decorations, of which remains may still be traced, wherever the early surfaces remain. If the last century was a period of destruction, this is as certainly one of renovation, and the works which are now in progress at St. Alban's mark an epoch in the history of art and of the church, not less distinctly than the Roman brick and huge arches of its tower, or the shattered sculptures of its shrine. There is no English church, unless perhaps we except Canterbury, which tells so striking and so plain a story. After long years of neglect, it is "renewing its strength," and recovering its ancient beauty. It rises on its green hill above the Ver, a long "ridge" of building, a witness to the changes of 800 years; while the bricks of its tower, as the sun lights up their faces, tell the tale of yet another ten centuries. Roman Verulam, the pagan city, with its temples, its amphitheatre, and its luxurious villas, has vanished, and but a mass of crumbling wall remains on its site. The great Christian church, to build which the city was spoiled, still looks across to the gate from which St. Alban was led to his execution, and if my Lord Abbot has passed away, his chair has been raised to an episcopal see, and a Bishop of St. Alban's has succeeded, not indeed to the old magnificence of the Abbots, but to their church, and to its venerable associations. The use, in mediæval buildings, of the materials left by the ancient Romans, though carried to a greater scale in this than in any other building, is by no means unique. We find it in the Saxon churches of Brixworth and Dover; at Colechester we see it in the Saxon Church of the Holy Trinity and also in the Norman castle, and in the priory of St. Botolph; and every here and there where a Roman structure was at hand we see its well-burnt tiles doing duty in the existing church. I have already described what remains to our own day of the work of Abbot Paul: its stern character, majestic in its scale and proportions, but devoid of any approach to decoration. The next piece of work which we have succeeding the Early Norman, is that of the slype or leontory on the south side of the south transept. This is also Norman, of a more ornate character, with capitals exquisitely and delicately carved. The Abbey records state that this slype, as well as the Chapter House, which stood on the south of it, was built by Robert de Gorham, 18th Abbot, in the reigns of King Stephen and Henry II. He granted lands in the neighbourhood to one of his family and name, who settled there; and the place obtained the appellation of *Gorhambury*, i.e., the house and dwelling of Gorham. King Stephen was honourably entertained by this Abbot, who profited by the occasion to obtain permission to demolish all that remained of the royal place of Kingsbury, because certain of the royal servants, who gave much annoyance to the Abbot, occupied a tower towards the east, almost in the centre of the street, as a residence and refuge. This palace had been bought by Elfric, 11th Saxon

Abbot, of King Ethelred, and was all destroyed by that abbot, except the tower before-mentioned, in the reign of Canute, who would not permit all the buildings to be razed to the ground, because that some vestige might remain of the royal residence, together with the name, which still survives after the lapse of so many centuries. The position of St. Alban's Abbey on the line of the Watling-street, the great road which crossed the country from Kent to Chester, together with its convenient distance from London, gave it a special, and sometimes undesired, importance, as a resting-place for Kings and great personages travelling northward, and as a sort of outpost of the metropolis. It grew, as we know, into one of the wealthiest Benedictine houses in London, and if its resources were sometimes drawn upon after a fashion which provoked an outcry from the monks, the general hospitality of the Abbey was unbounded. Prelates from far countries, such as that Armenian Archbishop, who told to the brethren the story of "The Wandering Jew"; monks of other orders, such as those from Clugny, who at Abbot Wheathampstead's expressed desire, left with him a pattern of the habit worn by them; great lords and bishops, with their train of attendants, their horses and their dogs; and great foreign princes, who after kneeling at the Canterbury shrine, seldom failed to visit that of St. Alban, were all welcomed, and all received the lodging and the entertainment due to their several conditions. The great tower and the vast church are nowhere more impressive than when approached from the side of London, and the view from the last steep ridge over which the road passes, where the Abbey suddenly presents itself, projected against the sky beyond a wide wooded landscape is much the same (allowing for the difference between a well-kept road and a rough track through the old forest of Hertfordshire) as must have been looked on by those earlier pilgrims. Such an abbey must have been the pleasantest of hostleries. It well maintained those old Benedictine traditions of hospitality and learning which gave strength to the order in the dark days of the last century, and in our own time have preserved to it, in part, at least, its primitive cradle at Monte Cassino. The next work in point of date is the lower portion of the west end. You are all aware of the position of the great western porch, but I am confident that many here assembled were not aware that there had existed years ago two other entrances in the west front, to the north and south aisles of the nave respectively. About 150 years ago, as I believe, speaking more accurately, in the year 1722, when much repair was done to the Abbey, these porches were from some cause blocked up in the outside; the blocking material being the moulded and carved fragments of the parts of the porches themselves, nearly one half of each porch being rudely shaven down for that purpose. These three porches were begun to be erected by Abbot John de Cella in the reign of King John (about the year 1195), a prelate of more taste than worldly wisdom, who conceived the ambitious idea of rebuilding the whole western front with its flanking towers in the rich Early English architecture of the period. The historian, Matthew Paris, amusingly dwells on the misfortunes and disappointments of this over-sanguine Abbot, arising as he states "from his attending but little to that admonition of which mention is made in the Gospel, that is to say, 'He who is about to build should compute the cost lest all begin to jest at him, saying, This man began to build and was unable to finish it.'" The preceding abbot had left him the sum of 100 marks, which had been assigned and set apart for the work of the church and the western towers. He pulled down the Norman west front, and "began to bring to the spot timber, and to provide stones, not a few, with columns and planks. He assembled a number of chosen masons of whom Master Hugh Goldelif was the chief—a deceitful but clever workman—and having dug and thrown out the bottom, in a short time the 100 marks, with many more, exclusive of daily allowances, were expended, nor as yet had the wall reached the level of its foundations. It happened by the design of the said Hugh, in addition to the stealth, fraud, impertinence, and, above all, extravagance, before the average of the work had risen to the boarded shed, the abbot grew tired, weary, and timid, and the work languished. The walls were covered up for the winter; but in consequence of the tender-

ness of the stone (from the Totternhoe quarries, near Dunstable) they became fractured, and from their thinness bulged out and ruinous, together with their columns, bases, and capitals, and fell with their own weight, so that the wreck of images and flowers became the laughing-stock of beholders. The workmen therefore quitted in despair," and the chronicler significantly adds, "nor did any wages reward their labours. Howbeit the abbot, not dismayed on that account, appointed Gilbert de Everholt guardian of the work, and contributed towards it a sheaf from every acre of sown land. And this lasted from the time from which he began to give (that is to say, the third year of his prelate) through his whole life, about 17 years, and in the life of the following abbot, about 10 years; neither did that unprosperous work ever appear to increase, nor at last was his heart indulged with the fulfilment of the wish that it might be finished in the time of Abbot John, so that he grieved inconsolably." Many devices were resorted to in order to get money of which he raised "not a little," but that unfortunate work, like the sea, swallowed up all the rivers, nor as yet had a happy advancement begun. Therefore, as the work had gone on fruitlessly in past years, and Brother Gilbert de Everholt being dead, the custody of the lifeless and languishing work devolved on Brother Gilbert de Sisseverne, who had charge of the same for about 30 years, who having spent upon it the above-named supplies, scarcely in that period added more than 2ft. to its height. These porches are the very ones which are now being extensively repaired at the expense of Sir Edmund Beckett, and by the excavations we have made in the locality we find the statement of the chronicler to be true that the Norman church and towers were built to the full extent westward of the church as it now exists, and the Early English work of Abbot John de Cella and his successor Abbot Trumpington are built on the Norman foundations, slightly added to the projection of the porch buttresses. The entire re-edification of the west front, with the towers, so grandly commenced on the site of the destroyed Norman ones in the reign of King John, was not accomplished, the work being checked when it arrived at about one-third of its height in the front, and at the time of its revival a few years later, another architect, William de Trumpington, the succeeding abbot, brought to the task genius formed in a different mould. He completed a portion of the nave, *i.e.* four bays on the north side, and five on the south—a work of great magnificence, together with the west front from the pillars of the porches upwards, but not the tower, which, like those of Westminster Abbey, were left imperfect for ages. Sir Gilbert Scott remarks:—"I doubt whether there exists in England a work so perfect in art as the half-ruined western portals of St. Alban's. I venerate the architect who designed them, who I believe was John de Cella's second architect, Gilbert de Eversholt. His work is cotemporary with two others, which are as fine as almost any in existence: the western porch at Ely, and the choir of St. Hugh, at Lincoln. All of them were the works of the earliest perfected 'Early English,' after it had thrown off the square form of the Romanesque capital; and I believe it to be also cotemporary with another of the finest English works—the sanctuary of the dependent monastery of Tyne-mouth, which, however, retains the square capital. Next to this excellent work is that of Abbot William Trumpington, who, in a more economical spirit, with more of business, but less of art, carried on the work which de Cella had relinquished in despair, completing the west front, now destroyed, and finishing five bays of the nave on the south side, and four on the north, besides many other less important parts. His works are noble specimens of Early English, though without the spiritual character which marks the works of de Cella. It is most interesting to trace out the limits and the points of junction in the works of the two abbots, and to observe the remorseless way in which the man of business cut down the details of the work of his more ambitious predecessor. Columns with bases for eight shafts reduced at the capitals to four, the marble bandings prepared for the larger number but roughly altered to suit the reduction, while the marble largely used or contemplated by the one is almost wholly omitted by the other." The architects of this period indulged in the use and excelled in the

application of Purbeck marble, which was one of the best materials that could possibly be employed in the construction of designs, of which one of the leading aims was to conceal the actual solidity of the main columns by clustering around them numerous slender shafts. There are fine examples of these columns at Boxgrove Church, Sussex, a magnificent building, the execution of the repairs of which it was my pleasure to superintend under the direction of the late Sir Gilbert Scott in 1864. Strength, combined with lightness of character, was an advance in constructive science, pressed forward with a view of giving a pictorial richness of effect, an intricate play of light and shade, and a glowing variety of detail. The union just named was formed and practised with wonderful skill towards the latter end of the twelfth century, the firmness of the pillars being so dexterously masked by the arrangement of the supplementary shafts, and their merely decorative office is at first sight scarcely recognisable. John de Cella perhaps carried the invention too far, and reserved so little actual strength for the basement of his gorgeous front that the building gave way. It had evidently been the design of both Abbots de Cella and Trumpington that inside the porches at the west end of the nave a flight of steps all across the building should be placed. We have no direct evidence of their having been fixed. "Buckler" thinks they were not, but I have discovered pavement well worn with the feet at the lower level, showing conclusively that steps must have been there to get to the floor of the nave. It is part of Sir E. Beckett's plan to restore these steps in their entirety, which will certainly add much to the dignity of the western entrance. I believe the alteration to the higher level was made in the 15th century by Abbot Whathamstead, who cut off the bottom rail of the present great western doors to suit his new arrangement. Abbot Trumpington also inserted Early English windows, since altered, in the north aisle of the nave, and also two fine windows in the south transept, which, in 1873 I opened and repaired after their having been blocked with rubble walling for centuries. The same abbot also inserted the beautiful windows (of course I speak of stonework only) in the south aisle of the choir, and it is curious to observe the effective adaptation of his pointed inner arches to the semi-circular Norman groining. He also raised a lofty lantern on the tower, and I infer from a sketch which the late Sir Gilbert Scott left at his death, that he would have reinstated this lantern had funds sufficient been provided. It was during the rule of the succeeding Abbot, John de Hertford, that it was found necessary to repair, or rebuild the east end of the church. For this purpose, in 1256, the whole of the eastern apse from the chord of the arc was pulled down, and in its place a lofty building erected with a square end—in fact, as we see it now to the eastern wall of the Saints' Chapel, in which the shrine of St. Alban's stands. Henry III. had just completed the Chapter House at Westminster, in which the principle of traceried windows had been carried out to a perfect ideal, and we cannot suppose that the first in rank among English abbeys should fall short in advancement of style of the second Abbey, only some 20 miles distant. Accordingly we find the work of John de Hertford and his immediate successors to be among the finest productions of the period. The re-constructors of these eastern portions of the Abbey seem to have commenced, not only the sanctuary of the church with the chapel which contained the shrine of St. Alban, but also the chapel east of it (through which there was a public way for three centuries prior to 1878), in which was placed the shrine of St. Amphibalus, the proto-martyr's friend, with the chapels on either side of it, and yet further eastward they commenced the Lady-chapel itself, though its completion was left to a later date. These were never perfected according to their original design, but what was done was as perfect in art as anything which its age produced. Its window tracery is carried to a high state of perfection. Its style carries us on to the last decade of the 13th century, agreeing in character with the Eleanor crosses, one of which was erected near to where the clock-tower now stands in St. Alban's. This cross was taken down in 1702. The body of Eleanor, Queen of Edward I., rested at St. Alban's in progress from Herdeby near Lincoln, where she died, to Westminster. In the year 1201 Abbot Reger

de Norton died, and his body was buried in front of the high altar, and his heart was interred in the front of the altar of St. Mary of the Four Tapers in the antechapel alluded to. In excavating during the recent repairs we found the little stone sepulchre, cylindrical in form, which contained the Abbot's heart. The sepulchre with its stone cover remains *in situ*, but in the glass case which I now produce are the fragile remains of a cover of a wooden box which contained the heart. That distinguished scholar, Sir Henry Rawlinson, on examining the inscription on the cover pronounced it to be of Kufic character, and that the word "God" was distinguishable. It is presumed that this box was a precious relic brought from the East by one who had returned from the Crusades. John de Berkhausted succeeded Roger de Norton as Abbot in 1291, and ruled until 1302. His body is buried in the presbytery under a large Purbeck slab which has an incised inscription in Norman-French. The succeeding Abbot was John de Marins, who ruled from 1302 to 1308. During his rule the magnificent marble shrine was constructed, the restored remains of which now stand on their original site in the Saints' Chapel. In his time when King Edward II. visited the Abbey, the Abbot caused the tomb and feretory of St. Alban to be removed from the place where it stood temporarily, for repairs to the church; and the marble tomb or shrine which we now see to be constructed, at a cost of 820 marks. The Lady-chapel appears again to have engaged the attention of the builder, for Abbot Hugh de Eversden, who ruled from 1308 to 1326 is said to have recommenced the work and carried it to completion. It was also during this abbacy that a great catastrophe befell the nave. In the year 1323, one day during the time of the celebration of divine services, two of the Norman piers on the south side, supporting the roof, fell with a great crash, and within an hour the roof for a length of nearly 100ft. had fallen in, and the cloisters built against the south wall shared the same fate. The work of rebuilding this portion was soon commenced, and we find that the whole was reinstated at the expiration of ten years from the time of the catastrophe. Great as must have been the havoc effected, there is compensation to us who live in these times, at least, from the fact that the re-erection of the fallen building has left to us one of the most magnificent pieces of Decorated architecture to be found in this or any other country. Five bays were rebuilt, a worthy monument to those whose exquisite taste enabled them to design so grand a structure. It is very singular that these Decorated piers which support the work of Abbot Hugh have been the first of their kind to show signs of fracture. During the past year Sir E. Beckett has caused them to be repaired at a great expense. Their failure arose from the circumstance of small stones having been used in their construction, thereby giving them no proper bond. In fact, not one stone passed absolutely through the pier or was tied to its opposite neighbour. The clunch or Tottenhoe stone is a casing only, filled with flint and rubble concrete. This has been remedied as far as practicable. Another cause of failure arose from interments having taken place between the piers, such interments necessitating on the part of the sexton the removal of all the foundations from pier to pier. With the enormous weight above it, it is a matter of surprise that a second catastrophe had not happened. Abbot Hugh was twice besieged in his abbey by the townsmen on the question of rights and privileges. They desired to be acknowledged to the king rather than to an inferior lord. His successor, the Abbot being obliged to submit to the King's writ, commanding the Abbot to place all the liberties, privileges, &c., of the same establishment as recorded in Domesday Book. During, however, the rule of the successor Abbot, Richard de Waddington, who was popular with the townsmen, surrounded their royal charter, returned all the privileges of the town, and proved that it might be considered that the Abbot Waddington was too much inclined to the town and in astronomy. His successor, Abbot de Waddington, which was the first of the south transept. The old charter of Henry VIII., speaks of the church as being in his time, and noted the decay of the church and the ruin of the walls and flow of the tide. I believe that some portions of this church are now in existence in St. Alban's. Michael de Montaigne, 20th

Abbot, repaired the cloister which had been destroyed in 1323. The remains of such so-called repairs, which amounted to reconstruction, may now be seen against the south wall of the Abbey, affording a good idea of the perfection of the Decorated work of the period. Edmund of Langley, fifth son of Edward III., born at King's Langley, was afterwards baptised by this Abbot in the royal palace there, 5th June, 1341. Philippa, the Queen, went over to St. Alban's Abbey to be churched, and her offering was a cloth of gold. Abbot Thomas de la Mare ruled from 1349 to 1396, and was a remarkable man in his time. He rebuilt the Abbey gateway, which is the building now standing, with its chambers, prisons, and dungeons. When I had charge of the repairs of this gateway in 1870, the workmen opened the crown of an arch in the north part of the building, which disclosed one of these dungeons in size about 10ft. square and 2ft. deep in the earth. In olden times this hole was approached only from the floor above, thereby making the depth some 40ft.; telling a tale of the habits and customs of our forefathers in the good old times. This abbot was in high favour with Edward III., and when Edward the Black Prince had won the battle of Poitiers in 1356, and had taken the French King, John, prisoner, the captive monarch was for a time resident in the Monastery of St. Alban's in custody of the Abbot. There is also a tradition that the King was lodged for a time at the hostelry known as the Fleur de Lis, now standing in French-row, near the Clock Tower. In the year 1381, the 4th of Richard II., the insurgents under Wat Tyler and Jack Straw threatened destruction to the Abbey. They forced the great gates and extorted charters from the Abbots. The remains of these gates are now deposited in the Abbey slype. After the insurrection, the King came in person to St. Alban's with his chief justice, by whom fifteen of the leading rioters were condemned to death, and hung outside the Abbey Gateway. The beautiful engraved brass to the memory of this Abbot, which is now placed for preservation in what is known as Abbot Wheat-hampstead's chantry, was evidently wrought during his lifetime, for a space is left for the date of his death, which has never been filled up. When I happened to be at Lübeck, in North Germany, in 1876, I saw in the Dom Kirche there, a brass, twice the size of this one of Abbot de la Mare, and after examination I became convinced that the same hand which engraved the brass in our Abbey had also executed the one then before me. I communicated with Sir Gilbert Scott in England, and he informed me that he had ascertained the artist had been lent from Bruges to execute the work, both at St. Alban's and at Lübeck. I brought home some careful engravings of this latter brass, and in comparing them with this at St. Alban's there could be no question that the information as to the artist which Sir Gilbert had received was correct. The succeeding abbot, John de la Morte, had a severe contest with the Abbot of Westminster as to his priority of seat in Parliament, and it is recorded that on one occasion, finding the latter had taken the place of honour before his arrival, he deliberately sat down in his rival's lap, thereby asserting his prior right.

TEWKESBURY ABBEY.

AT a meeting of the Restoration Committee of Tewkesbury Abbey on the 9th inst., Sir E. A. H. Lechmere, M.P., in the chair, the chairman having called attention to the allegations contained in recent letters to *The Times* as to the supposed intention of the committee to remove the present west window, it was decided to publish what had passed at meetings held in January and March last, as the best means of showing the groundlessness of these allegations, and at the same time of allaying any anxiety which might be felt by those really interested in the preservation of this well-known feature of the abbey. At the first meeting it was resolved:—

"That there being conflicting opinions on the part of the architect and members of the committee with respect to the restoration of the west front, the further consideration of the same be postponed until an opportunity arises for the architect and the committee to have a personal conference."

"Mr. Scott having attended the second meeting in March and advised the committee to confine their efforts to getting good glass, which was greatly wanted inside, and which would redeem the defects in the tracery, the committee resolved to be guided by the advice of Mr. Scott."

"While giving publicity to the only decision of the committee in reference to this particular matter, the committee desire to record their conviction that, instead of 'irremediable damage having been done by the present restorers,' as has been alleged, not only have all historical features of the building been carefully preserved, but many details of architectural and antiquarian interest brought to light during the progress of the work, which, but for the restoration, would have been unknown and undiscovered."

THE CHURCH OF ST. JOHN THE BAPTIST, BERKSWELL.

ON December 21, Mr. J. A. Cossins read a paper to the members of the archaeological section of the Birmingham and Midland Institute, on the Church of St. John the Baptist, at Berkswell. Mr. Cossins said it appeared to be probable that the present fabric of the church, though dating from the twelfth century, stood on or near the site of a much older oratory, or chapel. The known facts of early Christian settlements lent some support to this view, and the fact of the church having a crypt was of itself a strong indication of an earlier building, as there were reasons for believing that, except there was some structural motive for a crypt, they were very rarely built after the eleventh century, unless an earlier crypt had previously existed on the spot. He had formed the opinion that the tank at Berkswell was an ancient holy well, and that a chapel or oratory stood near it; and further, that the present church stands on the original site, the presence of the crypt adding much to the probability. The church was very interesting, and possessed some unusual features. The plan was the very ordinary one of a chancel, nave, north and south aisles—the north aisle having been prolonged beyond the nave to the east, probably to form a chantry chapel. There was a low square tower at the west end, which, though dating from the seventeenth century, was in its proportions and the great thickness of its walls more like a tower of the Norman period. There was a picturesque wooden south porch with a room over it, and underneath the chancel and a part of the nave a remarkably interesting, and, in some respects, singular Norman crypt. It consisted of two parts—an octagon under the nave communicating by a very fine arch with an oblong under the chancel. He had thought that the octagon part of the crypt had been an ancient baptistery. The circular or octagon plan seemed to have been a favourite one for such a structure; and if the well had been for a long time an object of reverence and perhaps of emulment, it would be natural to suppose that after open-air celebrations had ceased to be customary, they would endeavour to connect the venerated associations of the ancient well with the church. He could find no evidence in support of this conjecture. The crypt was now used as the family vault for the Eardley Wilmot family, and the north side was fitted up with slate shelves like a wine cellar, on which about a dozen coffins rested. The other remaining Norman portions of the building were the chancel and the north arcade, the south door and some small fragments of the walls of the nave. The chancel was an extremely interesting example, the half-columns serving as buttresses. Mr. Cossins exhibited an old engraving from the *Gentleman's Magazine* of 1824, showing the appearance of the church before the chancel was restored. It was apparent from this that there was a window of three lights at that time in the south side. The window now there was a modern one, but accurately copied from the old ones. The proportions of the chancel were good, and the corbel table effective, the corbels being curiously-cut grotesque heads. The openings of the eastern triplet formed an arcade in the interior. The arches were all plain throughout the church, and the capitals mostly of the scalloped kind. Those of the eastern window were carved with stiff conventional foliage, and the terminals of the labels were grotesque heads, and formed a

very good and characteristic example. The chancel-arch was plain, with a bold shaft carrying the inner order of the arch and a smaller nook shaft on the western side. The capitals had been renewed or restored, but there was no doubt of their having been scalloped like the present ones. It was probable that the church at the end of the Norman period consisted only of a chancel, nave, and north aisle of two bays; but the plan was puzzling, and the history of its successive alterations and transformations difficult to read. He considered the time of the building of the Norman parts of the church to have been during the last twenty years of Henry I., or perhaps early in the reign of Stephen, and whilst the manor was in the possession of Ralph de Mandeville. It having been given to him about that time by Henry de Newbrough, the Earl of Warwick, it was probable that he would be disposed to be liberal under the circumstances, and might have rebuilt the parish-church. Ralph was succeeded by Nigel de Amundeville, who, Dugdale believed, had his seat at Berkswell. It was likely enough that Nigel might have rebuilt the chancel and eastern part of the crypt during his residence at Berkswell. This was mere conjecture; but it was, he thought, nearly certain that the whole of the Norman parts of the church were built in the time of Ralph and Nigel. Another feature of the church in point of date was the small triplet window at the west end of the north aisle. This was very likely added in the 13th century or 14th century, possibly about 1320 or 1330. The aisle appeared to have been re-roofed about 100 years later, as the corbels to carry the principals were of the 15th century. The present roof was modern. The north aisle was of the latter part of the 15th century, and was built on a part of the foundations of the original Norman north wall. Mr. Cossins went on to refer to the peal of bells, observing that it was seldom that they found all the bells of a peal so old as those at Berkswell. There used to be in the church an oak pulpit of the 15th century, and it was much to be regretted that it had been removed and destroyed. Mr. Cossins, in conclusion, read extracts from some of the old records of the church.

The chairman, in moving a vote of thanks to Mr. Cossins for his paper, said that that gentleman had given a new interest to a church with which most of the members were more or less familiar. Mr. Cossins's paper was unrivalled in interest, unsurpassed in novelty, and would form a valuable part of the society's records.

METROPOLITAN BOARD OF WORKS.

THE weekly meeting of this board was held on Friday last, Sir J. M. Hogg, M.P., in the chair. A very numerous deputation representing the timber trade in London attended to present a memorial against the 18th clause of the proposed Amendment Bill of the board—a clause providing that no stacks of timber of wood on a timber stage more than 25ft. high shall be erected within 30ft. of any highway without the written consent of the board. Mr. A. W. Pratt, the spokesman of the deputation, declared that no accidents or injuries had yet occurred from such stacks of wood, and that the proposed clause would necessitate the removal of the trade to the outskirts of the metropolis, and would inflict much injury, not only on manufacturers, but also on artisans. The memorial was referred to the works committee.

It was agreed to lend the guardians of St. Marylebone £1,000 for works at the Southall Schools, and £4,500 for the purchase of a plot of land in Ruckham-street, facing the new workhouse infirmary.

The works committee recommended that a proposal by the Plumstead district board—for the draining of the southern portion of the parish of Eltham into the main sewer of the West Kent sewerage board in lieu of into the board's southern outfall sewer—be adopted. Sir Joseph Bazalgette, the engineer to the board, explained that this would be the more convenient and cheaper course to pursue, as the land lay very low, and was nearer to the West Kent sewer than to the board's; but objection being raised to the size of the connecting-pipes, the matter was referred back. The same committee was instructed to consider the whole question of extending the area of the board's jurisdiction. It was agreed to contribute one-half the cost,

estimated at £2,131, of an improvement in Little Chapel-street by the Westminster district board, and a similar proportion of the cost, estimated at £1,650, of a further widening of Pear-street about to be carried out by the same board.

The Building Act committee reported that they had considered a letter from Mr. Robert Walker, district surveyor of St. Martin-in-the-Fields and St. Anne, Soho, requesting the board to hold a formal inquiry with respect to certain points in connection with reports he has officially made relative to the Royal Comedy Theatre, Pantion-street, Haymarket, and the Avenue Theatre, Northumberland-avenue, and inclosing drawings showing the construction of portions of the Avenue Theatre, and copies of correspondence with the superintending architect on the subject; and, after hearing the statements of the district surveyor, the superintending architect and the assisting architect, they had arrived at the following conclusions:—

(a) That the committee regret that the examination of the Avenue Theatre by the assistant architect, on behalf of the superintending architect, on the 26th November last, was not more carefully made, and under more favourable circumstances; and the committee also regret to find that in some few particulars the statements contained in the letter of the superintending architect to the lessee of the theatre, dated 1st December instant, have required modification. (b) That, in the opinion of the committee, the district surveyor committed an indiscretion in writing to the superintending architect the letter dated the 20th November last; and that the district surveyor ought not to interfere between lessor and lessee in any case in the manner in which he did; and (c) that the committee regret the publication by the district surveyor of his letter of the 9th December instant, addressed to the superintending architect, before the board had an opportunity of inquiring into the facts; and are of opinion that this was a great impropriety on the part of the district surveyor.

And recommended that the clerk be instructed to communicate the foregoing resolutions to the district surveyor.

Mr. Deputy Saunders moved the adoption of the report. Mr. Jones complained that the committee should censure the district surveyor, an officer who simply defended himself when his conduct was unjustly impeached. Mr. G. B. Richardson strongly condemned the conduct of the district surveyor, and declared that his conduct must be characterised as unprofessional and most ungentlemanly. Mr. Freeman thought Mr. Walker was deserving of some of the censure pronounced upon him in this report; but the board should bear in mind that that which provoked him was the report of their own officer, which had turned out to be inaccurate and altogether incorrect. Mr. Fell concurred in this, adding that it took the officer only a quarter of an hour to examine the theatre in question, and to decide as to the safety of the public in respect to it. Mr. Selway said Mr. Freeman had done an officer of the board a great injustice, for that official had simply to see that the rules of the board in regard to theatres were complied with, and such an investigation could be completed in a very short time. Mr. Deputy Saunders, in replying, said that the error of the officer of the board, if it was an error, consisted in showing too great a regard for the public safety; and the report was approved.

SHORTNESS OF LIFE AMONG ARCHITECTS.

IT is only a short time ago, remarks the *Saturday Review*, that any one conversant with the artistic politics of the day would, if asked to name the architects who had in the course of the competitions, official or unofficial, which were at that time in higher favour than they have since become, taken the foremost position as competitors, if not as combatants, have undoubtedly put in the front line Digby Wyatt, Scott, Edward Barry, Burgess, Street, to name them in the order of their departure. Now all of these are dead, Scott only just an old man, and the rest in middle age. Every one of the men, in fact, over whom any real battle at that time raged has, with the exception of Mr. Waterhouse, left the scene. The *Times* attempted to sketch, with a keener eye to faults than merits, the difference between the old and the new taste in architecture by pairing off Mr. Street with Mr. D. C. Burton, who had died a few days before, aged eighty-one. The comparison might have been more telling if it had included a third architect, who died on the very day before Mr. Street, and who was, although a year older than Mr. Burton, rather the first of the new than the last of the old school.

More than forty years ago, when prominent men of the Gothic school who have since been famous and died were still unheard of, Anthony Salvin seemed destined to lead the revived school of Mediæval art. But he was rather tepid in the important matter of ecclesiastical architecture, and so, while making proof of his mastery of castellated construction at the Tower, at Windsor, at Alnwick, and in his own modern castle of Peckforton, as well as of considerable taste in country-houses, he practically became an outsider in the animated conflict of styles which has filled up the intermediate years.

There is never an effect without some cause, and it is better to seek what explanation can be given for the remarkable shortness of life among conspicuous architects than idly to lament the losses. No doubt, as the phrase goes, it is the pace which kills; but there is something more than the mere speed to account for the dangers and the casualties of the architectural race. The nature of the broken country which has to be crossed tells against safety as much as the mere speed. Some men kill themselves by over-devotion to an art, and others by over-devotion to a profession. But it is the hard and peculiar fate of an architect to be following both an art and a profession. His education in composition matches with that of a painter in painting. His education in construction matches with that of an engineer in engineering. Once he is in practice, the thought needful to marry beauty with utility in his designs is only the beginning of troubles. He has to settle his accounts with employers, who may be stingy and overreaching, exacting and capricious, ignorant and prejudiced, vain and half-instructed, with contractors too often incompetent, dishonest, or insolvent, with workmen too stupid to understand and too obstinate to obey. Add to this the wear and tear of railways, the severities of weather, and it will be seen that the career of a successful architect is one which tells with unusual severity on the human frame. Yet there is no remedy which could be thought of which would not be worse than the disease. To separate the professions of artistic and of constructive architect would be to extend and to perpetuate a system which has already, in the hands of speculative builders, worked so much woful mischief to the national taste.

BOOKS RECEIVED.

Album of Decorative Figures, by J. MOYR SMITH (London: Sampson Low and Co.), is a varied collection containing subjects to suit all tastes. We like best some of the tile-decoration subjects and some of the more ambitious subjects least. The frontispiece—"The Summer of Civilization"—intended to represent Hellas in its prime, seems to us alike unsatisfactory in conception and execution, though the last-named defect may be due to the process by means of which it is reproduced. The few Scriptural subjects in the book do not seem to us at all suitably rendered. The best of the larger illustrations is the double page representing "Terpander Singing in Lesbos," a composition fairly full of life and spirit, and in which the accessories of costume, &c., seem to have been fully studied.—*Practical Geometry for Art Students*, by JOHN CARROLL (London: Burns and Oates), is the second edition of a cheap and simple course of lessons on the construction of plane figures and scales, pattern-drawing, geometrical tracing, and elementary solid geometry, adapted to the second-grade art syllabus of the Science and Art Department.—*The Garden Oracle*, by SHIRLEY HIBBERD (London: *Gardener's Magazine* office), has reached its 24th annual issue.

An inquiry was held at Barton-on-Trent on Thursday week before Mr. Arnold Taylor, an inspector of the Local Government Board, respecting an application from the town council for sanction to borrow £21,600 for market-hall, gas-works and street improvements. The inspector expressed a doubt as to whether the market-hall would be found large enough for the wants of the rapidly-growing town.

Another section of the South London Tramways system, about 1½ miles in length, was opened on Monday. It extends from Chelsea Suspension-bridge, via Victoria-road and Queen's-road, Battersea to Lavender-hill.

CONTENTS.

The Past Year	869
The New Act on Conveyancing	870
Fires in Public Buildings	871
The Water Question.—XXIII.	872
Life and Works of Michel Angelo	873
The Water Supply of England and Wales	875
St. Alban's Abbey	876
Tewkesbury Abbey	878
The Church of St. John the Baptist, Berkswell	878
Metropolitan Board of Works	879
Shortness of Life among Architects	879
Books Received	880
Our Lithographic Illustrations	881
Competitions	881
The City Churches	880
Architectural and Archaeological Societies	880
Funeral of Mr. G. E. Street, R.A.	883
The late Mr. Anthony Salvin	883
Edinburgh Architectural Association	883
Practical Notes on Plumbing.—XXIII.	883
Hints on Home Sanitation	883
Notes from Edinburgh	888
The Health of Navies	888
Clips	888
Building Intelligence	888
To Correspondents	888
Correspondence	888
Intercommunication	888
Legal Intelligence	888
Water Supply and Sanitary Matters	888
Our Office Table	888
Meetings for the Ensuing Week	888
Tenders	888

ILLUSTRATIONS.

GAYTON MANOR HOUSE, NORTHAMPTONSHIRE.—(LIMITED DATE OF MILET FOR THE MIDLAND COUNTIES ART MUSEUM.)
—POLESWORTH VILLA & E.—HOUSE AT EWHURST.
—MURAL TILES FROM GREAT AND LITTLE MALVERN A BAY.
—NEW CONVENT AND CHURCH AT DUMFRIES.

OUR LITHOGRAPHIC ILLUSTRATIONS.

GAYTON MANOR HOUSE.

A SMALL view of this house is given in Baker's "History of Northamptonshire," published in 1812, but the only information afforded is, that it was "built in the time of Elizabeth or James," that it stands at the north end of the village, and that it has now become a farmhouse. The walls are built of a beautiful grey stone, common in the locality; and the fact that so many of the windows are bricked up, rather adds to, than detracts from, the beauty of the building, the red and orange of the brickwork forming a most pleasing contrast with the grey of the stone. The building at present appears to have escaped almost entirely from the hands of the modern workman. Right in front of the house stands the village-church, a most interesting structure, containing several fine tombs and some good woodwork. I believe this is now being restored by a clever local architect, who, it is to be hoped, will refrain from doing more than is absolutely necessary for putting the fine old place into an efficient state of repair, many of the churches in the neighbourhood having suffered deplorably from over-restoration.—ED. W. MOUNTFORD.

DESIGN FOR A CERTIFICATE OF MERIT.

THIS design was placed first and adopted in a competition originated by the Committee of the Midland Counties Art Museum, Nottingham Castle, some months ago. The certificate itself is intended to be awarded to successful picture exhibitors at the autumn and other exhibitions held annually at this building. The conditions require that the drawings should be prepared in pen and ink, and that the design should have represented in it the Castle Museum itself. The author of the design is Mr. Arthur Marshall, architect, Cauldon-place, Long-row, Nottingham.

POLESWORTH VILLAGE HOUSE.

ADJOINING the parish-church of Polesworth there were, many years ago, a group of buildings, a portion of which had been used for religious purposes, the other part being in use as a manor-house, the walls of the principal rooms were lined with oak paneling. The site and buildings having been given to the parish, a vicarage-house was built on the site of the old manor, a portion of the ancient walls and all the oak paneling being preserved. The site of the old library or parsonage, which was formerly the refectory, has been preserved, and also the old stone chimney in the room. The manor-house was destroyed a few years ago by the late Mr. G. E. Street, R.A.

HOUSE AT EWHURST.

THIS house is to be built at Ewhurst, in charming country, near Cranleigh, in Surrey. The principal aspects are south and west, with views over Sussex to the sea. The external walls will be built hollow, of local stone of a brownish colour, with brick lining, the roof covered with tiles and chimney-shafts of red brick. Special instructions were given for the battlements and low roofs which have been employed. The internal joinery will be of oak, felled on the estate for the purpose. The billiard-room is over the kitchens and heated by hot water therefrom. The illustration is from a drawing in the last Royal Academy Exhibition.

MURAL TILES FROM GREAT AND LITTLE MALVERN ABBEY CHURCHES.

AMONG the very many valuable remains existing at Great Malvern of Medieval tiles, those illustrated by one of our lithographic pages to-day may be taken as good typical examples. Those shown *in situ* are from the reredos screen on the north side of the high altar. The colours are built on a dark background, softened and toned; the mellow character of which is necessarily lost in a black and white reproduction. The spirit of the drawing is worthy of remark, specially in the heraldic figures of the shields. Fig. C is a large tile from the sacristy of Little Malvern Church. Fig. D is a copy of an old Dutch tile in blue, and the remaining Figs. E and F are from France.—M. B. A.

NEW CATHOLIC CHURCH AND CONVENT, DUMFRIES.

THIS building, now in course of erection, is being built for the nuns of the Perpetual Adoration, at the cost of the dowager Lady Herries. It is situated on the top of Corbelly-Hill, Maxwell Town, Dumfries. The site is a most beautiful one, being the highest point in the neighbourhood, and commands a view of the country for many miles. It is built with the local stone, the dressings being polished and the facings rock-faced. The colour of the stone harmonises well with the surrounding scenery. The whole of the church, but only a portion of the convent, is now being built. It has been designed and is being carried out under the superintendence of Messrs. Pugin and Pugin, of Westminster. The contractor is Mr. John Dowlin, of Glasgow; Mr. Ely is the clerk of works. The illustration we give was in the Royal Academy, but in colour.

IN our sheet, published last week, of sepulchral monuments, by Messrs. Brindley and Weatherley, our lithographer omitted the title of the well-known incised slab of "lairs" stone, which we illustrated from Châlons sur Marne, France. Its date is about 1338. The other two examples shown were from Italy.

COMPETITIONS.

WEST KENINGTON CONGREGATIONAL CHURCH.—Messrs. J. Cubitt and J. M. Brydon's design has been selected in limited competition. A thousand sittings are provided in a nave with unusually wide bays and with little obstruction to sight. There are a central tower and shallow transepts. Schools, class-rooms, and a lecture-hall are also provided for on the site.

A new Primitive Methodist chapel was opened on Christmas Day in Station-street, Newport, Mon. It is built of hewn local stone, with Bath stone dressings and measures 63ft. by 57ft. A gallery surrounds three sides of the building; the roof is octagonal and open, and is constructed of pitch-pine; the seats and rostrum are of the same wood. The chapel is seated for 520 persons, and beneath it is a school-room for 120 children. Messrs. Habershon and Fawcner, of Newport, are the architects; and Mr. John Linton, of the same town, is the builder. The cost has been about £5,000.

The railway-station at York, the largest provincial station in England, is being repainted and decorated; the ironwork in two shades of Woolston's Torbay blue, and the woodwork in white, with vermilion line round the panels. The contract has been taken by Messrs. Adams, Robertson, and Sons, of Alwick and Newcastle-on-Tyne, and Mr. Frank Plenty has inspected the work under the superintendence of Mr. Coppertwaite, the North-Eastern Railway Company's engineer.

THE CITY CHURCHES.

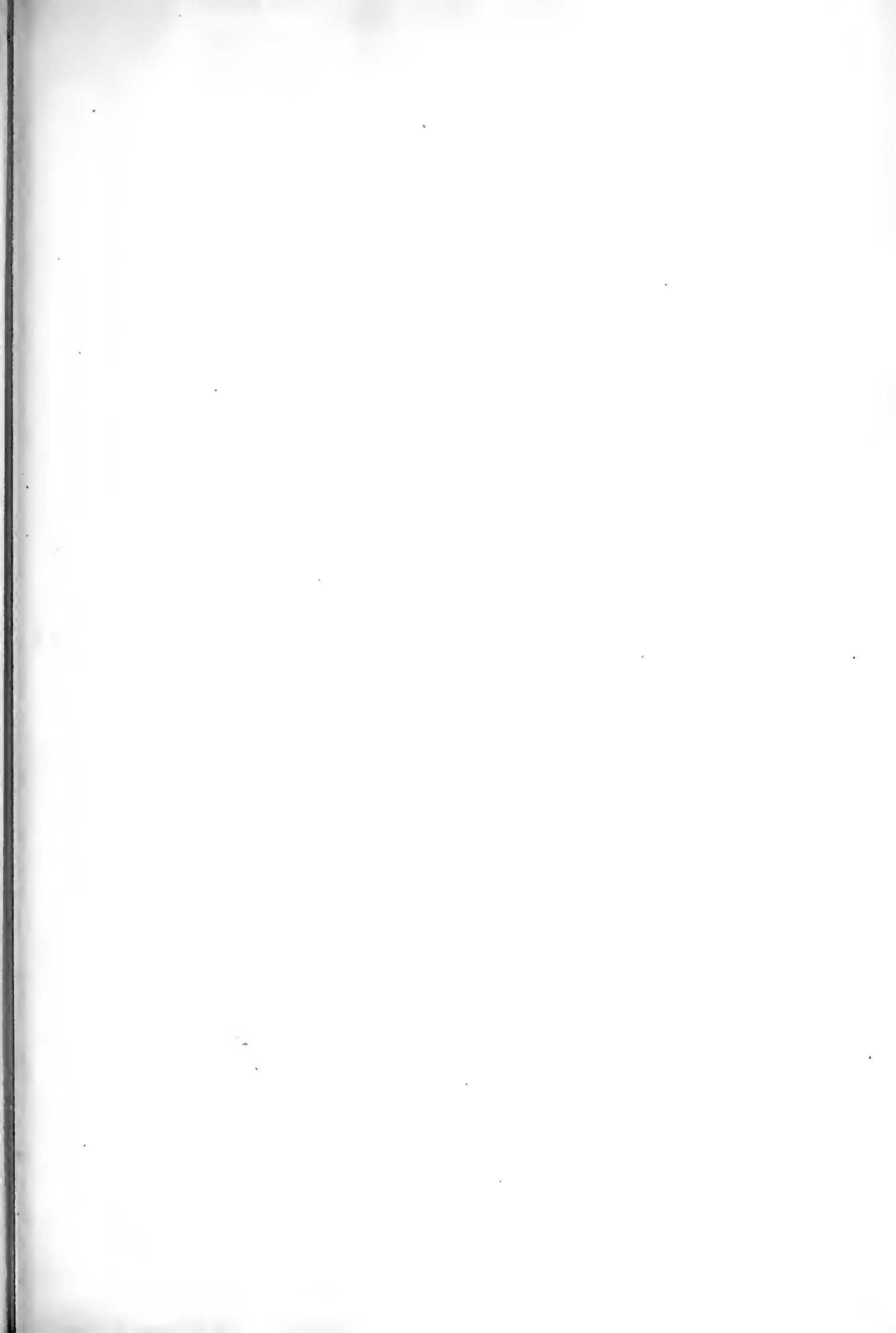
THE following account of the cost of the fifty churches built in London by Sir Christopher Wren is taken from the *Gentleman's Magazine* of July, 1734:—

	£	s.	d.
St. Paul's	736,752	2	3½
Alhallowes the Great	5,641	9	9
Alhallowes, Bread-street	3,348	7	2
Alhallowes, Lombard-street	8,058	15	10
St. Alban's, Wood street	3,165	0	8
St. Anne and Agnes	2,445	0	10
St. Andrew's, Wardrobe	7,060	16	11
St. Andrew's, Holborn	9,000	0	0
St. Antholin's	5,685	5	10½
St. Austin's	3,145	3	10
St. Benet, Gracechurch-street	3,583	9	5½
St. Benet, Paul's-wharf	3,328	18	10
St. Benet Fink	4,429	16	10
St. Bride's	11,439	5	11
St. Bartholomew's	5,077	1	1
Christ Church	11,777	9	6
St. Clement, Eastcheap	4,395	3	4½
St. Clement Danes	5,786	17	0½
St. Dionis Back Church	5,737	10	0
St. Edmund the King	5,207	11	0
St. George, Botolph-lane	4,509	4	10
St. James, Garlick-hill	5,357	12	10
St. James's, Westminster	5,500	0	0
St. Lawrence, Jewry	11,870	1	9
St. Michael, Basinghall	2,822	17	1
St. Michael, Royal	7,455	7	9
St. Michael, Queenhithe	4,354	3	8
St. Michael, Wood-street	2,554	2	11
St. Michael, Crooked-lane	4,541	5	11
St. Michael, Cornhill	4,686	5	11
St. Martin, Ludgate	5,377	18	8
St. Matthew, Friday-street	2,301	8	2
St. Margaret, Pattens	4,986	10	4
St. Margaret, Lothbury	5,340	8	1
St. Mary, Abchurch	4,922	2	4½
St. Mary Magdalen	4,291	12	9½
St. Mary, Somerset	6,579	18	11
St. Mary at Hill	3,980	12	3
St. Mary, Aldermanbury	5,237	3	6
St. Mary-le-Bow	8,171	18	9
St. Mary-le-Steeples	7,388	8	7½
St. Magnus, London Bridge	9,579	19	10
St. Mildred, Bread street	3,705	13	6½
St. Mildred, Poultry	4,654	9	7½
St. Nicholas, Cole Abbey	5,042	6	11
St. Olave, Jewry	5,580	4	10
St. Peter's, Cornhill	5,617	8	2
St. Swithin's, Cannon street	4,687	4	6
St. Stephen, Walbrook	7,652	13	8
St. Stephen, Coleman-street	4,020	16	6
St. Vedast's, Foster lane	1,553	15	6

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

MANCHESTER SOCIETY OF ARCHITECTS.—The annual report of this society, which has been issued, contains an expression of regret on the part of the council that the responses of students in connection with competitions for which valuable prizes were offered, even with an extended allowance of time, were very far from reaching the standard desired. The council, however, are unwilling to come to the conclusion that the small number of students who come forward is in consequence of indifference or want of interest in the profession. They have decided to continue the prizes for the present session, and to leave the choice of subjects in the hands of the students themselves, in the hope that by so doing many may be induced to compete who would not otherwise do so. The council again arranged to give a prize to the students of the Building Trades Institute, and the response was very satisfactory. The council considers that, so far as the students themselves and their work are concerned, the money devoted to prizes by the Institute is well spent, and it has pleasure in recommending that they be continued. Referring to a paper read by the president of the society (Mr. J. Medland Taylor) at a conference of architects in London, in May last, upon the important question of quantities, the committee stated that opinions differed as to whether an architect should himself take out the quantities for his own works, or should delegate that part of the work to an independent surveyor, and until the question was settled the Council considered that each architect should act upon his own judgment as to what is best for the interest of his clients. The Council recommended (and it was now required under the by-laws of the Royal Institute of British Architects) that quantities, if taken out by the architect, should be so done with the full concurrence of the client, to whom the question of quantities should be properly explained, and that the payment of such services should be made direct by the client, and not as heretofore through the builders.

Mr. A. Holt has been elected first borough surveyor of Lewes, at a salary of £200 a year.



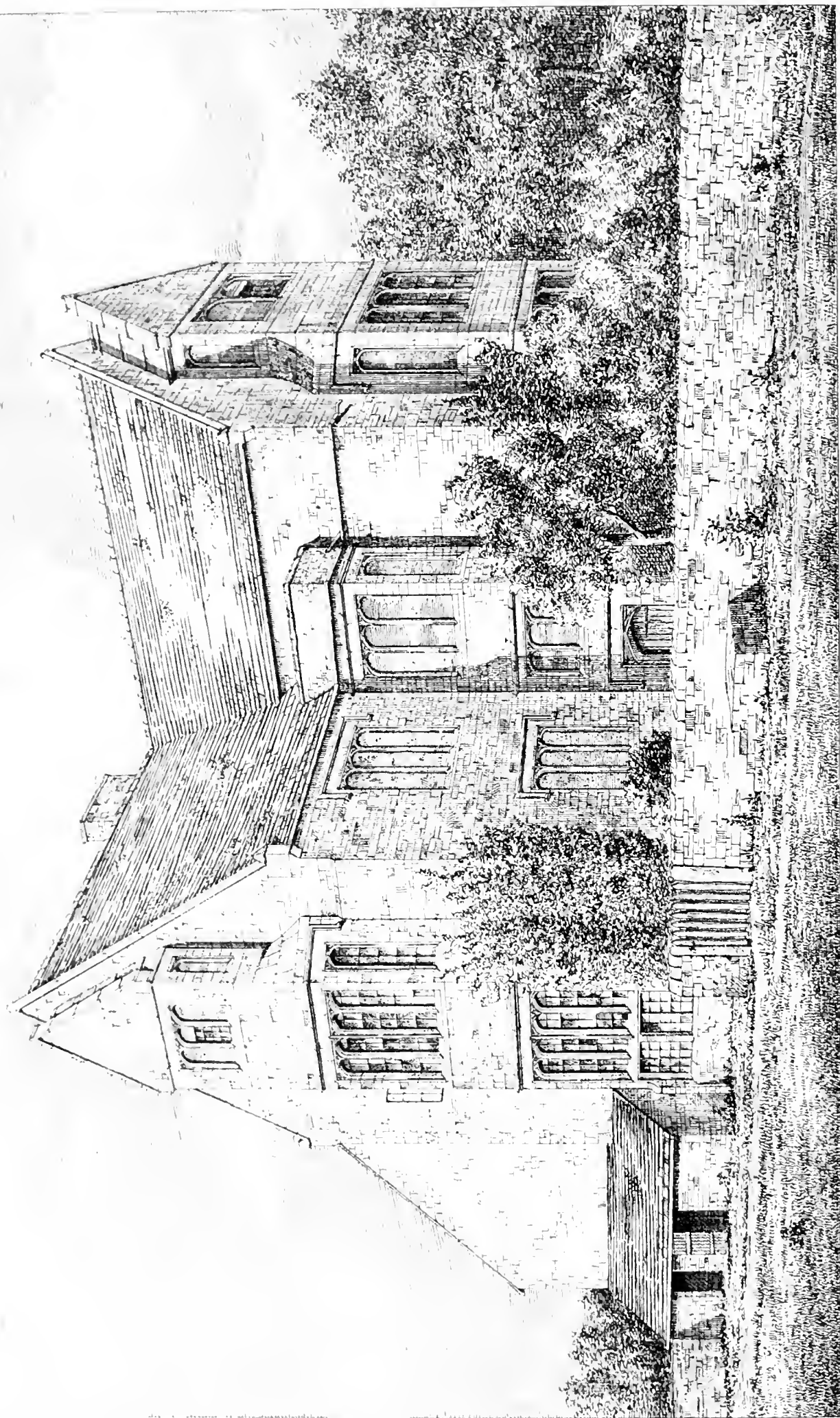
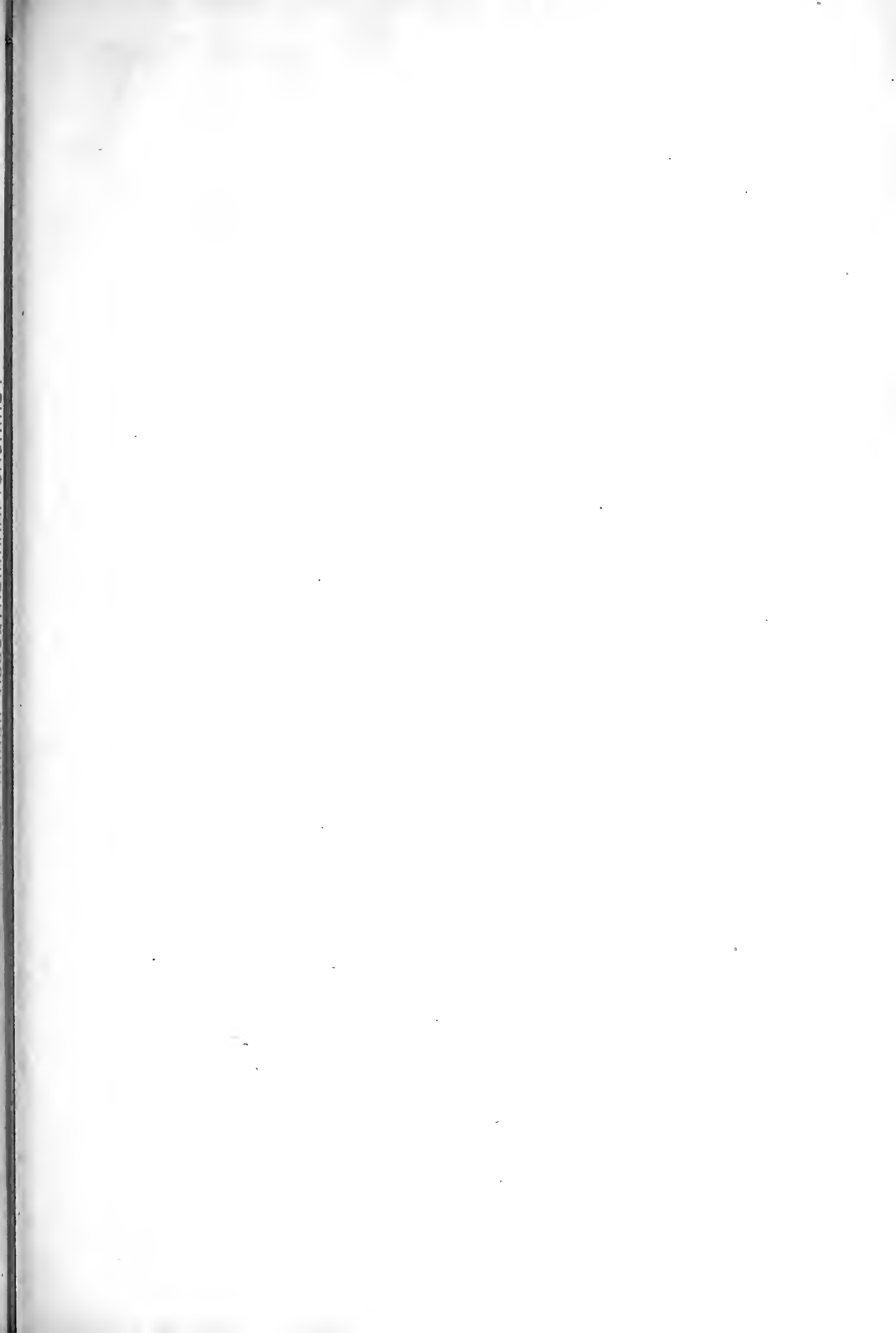
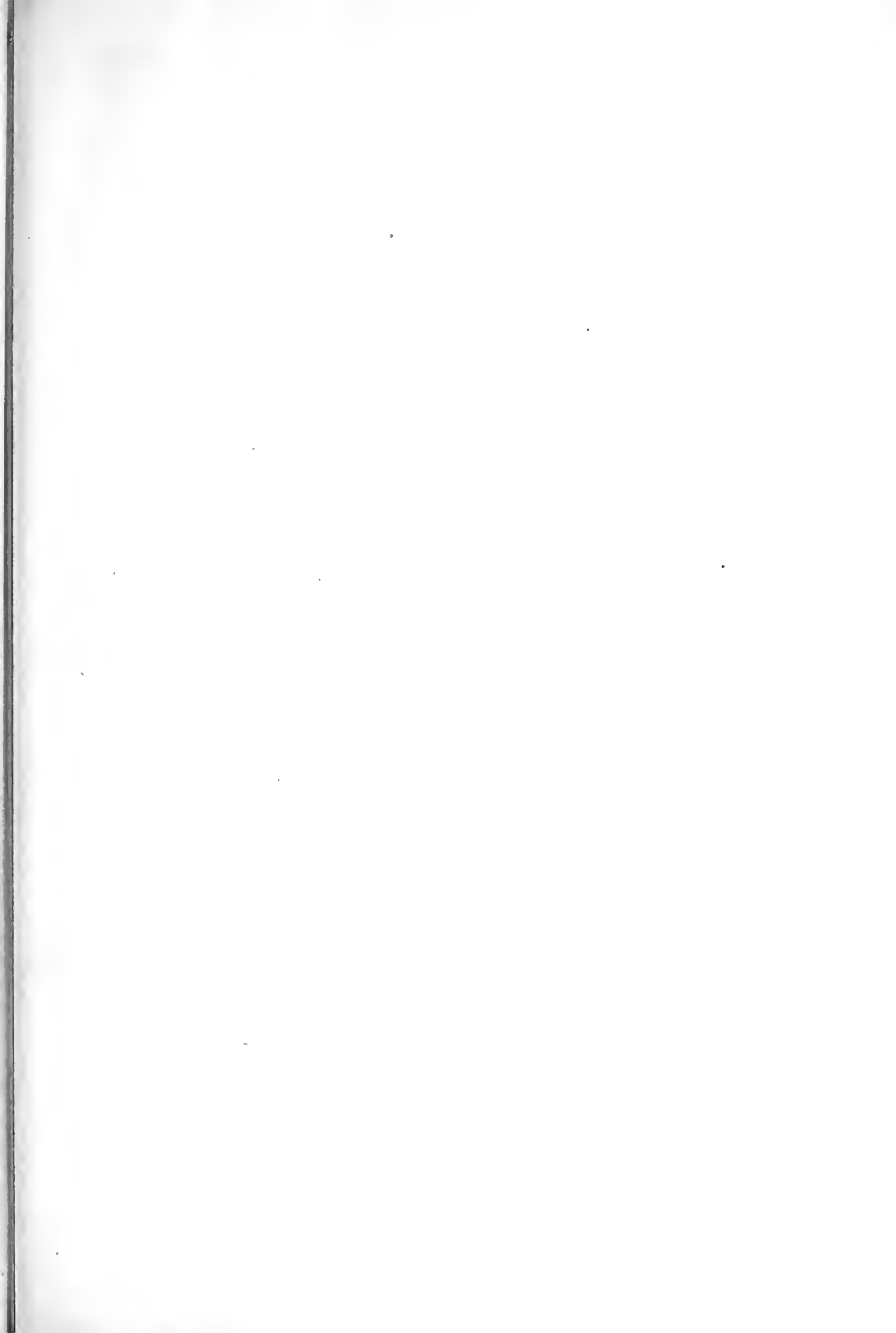


Photo Lithographed & Printed by James Alderman 6, Queen's Square, W.C.

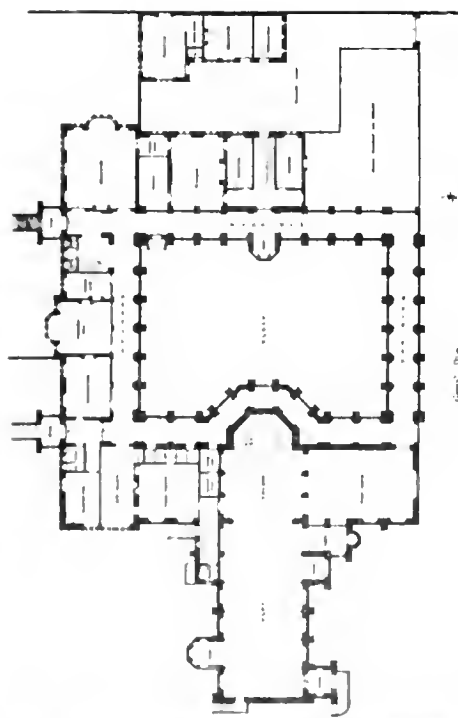
CAYTON MANOR HOUSE, NORTHAMPTONSHIRE.





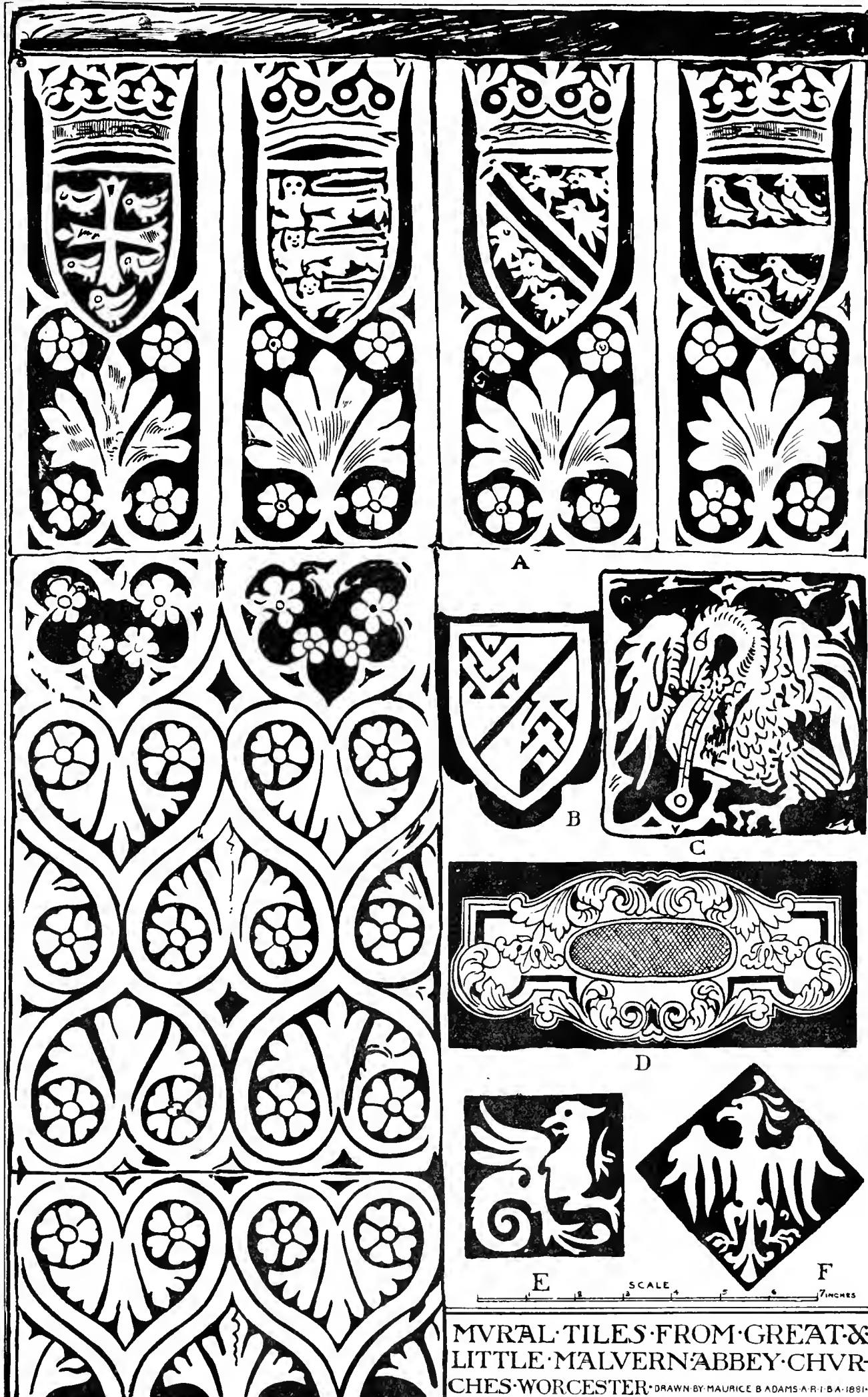


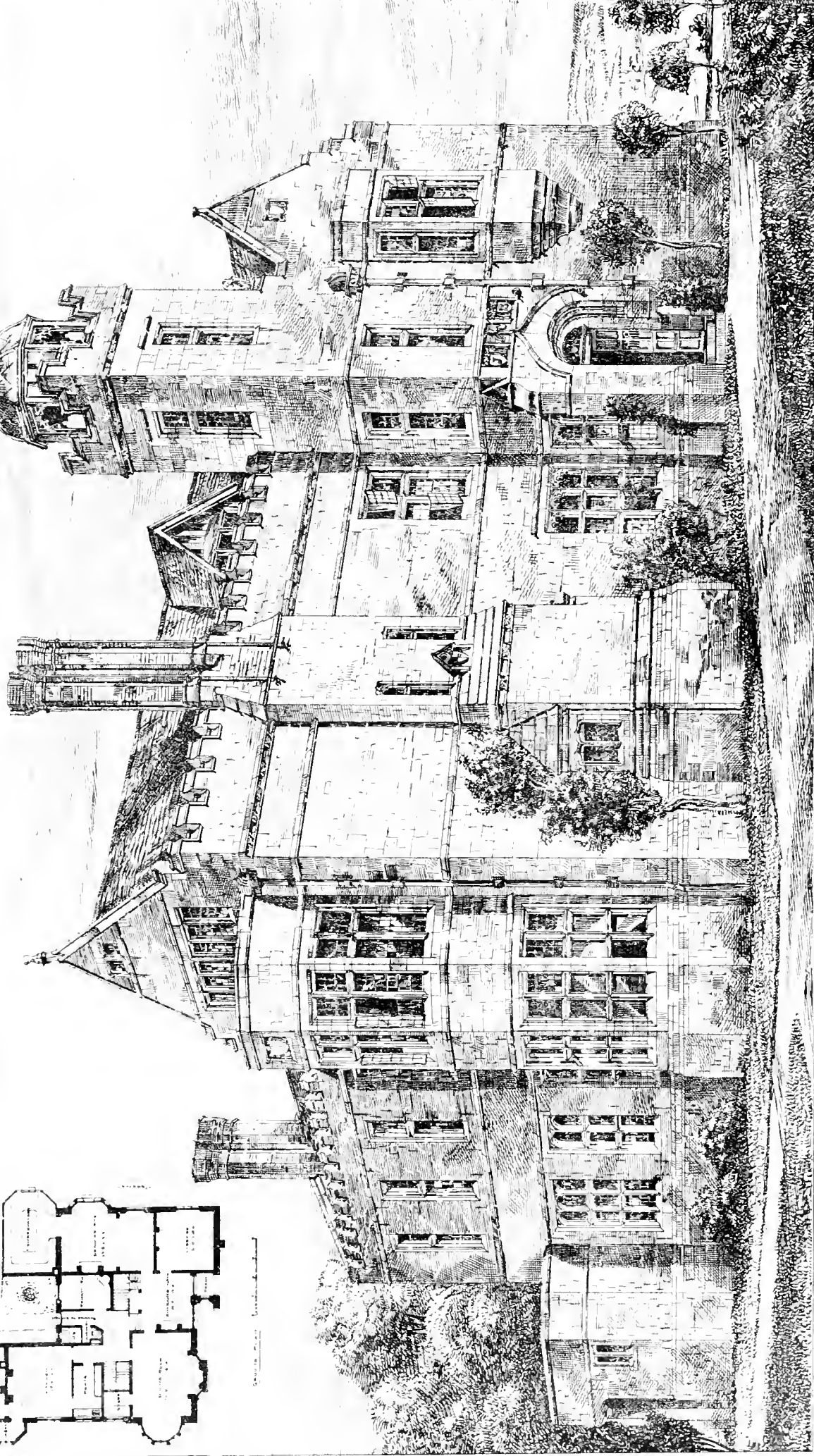
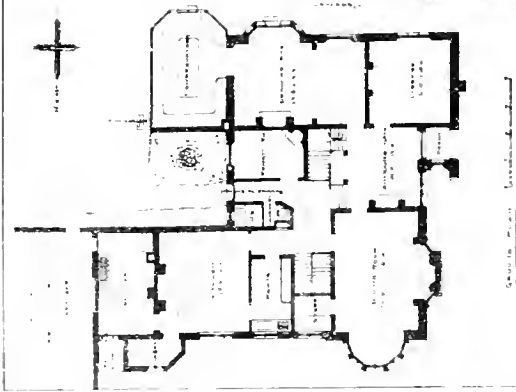
New Convent and Church, Dumfries: PUGIN AND PUGIN ARCHITECTS



General Plan

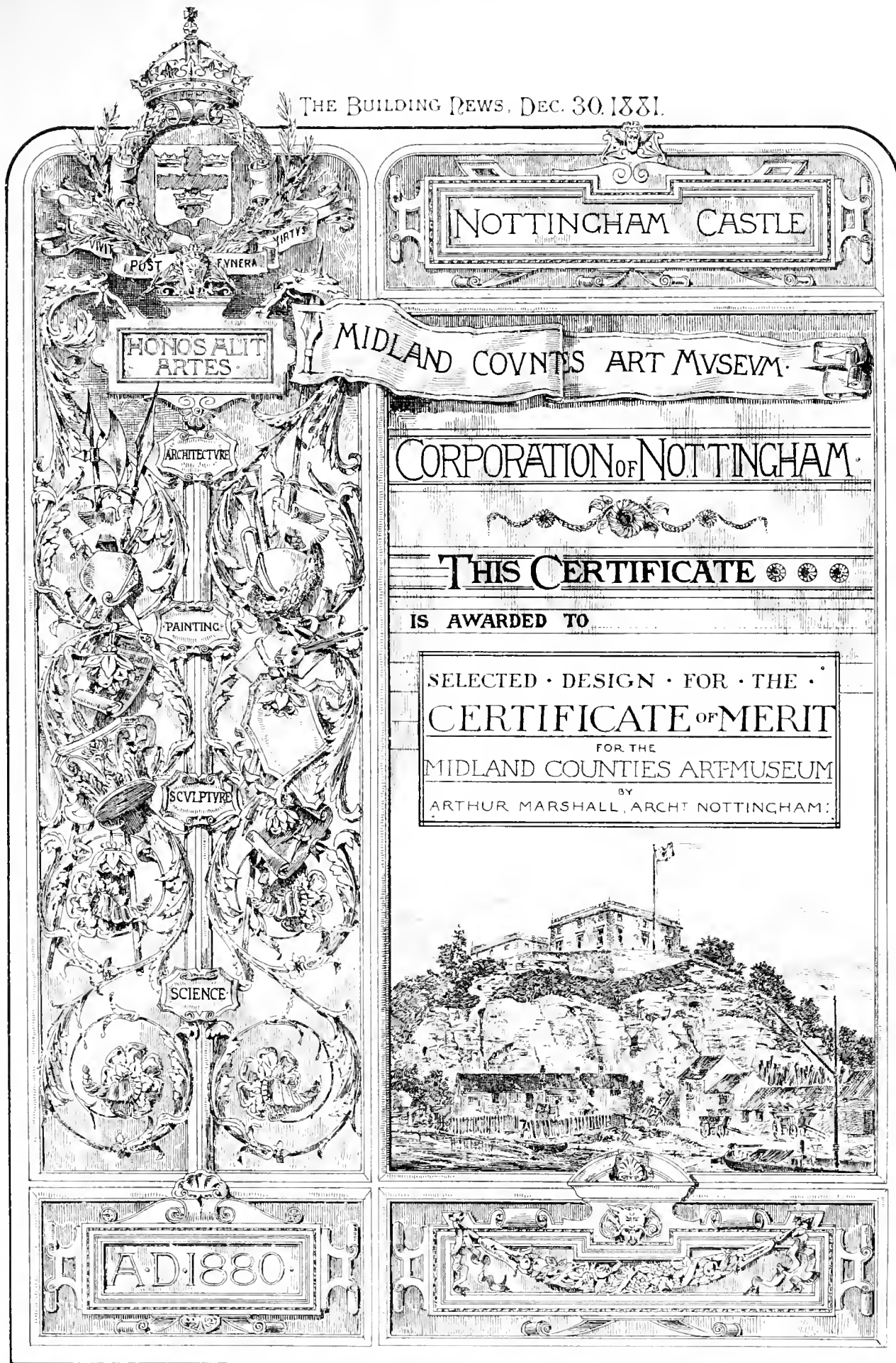






HOUSE AT EWHURST SURREY. ABOUT TO BE ERECTED.
ASTON WEBB, ARCHT.





[illegible]

FUNERAL OF MR. G. E. STREET, R.A.

IN the presence of a vast congregation, the remains of the late highly-gifted leader of his profession were yesterday (Thursday) afternoon interred in the nave of Westminster Abbey. The cortege started from Mr. Street's residence, 14, Cavendish-place, Cavendish-square, about 2 o'clock, and proceeded via Regent-street, Waterloo-place, Cocks-pur-street, Whitehall, and Parliament-street, to the Abbey, which was reached just as Big Ben was striking three. The procession consisted first of the body, in a plain unpolished oak cased coffin, covered by a purple pall with scarlet cross, and resting upon a funeral car; seven mourning coaches, containing the relatives and private friends, the chief mourners being Mr. Street's only son, Mr. Arthur Edmund Street, M.A., A.R.I.B.A., and his brother and sister; and the office staff. After these followed the members of council of the Royal Academy in four carriages, and after these nine carriages, in which were the following past-presidents, vice-presidents, and members of council of the Royal Institute of British Architects:—1st, Professor T. L. Donaldson, past-president, now the sole survivor of the founders of the Institute; Messrs. John Whichcord, past-president; Charles Barry, past-president; and Geo. Godwin, F.R.S., past vice-president. 2nd carriage: Messrs. Horace Jones, V.P.; Ewan Christian, V.P.; F. C. Penrose, M.A., P.V.P.; David Mocatta, P.V.P. 3rd carriage: Messrs. A. W. Blomfield, M.A.; James Brooks, David Brandon, Arthur Cates. 4th carriage: Messrs. Joseph Clarke, John Gibson, H. Curry, and O. Hansard. 5th carriage: Messrs. J. T. Knowles, Alfred Waterhouse, A.R.A.; E. G. Paley, Lancaster; Thos. Worthington, Manchester. 6th carriage: Right Hon. W. H. Smith, M.P.; Col. Sir Andrew Clarke, R.E., C.B., K.C.M.G.; and the secretaries of Institute. 7th carriage: Sir P. Cunliffe Owen, C.B.; Mr. P. C. Hardwick, M. Emile Trélat, Paris (representing the hon. and corresponding members of Institute); Mr. J. Abernethy, Past President of Institution of Civil Engineers. 8th carriage: Messrs. J. G. Symons, F.R.S., President of the Meteorological Society; C. L. Eastlake, Keeper of the National Gallery, and ex-Secretary of Institute; Joseph Goddard, President of Leicestershire Society of Architects; and J. P. Seddon. 9th carriage: Messrs. T. M. Rickman, J. Tiltman, President of Northern Architectural Association; and J. W. Connor, President of Leeds Architectural Association. To these succeeded a carriage containing the President and Secretaries of the Architectural Association, Messrs. Aston Webb, Eales, and Berry. Following these were the private carriage of the Prince of Wales and many private carriages. The procession entered the Abbey by the west cloister door, and proceeded through the nave and choir to the lantern, beneath which the body rested on tressels, while the first portion of the service was read by Canon Duckworth. The pall-bearers were the Right Hon. A. J. B. Beresford-Hope, M.P., past President of the Institute, and also representing the Royal Architectural Museum; Sir Frederick Leighton, P.R.A.; the Right Hon. G. Shaw Lefevre, M.P., First Commissioner of Works; Mr. W. H. Gladstone, M.P., representing his father, who was a personal friend of the deceased; Mr. Edmund Freshfield, representing the Society of Antiquaries; Professor T. Hayter Lewis, F.S.A., senior vice-President of the Institute; the Bishop of Winchester, Dr. Harold Browne; and the Hon. Justice Kay, representing her Majesty's judges. The long procession completely filled the space under the central tower and the transepts, and overflowed into the sacrum, which was already densely occupied. It would be manifestly impossible to find space for the names of many of those present, but the number included the following members of the Academy, in addition to those already mentioned of the Council:—Messrs. Alma Tadema, E. Armistead, Vicat Cole, Hodgson; and members and Associates, Messrs. J. E. Millais, C. Herbert, P. Calderon, W. Oulss, R. Horsley, E. Long, W. Calder Marshall, H. S. Marks, T. McQuoid Whirter, T. O. Barlow, W. Q. Orchardson, G. Aitchison, Marcus Stone, E. J. Boehm, Birch, and Eaton, secretary; and among architects, other than those already named, may be noted Professors Kerr and Roger Smith, Messrs. J. Fergusson, F.R.S., E. P. Anson, W. White, E. R. Robson, W. Woodthorpe, R. W. Edis, R. Phené Spiers,

teacher of drawing at the Academy; H. Jarvis, J. D. Matthews, B. A. Paice, H. H. Stannus, T. E. Colcott, Bloomsbury; G. D. Oliver, Carlisle; W. Wood Bethel, Westminster; H. G. W. Drinkwater, Oxford; the latter four former assistants; Tanner, Gaudy, and S. Vacher, from Mr. Street's office; Wallis, clerk of works at the Law Courts; H. G. Margitson, principal stone-carver at same; W. T. Creed, a former clerk of works; Mr. Thomas Hawkesley, past-president, and members of the Institution of Civil Engineers, and many clergymen, builders and contractors. At the conclusion of the first portion of the burial service, and the singing by the choir of the anthem, "How Blessed are the Departed," the procession reformed and followed the body to the place of sepulture. This is on the north side of the nave, close to the new pulpit, and beside those of Robert Stephenson, Sir Charles Barry, and Sir Gilbert Scott. While standing around the open grave it was impossible to avoid recalling the last funeral at this spot, in April, 1879, when Mr. Street, with evident emotion, acted as one of the pallbearers to his great predecessor, whose chairs at the Academy and Institute he has subsequently filled, and whose memorial brass he designed. Here Dean Bradley read the latter portion of the service, and the anthem, "His body is buried in peace," having been sung, the friends pressed forward to take a last look at the coffin, which was nearly hidden by the wreaths of flowers thrown in, while the great organ pealed forth the "Dead March" in *Saul*.

THE LATE MR. ANTHONY SALVIN.

THE following additional particulars of the career of the late Mr. Anthony Salvin have been sent to us for publication:—

The late Anthony Salvin was the son of General Anthony Salvin, of Sunderland Bridge, in the county of Durham, and the representative of that branch of the ancient family of the Salvins of Croxdale. He was born October 17th, 1799, was educated at the Durham School, and lived many of his early days with his uncle, the Rev. Wm. Nesfield, at Brancepeth Rectory. The restoration of Brancepeth Castle was then going on, and the youth, much interested in the operations, doubtless at that time acquired the taste for architecture which determined his choice of the profession he followed during the remainder of his long and active life. He came to reside in London about 1820, and with his future brother-in-law, William Nesfield, the painter, mixed in the society of the art-world of that time, Turner, Prout, and others, and was for a short time in the office of Nash, when the elder Pugin was in the office. He joined the Society of Antiquaries in 1824, and lived to be the oldest member. Salvin began practice at an early age, as in 1828 he built Mamhead, near Exeter, for Sir Robert Newman, at a cost of about £20,000; and in the same year Morby Hall, for Mr. Henry Preston, at a cost of £40,000; and in 1829 had the gratification of being called in by Mr. Russell to restore the Great Hall at Brancepeth Castle, the building which inspired his career.

Then followed in quick succession such works as Methley Hall in 1830, for the Earl of Mexborough; Parham, for the Honourable Robert Curzon; and many others of equal importance. Mr. Salvin was consulted for many years on all matters relating to Government castles, and his skill and knowledge of Mediaeval fortresses well warranted the confidence reposed in him. His careful studies of the remains of English and Welsh castles in all their details is shown by his sketches, which are admirable both for their artistic merit and archaeological knowledge. Amongst the most successful of his works may be named Peckforton Castle, which was built from the foundation for Lord Tolemache, also the restoration of the Beauchamp Tower and Traitors' Gate at the Tower of London. The careful manner in which Caernarvon Castle has been kept from ruin may be credited to Salvin's influence in high quarters, and his enthusiasm for our ancient work.

At Wind-or Castle he was somewhat controlled by the late Prince Consort, as in the restoration of the Curfew Tower, but in all things he earnestly endeavoured to be Conservative. Alnwick Castle was restored by Salvin for Algernon, Duke of Northumberland, between the years 1852 and 1861. This was his great work, and the outlay was princely. The

decoration of the interior was controlled by the Duke, who insisted on its being carried out in the Italian Cinque-cento style, and for this purpose Cardinal Autonelli, at the Duke's behest, persuaded Commendatore Canina to come from Rome with a number of Italian artists and carvers; but the whole of the internal work was under Salvin's direction.

Keele Hall, in Staffordshire, near Newcastle-under-Lyme, built for Mr. Ralph Sneyd, between 1855 and 1862, is probably one of the best planned houses in England, from its clever adaptation to the ground. In planning Salvin was an adept. The court-yard is on a low level, and, a flight of stone steps, similar to the ancient arrangement of Parham Court, approaches the great hall on the first floor, on which the principal apartments are arranged, the basement being occupied by servants' offices. The whole is most artistic and a model of attention to old work. Amongst his later works Thoresby Hall, in Notts, commenced in 1864 for Earl Manvers, and finished in 1875, is conspicuous; and the restoration of Dunster Castle, for Mr. G. T. Luttrell; Petworth House, for Lord Leonfield; Longford Castle, for Earl Radnor; Encombe Hall, for Earl Eldon; and Birdsall House, for Lord Middleton, are all works of first-rate importance. Salvin may be said to have died in harness, a wholesome and good thing for a man of 82 years.

As late as last year he was building a house in Chesterfield-gardens for Lord Leonfield, when the growing infirmity of age compelled him to relinquish the task. But his work did not end here, for within the last few months, and greatly at his own expense, he interested himself in the restoration and enlargement of the church in the village of Fernhurst, Sussex, near which he lived during the last 17 years of his life. His anxiety at the last was that the bells which he had bestowed should be hung in the new tower and toll his departure. He died on Dec. 17th, 1881.

Salvin was a true gentleman that the profession may be proud of. A man of business and courteous, as all who knew him, employers and employed, will acknowledge.

W. E. N.

EDINBURGH ARCHITECTURAL ASSOCIATION.

THE annual dinner of this Association took place on the 22nd inst., Mr. John McLachlan, architect, president, in the chair.

After the usual loyal and complimentary toasts, Mr. John Honeyman, president of the Glasgow Institute of Architects, proposed the toast of "Success to the Edinburgh Architectural Association" in the following terms:—

Mr. President and Gentlemen,—I feel highly honoured by being called upon to propose the next toast, "Success to the Edinburgh Architectural Association." You have much reason to be gratified with the result of your past labours, especially in recent years, and much reason, too, to be encouraged by such success to attempt something more. I feel that I cannot refrain from alluding to that sad event which has come upon us so suddenly. Knowing Mr. Street as I have done for many years, although too seldom privileged to associate with him, both his words and his works have more and more impressed me with admiration for the greatness of his genius and the true nobility of his mind, and I realise with the added poignancy of personal sorrow, the greatness of the gap which his removal now leaves in the ranks of our profession. Enthusiastic yet practical, devoted to his art and not without ambition, yet unselfish—valiant, yet tenderly sympathetic—he was indeed, as Mr. Christian so well expressed it last Monday evening, "a prince and a leader" among his brethren.

In Mr. Street's address at the opening of the Institute he alluded to the difficult problem of how best to promote a closer union among the many architectural societies scattered over the country. This problem remains for us to solve, not to shelve; and it is on this subject I should like to say a few words before resuming my seat, believing that it has an important bearing on the responsibility of all architectural associations. Surrounded by men whose zeal I admire, whose abilities I respect, and whose esteem I covet, and who have so cordially extended to me the right hand of fellowship, I feel that it would be

difficult to find a more fitting occasion for alluding to this subject, and advocating the wide extension throughout our profession of those elevating sentiments, which, I may say, are at once the motive and the result of its effective unity. If we could only honestly say that we have surmounted those stumbling-blocks of prejudice and misconception which cumber our path, and that we have got the length of treating our brother-architect exactly as we would desire to be treated ourselves, we would clearly see how common aims, common hopes and fears, trials and triumphs, friends and enemies, and—shall we not say?—common devotion to a noble art, should bind us together, and beget within us a jealousy not merely permissible, but beneficent—a jealousy of ourselves and of our brothers lest we bring dishonour on the name we bear.

Now, undoubtedly, proper organisation must greatly contribute to such results; but hitherto we have hardly tried to turn it to the best account. You gentlemen, at least, have proved that you appreciate the advantages of meeting together in an association, the influence of which is, I am sure, not confined to those who are members of it. We in Glasgow have done the same. There are many such associations throughout the country, but I think I am right in saying that there are only these two societies in Scotland; and it is very sad to think that hitherto they have, to all intents and purposes, stood to each other very much in the relation that the Jews did to the Samaritans of old. I am sure that all who are here will agree with me in thinking that this state of matters is hardly creditable to us, and that a more cordial relationship would not only be agreeable and helpful to us as individuals, but that it would strengthen our influence as a profession in Scotland; and, taking a wider range, and considering the relations of all architectural societies to each other, it seems to me that one of our greatest wants at present is some scheme for bringing them all together in closer alliance, and facilitating intercommunion. Far be it from me, however, to advocate anything in the shape of amalgamation. We want federation, but I don't think we want to be called confederates; and both theory and experience point to the advantage of a proper division of labour and responsibility. Some of you may remember that a bold and, for a time, successful attempt was made to gather into one society everyone in Scotland—east and west, north and south—who was interested in architecture. It is exactly thirty years since I was admitted a member of the Architectural Institute of Scotland. I felt much interested in its work, and had little doubt about its success. Its professed object was exactly the same as yours—exactly the same as that of the present Glasgow Institute. This, indeed, is expressed in the laws of the old Institute and in ours exactly in the same words—"The advancement of the art and science of architecture." The Institute did good work for a few years, and then it gradually began to show signs of weakness; there were twists and ugly separations, indicating something wrong with the foundations, and at last it suddenly collapsed. This collapse had one bad result: it caused alienation between the architects of Edinburgh and Glasgow, and I think I may safely say that they have never been such good friends since, but on other grounds the split was not to be regretted, and it would certainly be entirely wrong to say that it was caused by the petty jealousies and animosities of the professional members. The causes of the Institute's dissolution were inherent in its constitution. Being a national institution, it was right that its headquarters should be here; and it was natural, though not right, that a majority of its council should belong to Edinburgh. The Glasgow section was thus controlled by the Edinburgh section, and as the former comprises a majority of the Fellows, and of the other members, the situation soon became irksome, and of long standing. Now, doubtless, if the Institute had confined its efforts to the promotion of the union of the profession in Scotland, with the elevation of the qualification and status of its professors, or to the enlightenment of public opinion on matters architectural through the agency of its mixed membership, more skilful management might have averted its fate, but, when, as themselves a considerable in the last stage of such pursuits are but a small portion of the work of any architectural

society worthy of the name. Your own experience, gentlemen, as members of this Association, must bear me out in this—that an architectural society must have much work to do of merely local interest—work educational, deliberative, or, it may be, actively defensive or offensive (not using the word offensively), the importance of which men at a distance cannot realise, and in the conduct of which their interference would be impertinent. And so we should not be surprised to find—indeed, it is exactly what might have been expected—that it was differences of opinion about enterprises of local utility which brought matters to a crisis, and led to the disruption of the Institute. Its history has, I think, a lesson for us now, and I therefore trust you will not blame me for saying so much about it.

That lesson seems to be this—that provincial societies are most likely to be useful in their respective spheres—to be vigorous, influential, and long-lived—if they are responsible for the management of their own affairs, and entirely free from any extraneous interference.

I have not the least fear that such independence will lead to selfish isolation and indifference to matters affecting the profession as a whole; on the contrary, independence, if it does not beget benevolence, and all charitable emotions, acts well as their foster-mother; and without doubt it is the parent of respect—respect for our fellow-workers, respect for ourselves, and hence a reciprocity of goodwill and esteem, the solid and only permanent basis of that union which is strength.

But, gentlemen, if we desire our profession to obtain what I may call national recognition, and to stand out among others in its true position and dignity; if we wish, as a profession, to give authoritative expression to our opinions, to encourage the highest culture, and to provide the most excellent facilities for education and research, to maintain friendly relations with our brethren in other countries, to be intrusted by the Legislature with certain useful functions; and by our Sovereign with the distribution of honours, the gracious bestowal of which testifies to her continued interest in our art—I say, if we desire as a profession to perform such duties and to enjoy such privileges, you must be perfectly sensible that it is impossible for us to do so through the agency of independent isolated local associations; and hence on the one hand the fitness and the need of one great national association, and on the other the duty which rests upon every architect to give it a loyal and hearty support. The want of this too generally, the want of it I may say specially, in the good city of Edinburgh is the only reason why the Royal Institute of British Architects is not a still greater power in the country than it is. Its influence during the past years (now nearly 50 since its establishment) has been great and beneficial, and it gives every promise of increased usefulness.

If I have not already exhausted your patience, I should like to add that there is one reason or excuse for keeping aloof from the Institute which has always seemed to me to be most inequent and foolish—namely, an objection to certain of its by-laws and regulations. Now it is surely evident that if a large section of the profession object to anything of the kind, and yet admit the utility of the Institute, their duty is to join it, and take some pains by their advice and by their votes to bring about improvements and promote efficiency. Of this I am very sure, gentlemen, that as you go on perfecting your organisation here, and doing diligently the important work which you alone can profitably undertake, your thoughts will often wander beyond the verge of your own field of labour, and the conviction will grow upon you that, with all your energy and all your influence, there is still beyond the scope of your endeavours valuable work to be done for the profession which the Institute alone can accomplish; and if this conviction induces you to join its ranks—as I hope, and indeed believe, it will—you may rest assured of this, that the effect of this more formal alliance with brethren in every part of the country will be felt by you to be at once an incentive and an aid, strengthening your position and expanding your sympathies, and thus, in the most direct and marked manner, contributing to that lasting success of the Edinburgh Architectural Association which we all here so sincerely desire, and to which I now call upon you to pledge a flowing bumper.

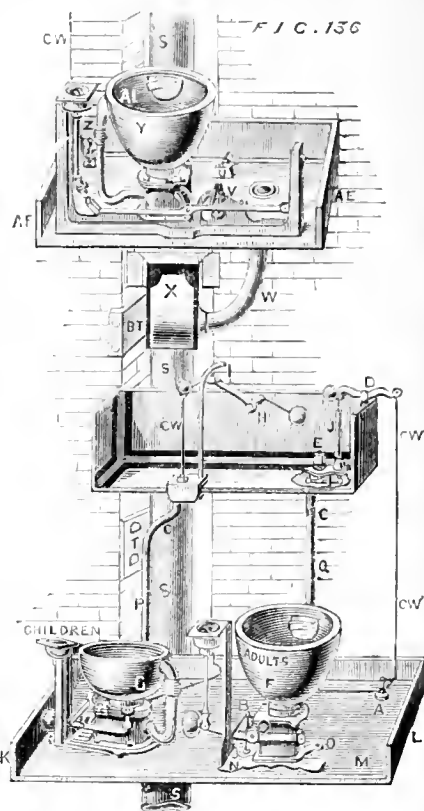
PRACTICAL NOTES ON PLUMBING.—XXIII.*

By P. J. DAVIES, H.M.A.S.P., &c.

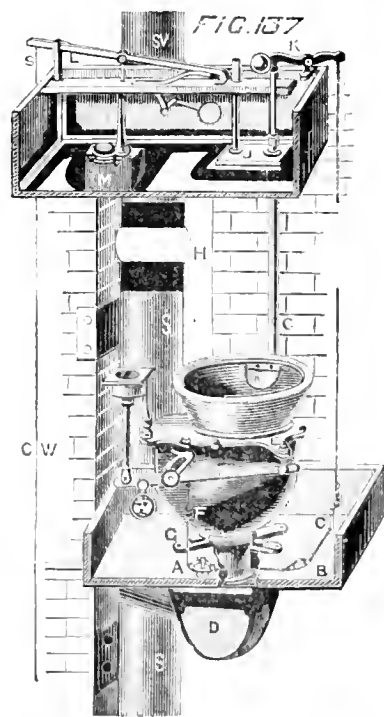
(Continued from page 823.)

INSIDE WORK, OR SANITARY PLUMBING—TWIN CLOSETS—FIXING AND WIRING CLOSETS.

A REFERENCE to Fig. 126, chapter XX., of this article will show the necessary traps and pipes to be fixed to twin closets, and Fig. 136 illustrates the two closets as fixed. Both



these closets are supplied with water through service boxes and submerged valves, from the cistern above. When such valves are used they



are generally actuated by means of a strong copper wire, CW, 1/4 in. in diameter, and by the use of the cranks BA; also the ball lever D,

* All rights reserved.

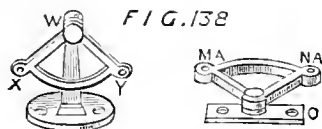
which answers, as its name implies, as a lever, to change the direction of the wire, and as a weight to bring up the wire. When fixing these closets it must not be overlooked that it is essential in all cases, without exception, to fix them over a proper lead safe, M, fitted with a good overflow pipe.

Though to some experienced hands in the trade it may appear superfluous, it is necessary to remind the younger ones that it is very requisite to use great care when bedding down, or as it is better known in the trade, when setting the closet, so that, when screwing it to the floor, the bottoms of the lugs and lead-work are well painted before the putty is applied; also that the closet must be properly bedded on good putty before the screws are put in. In the upper part of this diagram is shown a Bramah closet fixed over a U-trap, and there is also shown the old method of fixing the overflow of the safe into the side or cheek of the trap. There are plumbers even to this day who adopt this style, and I think that they are in this point decidedly in error.

Fig. 137 is a diagram of a pan-closet as fixed over a U-trap. This kind of closet I have long since condemned, but as there are thousands of plumbers who think otherwise, and will insist on fixing the old pan-closet, I deem it almost a matter of duty to apprentices in the trade to describe the proper method of fixing them. Some of my readers will probably more easily recognise this diagram under the title of "wired closet," which means that the valve in the cistern is actuated by the use of a wire C W (closet-wire). The cistern should be lined with 6lb., or, better still, 7lb. lead, and the valves fixed over a service-box properly wired.

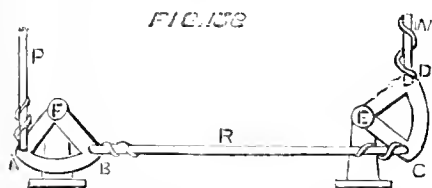
WIRING AND CRANKING CLOSETS.

The best method of doing this is to fix the cranks so that they may pull in a line one with each other. Use side cranks, M A, Fig. 138, for changing horizontal directions, as also at B, Fig. 137, and upright cranks W X, Fig. 138, for



changing the pull-line from a horizontal to a perpendicular, as shown at A, Fig. 136.

Fig. 139 shows the method of fixing cranks to a pan-closet without the use of a side crank, and which gives underhanded motion. P is

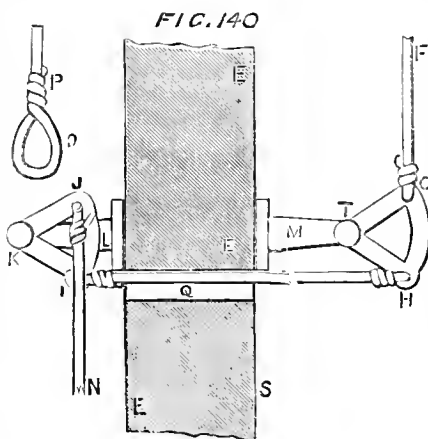


where the power is applied from the lever of the container, and W the end working the weight. It will very readily be seen that if you pull up the first crank at A, that this power will be communicated to that corresponding point of the second crank C, and affect whatever is at the end of the wire W. Now suppose you cannot go in a straight line with the wire W, but have a wall to pass through, as at E, Fig. 140, you must, under these circumstances, connect the wire W, Fig. 139, to N, Fig. 140. In this case the crank is shown to work back or with crossed wires, which allows the wire N to work close up against the wall E. Here notice the difference with the crank H. M G, as it is now fixed, throws the wire F at least 6in. away from the wall, and is a clear indication that the person who fixed it did not know his business.

The proper way to fix the foot of this crank is lower down at about S, so that the wire may pull from above the rivet line or about T, which would throw the crank to work backwards as K J I, and thus allow the wire to come near the wall.

By turning Fig. 140 upside down, and joining F on to P, Fig. 139, the whole of the work may be reversed. That is, pull at N, and you actuate

W, Fig. 139, and by turning Fig. 139 upside down, you at once get an overhead motion, or in other words, pull the wire, and you actuate W. The above is the method of fixing cranks to the bottom of joists or ceilings, and will answer



in situations where ball levers cannot be employed. Of course, in instances as here described, a weight must be fixed on the wire W to draw the wire back, or a check-spring may be employed.

In the selection of cranks it is always necessary to see that they are not put together with an iron rivet; they must be brass and work loosely.

If by any chance they have become clogged up and stiff through the use of oil, place them over a moderate fire and so burn out the oil; but remember that if you put them over too hot a fire you will most probably melt the rivet.

HINTS ON HOME SANITATION.*

By H. H. COLLINS, F.R.I.B.A., F.I.S. (Hon. Sec. of the Health Department, Social Science Association).

ALTHOUGH we cannot always select, yet we can all discriminate, with regard to the amenities and surroundings of the locality of the house we intend occupying. Given a certain number of residences from which to determine, we may choose that one which, from various reasons, is the one most free from objections, and which possesses the fewest defects. For example, we may endeavour to avoid a too-crowded locality—one surrounded by narrow and ill-ventilated streets, alleys, or lanes, the devitalised air of which would be sure, sooner or later, to prejudice the one we are about taking. We may give the preference to a detached or semi-detached house well bathed in air, to that of a terraced house, cribbed, cabined, and confined. We may choose between two sides of a street, so as to obtain the best aspect, say a south or south-westerly one in lieu of the other points of the compass. We may select a gravel, loamy, or well-drained subsoil in lieu of a damp, ill-drained clay one, and we may carefully refrain from dwelling in a house the foundations of which rest on fetid debris or former dust receptacles. We can easily ascertain if illness has been prevalent in the locality. We can see if roads are made, and with what materials, and we can easily ascertain if the same have been "taken to" by the parish, sewered, lighted, and supervised by competent responsible authority. Before entering into the occupation of any house we may protect ourselves against the incalculable evils arising from bad drainage, or roofs not watertight, by obtaining a verbal or written assurance that the same are perfect and the house consequently fit for habitation. It would be advisable to secure such a guarantee in writing, or such assurance given in the presence of witnesses. Quoting from the judgment of Mr. Baron Pollock, it will be seen that if such assurance is given, ignorance or carelessness upon the part of the landlord will not excuse him. "If persons take upon themselves to make assertions as to which they are ignorant, whether true or untrue, they must, in a civil point of

view, be held as responsible as if they had asserted that which they knew to be untrue." Mr. Justice Kay, in another judgment, said, "Now, what is enough in law to make a man liable for an action for deceit? It is enough that either he knew the statement he made was not accurate, or he made it recklessly, without having knowledge about it one way or the other." Lastly, with respect to exterior considerations, we should give the preference to that house which has the thickest walls, the greatest amount of light, and appears to be the most substantially constructed, carefully avoiding being led away by a showy exterior, however picturesque, or overlaid with (too often) meretricious ornament, for most of these so-called advantages are the means of retaining dampness, garnering filth and dirt, and preventing the escape and evaporation of the natural humidity of our climate. The dust-bin should not escape our notice; we should take care that it is so positioned as not to prove a nuisance; properly ventilated and moved as much away as possible from any of the ingresses to the house; nothing but dust and ashes should be allowed to be placed in it—vegetable and matter liable to decay should be burnt each day. The first consideration with regard to the interior of the house is its sanitary condition. Assuming that its external drainage is guaranteed and perfect, we must carefully see that there does not exist any connection with the main sewerage and the house proper. This is not difficult. See that the waste pipes from the sinks are open at their ends and pass outside; also that the overflow-pipes from cisterns are similarly treated. A simple plan for keeping waste and overflow-pipes clean is to obtain a cane and bind round its end a piece of rag or sponge, wet the same, and pass it up the pipe once or twice. See that sinks are placed against external walls and under window openings. Ascertain the position of w.c.'s; if situated in the centre of the house, give the preference to that house where the conveniences are positioned against an external wall, and lighted and ventilated from the outside; recollect that w.c.'s off staircase landings are the best. Take care that the w.c.'s are supplied from a separate cistern, so that no communication exists between the drinking-water cistern and themselves; this can easily and economically be effected by interposing a small waste-preventing cistern if it be necessary. See that the soil-pipes are of lead, and carried up their full bore above the roof, away from all windows or other ingresses to the house. It is an ordinary practice to make common light east-iron rain-water pipes serve both for soil and rain-water; this should not be permitted, but if the landlord objects to substitute lead for iron, then take care that the joints of the iron pipe are thoroughly air and watertight, and that the pipe is carried up above the gutter as just mentioned, and a branch put in to take the rain-water. In any such arrangement it is essential that the soil-pipe be exterior to the house. If possible it is very desirable that an open trap, Potts' Edinburgh or Buchan's, should be inserted at the feet of these soil-pipes. Pan-closets should be avoided; simple earthenware hopper closets are much preferable and more economical in first cost. If safes or trays are placed under w.c.'s, take care that the overflows therefrom pass direct into the open air. Let me recommend you to always close down the flap of the w.c. every night, shut the door and slightly open the window, and once or twice a week to have the basins washed out with dilute spirits of salt. There exists no reason why the basins of the w.c.'s should not be as clean and the water as pellucid as that of a drinking-fountain. Ascertain the position of the eisterns; these should be accessible, so that they may be cleaned out frequently, as if placed in roofs, under stairs, or jammed into sculleries, they soon become neglected and sources of disease; all eisterns should be covered. All drinking-water should be boiled and filtered, and if charcoal be employed as the filtering medium the same should be renewed at frequent intervals. Several filters worthy of attention are to be found in the exhibition, notably the Carferal and Maignen's "Filtre Rapide." If the bath forms, as it should do, a portion of the fixtures, take care that its overflow and waste-pipe discharge into the open air, and I should advise that means be taken to carefully shut off draughts by placing indiarubber seatings between the wood and metal work (the same

* Paper read at the Brighton Health Congress, December, 1881.

observations apply to w.c.'s). Similar remarks apply to all fixed lavatories, slop-sinks, &c., which should always be placed next external walls, and not in the centre of houses, where they are most productive of prejudicial effects. Let your preference be for that house which has an amplitude of light, is free from dark and unventilated passages; cupboards, closed dressers, nooks and corners are not always the conveniences they appear to be; they form, as a rule, receptacles for all the neglected dirt of a house to congregate in, and are fruitful sources of danger; every housewife will recognise that by exposing to the full light of day the pots, pans, and household requisites, she will be better able to preserve them clean, and what is equally necessary, whole, unbroken, and fit for use. Never use as a bed-chamber an apartment without a fireplace, for here it is that "the death of each day's life" occurs when vitality requires all the assistance which can be afforded to it. Ventilation is of vital importance to the hygiene of house and occupant. Guard yourself against the inconvenience and annoyance of smoky chimneys by special agreement with your landlord, but a smoky chimney is even better than having none at all. A simple and cheap means of obtaining ventilation without draughts is the insertion of a board about 3in. wide between the bottom rail of the sash and the sill of the window; but if you can obtain from your landlord fireplaces having hollow chambers formed round same, so that in winter air may be admitted in a warmed condition, and in summer in a cooled state, so much the better; many such are to be seen in your exhibition. I have hitherto spoken of the admission of pure air, but it is equally, if not more, necessary to extract, or at least to allow egress of, the foul air. This can be readily obtained by means of Sheringham's ventilators, Arnott's valves, and contrivances of a like nature being inserted in the outer walls, or in special flues, or in the chimney breasts, and at very little cost. It is very desirable that all halls and staircases during winter should be warmed; a good gas-stove will, if there be no other way, be a simple means of procuring this; but never adopt gas as a heating medium without the stove or apparatus is furnished with a flue to permit of the escape of the impure air: nothing can be more dangerous to health than the neglect of this hint. Attention should also be given to the state of the gas service: it should be examined and tested with a taper to see if there be any escape. As regards the appropriation of rooms, of course this depends on the class of house; but as a matter of common-sense, and consequently of sanitation, there is no difficulty in any class of house to select proper aspects for each apartment, bearing in mind the purpose for which they are to be devoted, thus: the dining-room, as probably the least used room in the house, may have a northerly aspect; the sitting and drawing-rooms, southerly and westerly; the kitchens, westerly; the larders, &c., northerly; nurseries, the same as sitting-rooms, and so forth; so that the largest amount of health and enjoyment may be extracted from even an ill-planned and ill-arranged dwelling. A "hint" as to paper-hangings will not be amiss: take care that they are not arsenical in colour and composition. One "hint" more with regard to the house and its belongings, worth all the rest: do not imagine that when structure, drainage, water supply, and the various appliances appertaining thereto, are left in perfect condition, that they will always remain so, and that, unlike every other production, they will last unimpaired for ever, or even that period of "for ever," a few years. If you desire health, you must work for and deserve it; constant supervision to insure great and continual cleanliness is essential. You cannot "nag" your domestics too much on this score; you cannot be too watchful, whether the house be large or small, whether it belongs to peer or peasant, if you wish to preserve it as a pure wholesome dwelling in which to live, instead of to die in. This is a duty you owe to society quite as much as to yourself, bearing in mind that public sanitation is mainly, if not entirely, dependent on private hygiene, and that the law declares in unalterable accents, "Secutur non tuum alienum non lodes." "That people must make use of their own property in such a manner as not to injure that of others." But there are other hints equally necessary to glance at—such, for example, as food. I am

afraid, as a rule, it is exceptional for the lady of the household to pay that attention to the kitchen department as was the honoured custom of the last century. In aristocratic families the duty devolves on the housekeeper, who delegates it to her assistant, who hands it on to some underling. In middle-class life, the cook, whether she be skilled or unskilled, reigns supreme. In the less elevated classes, an utter ignorance seems to prevail of dietary necessities. Goldsmith tells us that "Heaven sends us good meat, but the devil sends cooks"; and if this latter gentleman have an existence, I am sure a large proportion of my audience will be of the same opinion. How can "good digestion wait on appetite, and health on both," when the elements of the chemistry of food and cooking are absolutely unknown to the housewife? The hint here is to practically make yourselves acquainted with "what to eat, drink, and avoid." How much thrift may be engendered; how much household saving effected; how much good-humour secured; and how much health preserved by a little knowledge and some care given to this subject! First, as in all chemical operations, absolute cleanliness is required in pots, kettles, and utensils. Due weight—this will not suit the butcher! Purity of concomitants—a wail from the grocer! Economy in their use—warning from the cook! The meat weighed and washed; the vegetables cleansed, salted, and soaked; the fish carefully examined and well cleansed; the cloths free from impurities; the knives, spoons, &c., &c., clean and fit for use. Lastly, the result, a delicious meal, effected at half cost, productive of comfort and replete with health-giving properties. Sanitation is so wide a subject, and embraces so much that is essential for the welfare and comfort of mankind that "hints" might be multiplied "ad infinitum"; but I cannot conclude without calling your attention to one other matter of every day but yet of equal importance with the other subjects to which I have directed your attention, namely, "clothing." Dr. Max von Pettenkofer, Professor of Hygiene at the University of Munich, writes: "One of man's principal defensive weapons in his struggle for existence is his clothing; the place it takes in the history of civilisation and its connection with physiology are not often thought of; it is spoken of from a moral and æsthetic point of view; its main purpose is a purely hygienic one." He adds that "the forgetfulness of this is to be deemed a great misfortune, inasmuch as small and frivolous considerations have subjected mankind to many ills, and have often acquired an ascendancy over better and fitter hygienic clothing." The seeds of grave disorders and chronic illness are frequently—very frequently—promulgated by the neglect of well known principles with regard to clothing. This is a large subject, and I would refer you to Pettenkofer's work, wherein you will find much instructive and interesting matter; but I would mention that he calls attention to the fact that we generally consider clothing as an apparatus for keeping air from us, whilst in truth we could not bear any garments which did not allow of a continual ventilation of our surface. It is therefore necessary that we should make ourselves acquainted with those textures which being most permeable, afford us the warmest clothing. It is not the densest, thickest, or heaviest material which is best suited for our purpose. My "hint" on this head is that, as our health is so intimately associated with the economy of our dress, you should begin to think for yourselves with regard to it; emancipate yourselves from the tyrannical dominion of fashion, and study to obtain a deeper insight into those laws of clothing which will inevitably tend to increase the longevity of the community and to enhance its comfort and enjoyment. There are, as I have said, a host of other subjects connected with domestic sanitation, such as those relating to furniture, &c. On this head I would "hint" at the desirability of taking care that it should be of such form and character as to prevent the lodgment of dirt and dust; all hollows should be filled in, and all unnecessary ornamental projections dispensed with; under any and all circumstances a continual application of elbow-grease is very advisable. Too much caution cannot be exercised with regard to various matters external to the house, but often productive of serious consequences internally, such as the selection of the laundress, char-woman, scum-tree, tailor, &c. It is a "hint"

worth attention if the lady of the house would visit, or at least ascertain the character and surroundings of, the homes and workshops belonging to these people before availing herself of their services; good in countless ways would result from such knowledge. As my pen writes these concluding observations, I seem to hear a murmur that I have quite lost sight of the remark with which I commenced this paper, and the question inevitably arises, "That since life can little more supply than just to look around us and to die," is it worth the trouble of practically adopting the many hints laid down for our guidance? Cui bono? Has ever a people so lived, and if so, with what results? My answer is, Yes, and with the happiest and best of results; results which were intended for all, and which all may attain. Without entering into any polemical disquisition as to whether the laws to which I am about to refer were of Divine origin or not, or whether they have been acted upon by religious or superstitious motives; that they were wise and beneficent, if we judge only by results, there can exist no doubt. The Laws embraced every matter upon which I have lightly dwelt—household, dietary, personal, sumptuary, and every conceivable sanitary question affecting the happiness and life of mankind. Explained and amplified by the sayings of the Jewish race, they have acted as their guiding star for over 5,000 years, and have preserved them in health under unexampled difficulties up to the present day. Dr. Richardson thus writes:—"Facts show that from some cause or causes this race presents an endurance against disease that does not belong to other portions of the civilised communities. The resistance to those influences which tend to shorten the natural cycle of life is singularly instructive." He gives statistics which show that amongst infants 10 per cent. die amongst Jews, and amongst other denominations 14 per cent. That the average duration of the life of the Jew is 48, of others only 36. That a quarter of the Jews live beyond 71 years, and of others 59 years and 10 months. That the extracts from the civil state papers of Prussia show a mortality of the Jew 1.61 per cent., as against the mortality of the whole kingdom of 2.62. That the annual increase of the Jews is as 1.73 to 1.36 amongst other denominations. He adds the Jews escape great epidemics more readily than other races. The mortality of cholera, for instance, was so slight that the fact of its existence was even disputed. He attributes the main causes to what he calls "sobriety of life," thus interpreted by him—sobriety, better food, carefulness in the rearing of children, thoughtfulness for their aged and infirm, general care of their poor and also of themselves. Whilst in no way disputing the conclusions which Dr. Richardson has arrived at, I venture to assert that most of these beneficial effects have been the results of continuous and unremitting attention to the sanitary and hygienic laws laid down by Moses and amplified by his disciples—Laws which, for the first time in the history of the world, proclaimed that "Prevention was better than cure"; that the real science of medicine lay in the direction of prophylactic rather than therapeutic measures. That by the laws he laid down—not as a monopoly for Jews alone, but open to all who desired to live by them, admittedly onerous but undeniably efficient—he not only prevented disease, but if, unhappily, it arose, he took all those measures which modern science has revived to stamp it out.

NOTES FROM EDINBURGH.

THE lack of enterprise which characterised most departments of industry at the commencement of the year has continued to the close. The course of unseasonable weather, which set in after the month of June, adding another to the list of bad harvests, has given the depression of the agricultural industry an absorbing interest: and till matters look more hopeful in that quarter, the return of busier times for the builder will be unlikely to occur. Wages continue at the lowest point: masons getting 6d. to 6½d. per hour, and others in proportion. A fair amount of work has been sanctioned by the Dean of Guild Court during the year—mostly alterations on existing property; and in the extremities of the city chiefly, instal-

ments of speculative schemes have been carried out. In the farthest north, in Ferry-road, a lot of eight small, "self-contained" houses has been built, which may be noted as presenting an agreeable variety and a much-desired improvement on the sadly stale monotony of the door-and-bow-window style. These are built in the cottage style of the Queen Anne period, but with simple details suitable to the character and prospects of the property. They are small houses specially in request by those who like to have only their own house over their head. The architect's hand is apparent in the detail and proportions, which is more than can be said for the houses which have been erected during the year in furtherance of the scheme for building on the Warrender Estate. No respect has been paid here to the character of neighbouring houses, which are all of a superior class, nor to the character of the street, which is one of the main approaches to the city. The tenements are not out a story too high, but the details and proportions of doors and windows betray the absence of architectural design, where a little thought and a little extra cost can do so much to help what must be the uniformity of a street. The whole has the pauper aspect of a third-rate tenement. In the extreme west, amid green fields and within about a stone-throw of the Water of Leith at Coltbridge, a very lofty range of tenements, with commodious shops, presents a striking contrast to all the neighbouring edifices, which are suburban villas or cottages of very moderate size. Albert-street, in Leith-walk, is now completed; but building in this direction has not been very active, owing probably to the exorbitant feu duties. In view of these additions made of recent years at the outskirts, a Bill is being prepared for extending the municipal boundary.

The electric light was introduced on the 25th August, the evening of the National Volunteer Review. The wet weather, and damp condition of the vault under the new bridge, where the generating apparatus was placed, prevented its working after a few hours' trial. The lamps are about 50 yards apart, and have never given a very strong light, owing to the tension of the wires, which are exposed to the action of the wind overhead. The period of trial (three months) is about to expire, and the Gas Company have been experimenting on the South-bridge, with lamps having Bray's triangular arrangement of lights. The relative cost of the electric light as compared with that of the present and improved method of lighting Princes-street with gas, is thus given in the *Scotsman*, 4,000 hours being the yearly amount of light:—

Ordinary light, £203; best method of gas lighting, £500; and the electric light, at 2d. per hour per lamp, £1,100.

The wood-pavement of Queensferry-street has proved a failure, and has been replaced with the causeway laid in other streets. In rough weather it was always dirtier-looking than the stone, and more so as it began to exhibit irregularities of surface, when it rapidly disintegrated under the heavy and continuous traffic to which it was exposed. The very uniform level of the street may have been against it. No experiment in the way of street-paving, hitherto attempted in the city, has proved, in respect of durability, equal to the Val de Travers road-way, laid about twelve years ago, in the Kirkgate of Leith, a very narrow but very level thoroughfare. It has undergone, in several places, the torture and disturbance inseparable from the system of pipe-laying adopted, but is still, to all appearance, as intact and serviceable as at first. In wet weather the inequalities appear but trifling compared with the hollows which are seen in causewayed streets, even when bedded in cement. Curiously enough, the Val de Travers of the footway in the North Bridge has had to be relaid within the same period, and this time it is done with Limmer asphalt.

In street architecture of more ornamental character there has been little done. The most noticeable is the very extensive frontage built by the publishers, Messrs. Nelson, as a screen for their works in the Dalkeith-road. The design provides a large central entrance, with a range of offices on either side. The whole is executed in the Scottish Baronial style of ornate type, not without some resemblance in details to the Perpendicular or Elizabethan. The range is in one story, but the gateway has two floors and lofty pyramidal roof, flanked with corner

turrets, and finished with parapet and ornamental details peculiar to the style. It was designed by the architect, Mr. Lessels, to harmonise with the mansion-house, built for the proprietor in the adjoining park. This edifice, as well as Salisbury-green, beside it, is a good sample of the Florid Baronial, and strikes the eye by its picturesque appearance and happy adaptation to its site, having the "crown of the causeway" to itself.

Two rather ambitious-looking alterations in George-street make prominent objects, of some novelty in their design. The one in what may be considered Greek Classic, with porticoes at either end, and window-spaces carefully studied in their proportions for the several floors. The other is Italian; but in this case the frontage is too narrow and too lofty for the character of the detail, which cuts up the whole surface into meaningless strips, with piers, pillars, and pilasters. The doorway is in the style affected by some of the Queen Anne architecture. It has a low lintelled door and an absurd-looking little square hole for transom-light, where all the light that can be got is wanted.

The masonry of the north front of the University extension is now complete, and the roofing timbers are being placed on it. Internally it is in the confusion of a state of progress when many trades are busy. The same may be said of the work of restoration in St. Giles. The work here was begun immediately after the term, as the congregation were provided by Dr. Chambers with accommodation elsewhere till their new church was ready. Galleries and old plaster were speedily removed, and for a while a glimpse of the fine proportions of the vaulted nave could be had; but at present the interior is a forest of scaffolding, the heavy work of removing Mr. Burns' pillars and substituting new ones being now in hand.

The Tower of Free St. George's is nearly complete, and its outline easily seen through the scaffolding. It is of good altitude, 180ft. more or less, and will be a notable landmark in the city, in excellent contrast to its neighbours, the dome of old St. George's, the Perpendicular tower of St. John's, and the massive spire of St. Mary's Cathedral. The church itself is Classic Italian, of ponderous details, massive pillars, pediments and cornices. The new addition has nothing in accord with it, and may be described as a very plain tower, with open belfry stage and lantern above it in the emasculated and eclectic Classic of Queen Anne. The little sculpture employed is flat and of the monumental order, heads alternating with honeysuckle, &c. The pilasters at the angles of the tower are finished off at base of the belfry stage as buttresses, with weatherings having a section of double curvature. Over these the base mouldings project slightly, and these in their turn are carried back with large cavetto sweep to the piers of the belfry stage, which stand considerably back from the lines which form the tower, giving a quaint bell-cast outline to this portion of the edifice. The belfry-stage is Greek, i.e., it has on each face three lintelled openings, the angle piers being carried up above the upper details, to a moderate height, when they have pyramidal tops. The lantern stage is still lighter in design, and is octagonal or circular, with eight circular-headed openings, and conical roof boarded for lead or slate. The outlines for distant effect are all happily proportioned, and the only questionable arrangement is the treatment of the pilasters, which seems to intensify the change from the heavy to the lighter style, the belfry looking more discontinuous in its aspect than if the pilaster projection had been diminished, the apparent bulk of the tower reduced, and the ordinary treatment employed. The merit of the design lies in its simplicity.

Church-building has been, as hitherto, considerably greater as the building trade has been decreasing. Five or six churches have been opened in the course of the year, and as many more are in progress. They are mostly built for the accommodation of outlying districts of later growth, with exception of the church at Dumbiedykes, which is in an old quarter of the town, but one very densely populated. This edifice has been fortunate in finding funds for the completion of its spire, which, although a modest erection, has a fine effect of much greater altitude, arising from its being built on a site midway in one of the steepest streets of the city. It is a galleried church, and with Early

Gothic detail and aspidal end. The Free Church, of Granten and Wardle, in the north outskirts of the city, follows the modern arrangement of the Gothic nave, with narrow passage aisles and transepts. It has a completed tower, and was erected at a cost of about £5,000. It is an anti-galleried design. The U. Presbyterian body have erected a large church in Eyre-place, occupying a splendid site forming the centre, of which a large crescent is the circumference. This church is also ante-galleried—i.e., it has only an end gallery, and by far the greater proportion of the audience are in the area, which is a plain rectangle of rather ungainly width. The congregation are admirably placed as regards the pulpit; but in order to give something like a tolerable appearance to the walls, they are pierced with so many and such large windows on all sides, that the interior is more like a conservatory than a church, and the largest or gable windows face the congregation. The front exhibits the usual arrangement, the gable being reduced in breadth by tower (not finished), and staircase at the other side, "all vertical lines," suggesting something very different from what meets the eye around the corner. The cost of erection was £7,000. The most noticeable sample of an attempt to improve upon the old galleried system, is a very large church built by the U. Presbyterians for the Merchiston district. This was opened lately, and no expense apparently has been spared to make it what it is, one of the most commodious and comfortable churches in the city, in which all the members are placed in the best position as respects the pulpit. The cost was about £13,000. The proportions of the church as to width are much greater than those of the edifice previously mentioned—not less than 45ft. within the piers of the nave. The task of making this interior something better than a railway-shed, even with plenty of funds at command, was not an easy one. But it has been fairly accomplished, and with good proportion as to height, it carries its waggon-boarded ceiling well, the base resting on hammer-beams, or struts of Norman character, which have groined pendentive attachments to the walls. The plan is rectangular, the piers of the nave being massive, of square and quatrefoil section. The arches are low compared with height of clerestory wall, and would have had more pleasing aspect if the ornamentation had been more varied, with more of Norman moulding and less of the Norman billet. The aisles are used only as passages. A vestibule stretching across the front gives access to the interior. This has groined vaulting, very well designed, but its convenience is purchased dearly at the expense of light for the greater portion of the church beneath the gallery. The pulpit is a rostrum, with organ-loft over a lofty wall-screen behind. This serves effectually to dispose of the blank wall-space, but the detail is too flat, and the choir arrangement has too much of the look of a secular orchestra. The building is not so happy in its exterior, which is, perhaps designedly, somewhat of a medley. The Norman chevron adorns the principal openings. The principal doorway in the north gable is profusely decorated, and has a rather shallow interlacing arcade over it, with three lofty lights above. The ordinary method of masking the true proportions as to width has been resorted to, and had it not been for the buttressing, and especially that employed to convert what should have been a Norman bell-turret into a Gothic tower, this north elevation would be a very good specimen of the old Norman front. The tower, however, is a strange mixture of Early Gothic and Perpendicular in the management of its details, till it gets up to where the belfry-stage becomes Norman, with a pyramidal roof of stone. The belfry openings are very short, and look shorter, owing to the absurd length of the opening immediately below. The clerestory is very high over the aisle, and has an uncompleted look, as it is topped with a heavy row of corbels, which carry nothing but a thin line of iron gutter. The windows are lofty gable triplets, in the unbroken surface of the wall, and of purely modern Italian design. The church looks best from the eastern side, where the proportions as to length are better; and the tower appears as a bell-turret over the gable.

The fifth church was opened lately at Dalroy. It is a galleried church. The site was inconveniently small, and no attempt has been made to combine it with the hall built beside it, or

improve upon the popular Nonconformist Gothic of thirty years ago. A large number had to be accommodated in the least possible cubic space; and gallery beams are carried across the pointed windows at the side. The small clock-turret is built at the angle of the front, which carries a spirelet of very ambitious altitude. The cost was about £5,000.

THE HEALTH OF NAVVIES.

IN view of extensive canalisation soon to be done in France, the Minister of Commerce lately consulted the Academy as to measures that should be taken to preserve the health of workmen engaged. A report by M. Colin is the result. In it he notes the persistence of a depressed vital state in certain parts of the country, especially the coast departments, which are chiefly concerned in the works projected. Marshes by their mix-ma are not the sole cause of this "impaludism" (as he calls it); but virgin soil, newly turned, emits morbid germs, whence arise intermittent fevers, &c. With regard to precautionary measures, the report specifies the following:—1. Fragmentation of work, not attacking too many points at once, not entering on a piece of work before the piece next to it, begun previously, is finished. 2. Choosing strong, vigorous navvies, by preference inhabitants of the region; and 3, diminishing the time of contact with the soil. The work should be stopped at times when it is known to be dangerous—viz, July, August, and September, and in the extreme morning and evening hours. Evening vapour on plains and low lying parts is very dangerous. Large fires should be lit in the works morning and evening. 4. Lodging of the navvies in neighbouring centres of habitation, as much as possible in the heart of towns and villages, and on high ground, or where near the sea in pontoons moored at some little distance from the shore. Fevers do much less injury among workmen who reach their homes at night, than among those who remain on the works. 5. A special diet: before his work the navvy should have a substantial hot meal; preventive medications (such as arsenic, extract of nux-vomica, and sulphate of quinine) have not yielded such results as recommend their use. 6. Immediate conveyance to the hospital of a navvy attacked by fever, and caution as to premature re-engagement of men discharged from hospital. 7. Early filling of the excavations, admitting water, in urgent cases, to parts which prove peculiarly infectious, and stimulating vegetation on ground newly upturned.

CHIPS.

We omitted to state last week that the solid parquet floors in the two drawing-rooms, dining-room, library, breakfast-room, boudoir, billiard-room, hall, ante-hall, &c., at Rousdon, the new seat of Sir Henry W. Peck, were laid to special designs by Messrs. A. J. Arrowsmith and Co., of 83, New Bond-street.

At a meeting of the restoration committee of Church Down, near Cheltenham, held on Wednesday week, Mr. H. Philpott, of Cheltenham, was appointed architect, and it was decided that the second section of the work to be carried out in 1882 shall consist of the re-roofing of the nave, south aisle, and parvise-chamber over porch, and the repairing of stonework on tower and battlements. The chancel was restored last year.

A temperance café was opened at Bourn, Lincolnshire, on Wednesday week. Mr. Wilcox, jun., was the architect, and Mr. Topham, of Bourn, was the contractor.

Amongst the new Common Councillors for the City of London elected on Thursday last week was Mr. Alexander Peebles, F.R.I.B.A. Mr. H. H. Bridgman, A.R.I.B.A., was defeated at the poll.

A serious landslide occurred last week at Andoversford, in the deepest cutting on the Cheltenham and Banbury Railway. About 10,000 tons of saturated clay were displaced, and a gang of 100 men will be occupied for a fortnight in restoring the line.

At the meeting of the Chelsea board of guardians last week, it was proposed that Mr. Harcastle be appointed quantity surveyor for the workhouse extension; but, after a discussion, it was resolved to invite several surveyors to tender for the work.

Holton St. Mary Church, Suffolk, was reopened on Friday after restoration.

Building Intelligence.

BURSLER.—On Tuesday afternoon the new building erected at Burslem for the guardians of the Burslem and Wolstanton Union, as a board-room and offices, were opened. The building has been erected from the designs of Mr. G. B. Ford, architect, of Burslem, by Mr. J. Bowden, at a cost of £1,818, in addition to the purchase of the site, costing £112. The style is Queen Anne, and the building is constructed almost entirely of red bricks, with moulded strings. The ground-floor contains board-room, 27ft. 6in. by 10ft. 9in. and a relieving-office, collector's-office, waiting-room, &c.; and the upper story has offices for the clerk, registrar, overseers, &c.

CHURCH EXTENSION.—The usual monthly meeting of the Incorporated Society for Promoting the Enlargement, Building, and Repairing of Churches and Chapels was held last week. Grants of money were made in aid of building the new churches of St. Barnabas, Caneway Lake, in the parish of St. James', Wolverhampton, £250; and St. Chad's, West Cosely, Sedgley, Stafford, £350; enlarging or otherwise improving the accommodation of the following churches—viz., Greatworth, St. Peter, near Banbury, £20; Halstead, St. Andrew, Essex, £60; and Walkern, St. Mary, near Stevenage, £10. Under urgent circumstances, the grant formerly made towards re-seating and restoring the church at St. Pinneck, near Liskeard, Cornwall, was increased from £25 to £10. Grants were also made from the Special Mission Buildings Fund towards building the mission churches of St. Clement's, in the parish of St. Andrew's, Fulham, Middlesex, £20; and Acton-green, in the parish of South Acton, Middlesex, £30.

DARLINGTON.—The usual Christmas decorations at St. Cuthbert's Church, Darlington, are this year supplemented by a piece of decorative work of a permanent character. The ancient panelling at the back of the chancel-stalls, which was destroyed in 1748, has, through the liberality of the Duke of Cleveland, lay rector of the church, been restored from the drawings of Mr. J. P. Pritchett, who about 15 years since carried out the main restoration of the chancel. As every particle of the old panelling was destroyed, the restoration has been imitated from that now existing in the chancel of Staindrop Church, where the stalls, and especially the ends, are so exactly like those at St. Cuthbert's, that they must have been executed from the same drawings, if not by the same hands. This is the more interesting, as at that time one of the Neville family, who owned Raby and Staindrop, was Bishop of Durham, and changed the constitution of Darlington Church from a vicarage to a deanery. By Mr. O. borne, contractor, of Darlington, the work has been executed out of beautiful old English oak, which, after being in the roof of Middleham Church for 300 years, was taken down and replaced lately by a modern roof of foreign oak, during a so-called "restoration" of the church. The carving is an excellent reproduction of the old work at Staindrop. Two of the stalls—the place of honour—viz., the "return" stalls on north and south sides facing east, are enriched by having the coats of arms, crests, mitre, and coronet respectively of the Lord Bishop of the Diocese and the Duke of Cleveland blazoned in colour by Mr. Low Heral, printer, of Darlington. A further improvement in the chancel is the removal of the coils of hot-water pipes, which for about fourteen years had disfigured the chancel. This has been done by the churchwardens.

OUNLEE.—The structure being erected at Oundle, for the Grocers' Company, for the grammar-school, is now drawing towards completion. The buildings are in the Tudor style. The principal front stands back about 9ft. from the street line, and is about 130ft. in length, and 30ft. high to the top of the parapet, with an octagonal bell-turret at the corner about 48ft. in height, and a tower 20ft. square in the centre, on the top of which is the flag-turret, reaching to a height of about 60ft. The external facings are of finely-axed stone from the Sutton pits; the dressings to windows, arched, &c., are of Ketton stone; and the strings, plinths, copings, &c., are of Clipsham stone. The whole

of the internal finishings to windows, doors, &c., are of wainscot-oak, and all the floors to classrooms, corridors, and masters' rooms, are of the same material, with plastered walls and ceilings, and cement dados. The roofs are covered with green slates, with ornamental red tile ridges. The whole of the works are being very satisfactorily carried out by Mr. John Thompson, mayor of Peterborough (who has been ably represented constantly on the works by Mr. Wm. Bradford), and from the designs, and under the personal superintendence, of Mr. J. Sebastian Gwilt, architect to the Grocers' Company, London, aided by Messrs. Shoppee, his surveyors.

"To a practical man with a taste for mechanics, and the hums of constructive fairly well developed, we can conceive no higher mental treat than a couple of hours spent over the June numbers of that truly marvellous publication the *English Mechanic*. In a hundred and fifty odd pages that make up the bulky mass of letterpress, there is recondite information on almost every conceivable subject, ranging from how to construct a mouse-trap, to the latest method of calculating the phases of Orion;—*The Brightonian*. Price Two-pence of all newsmen, or post free 2½d.—31, Tavistock-street, Covent garden, W.C.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No front page or paragraph Advertisement inserted for less than 6s.

SITUATIONS.

The charge for advertisements for "Situations Wanted" is ONE SHILLING for TWENTY WORDS, and Sixpence for every eight words after. All Situation advertisements must be prepaid.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday. Front page advertisements and alterations in serial advertisements must reach the office by Tuesday to secure insertion.

TERMS OF SUBSCRIPTIONS.

(Payable in Advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom; for the United States, £1 6s. 6d. (or 6dols. 40c. gold). To France or Belgium, £1 6s. 6d. (or 33s. 30c.). To India (via Brindisi), £1 10s. 10d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

Cases for binding the half-yearly volumes, 2s. each.

NOTICE.

Now Ready.

Vol. XL. Price 12s. A few bound volumes of Vol. XXXIX. may still be had, price Twelve Shillings; all the other volumes are out of print. Most of the back numbers of former volumes are, however, to be had. Subscribers requiring any back numbers to complete vol. just ended should order at once, as many of them soon run out of print.

RECEIVED.—B. on T. U.—W. B.—T. L. B.—T. L.—W. A.—V. of K.—P. G.—S. and P. L. B.—V. T.—W. F.

F. Write the Secretary, at 12, Great George-street, S.W.

"BUILDING NEWS" DESIGNING CLUB.

DRAWINGS RECEIVED.—Sigma, H. F. S., Eclipse, Rollo, Just my Luck, Othello, That's my Idea, Beta, K., Spes, Eos, Fred, Good Luck to Your Fishing, Confido, Ambition, Semper Paratus, Gramgram, Bean Stalk, Try, "Crescam" in crescent. One of Them, June, Deva, H. A. G., S. W. R., H. S. L., L. S.

THE LATE MR. GEO. CHILDS.

Is addition to the sums acknowledged last week, we have also received the following:—

Mr. Thomas Archer 3 3 0
Mr. C. J. Fergusson 1 1 0
We have forwarded the amounts sent to us to Mrs. Childs, and are requested by her to tender her grateful acknowledgments to those who have assisted her.

Correspondence.

PROVINCIAL ARCHITECTS AND THE INSTITUTE.

To the Editor of the BUILDING NEWS.

SIR,—As Mr. Thomas Drew appears to be so very anxious for argument, I have again perused his letters which appeared in the BUILDING

News of December 2nd, 9th, and 23rd inst., and divesting them of eloquent padding, and feeling conscious of my inability to grasp their transcendently practical conclusions, I am only able to thus summarise them.

"Not to seek unduly for the increase of the numbers of Fellows of the Institute."

Required "a United Kingdom list of registered members of the Institute," and into this to "sweep every provincial architect of decent repute, competency, and irreproachable professional conduct, admitted by the recommendation of trusted Fellows of the Institute, by ballot or examination," or as Mr. Drew afterwards proposes, "Every fairly competent and qualified practising architect in the three kingdoms held in his locality of practice in honest and honourable repute."

The "annual subscription maintaining such registration to be one guinea, or even a more moderate fee." Now what is there in Mr. Drew's suggestions worth the consideration of Institute? The present constitution must not unduly seek its increase; but when the register is open it may "sweep" (as Mr. Drew euphemistically terms it) every decent architect into it. And, so far as I am able to read, just about on the same conditions as Associates, and Fellows are now admitted. Mr. Drew knows that after the 31st inst., an applicant will not be put up for admission, unless he undergoes an examination, and, judging from his description of the examination for admission to the dentists' association, the R.I.B.A., will not fall short in that respect. What, then, becomes of the grand movement of Mr. Thomas Drew? Where are his suggestions of practical value? Where are his "definite propositions" which are now in force at the Institute?

It appears to me that the important alteration which Mr. Drew desires is that funny little notion about election by, I presume, local brethren—very pretty in conception it no doubt is—but would it be an improvement on the present system? Perhaps, though, from the point of view of a local architect, it would be thoroughly satisfactory. One can well imagine half a dozen local practitioners assembling some evening at the local "pub" or meeting-house, and, after exchanges of mutual admiration, they decide that they are all "honest and of honourable repute"; they each and all determine to place themselves on the "register" at the price desired by Mr. Drew, viz., half a guinea (certainly not exceeding one guinea); they elect each other, and half a dozen names are added to the list of provincial architects. Surely this is sufficiently "encouraging," and would, no doubt, "sweep" every provincial architect into the Institute; but whether or not the dignity of the body would be thereby increased, must be left for Mr. Drew to determine.—I am, &c.,

WM. WOODWARD.

SIR,—As there has been much discussion lately as to the value of the letters "R.I.B.A.," any facts relating thereto will be of interest. A short time ago a work in London was intrusted to me, and I found (which is not surprising) that my name had not been the only "Richard in the field." I also learned that one of the arguments used in favour of my employment was that I did not happen to belong to the Institute. Those concerned, of course, had their own reasons for avoiding members of that body; these, however, did not include a desire to also avoid the payment of the usual five per cent. (The full commission was paid with high compliments thrown in.) I can hardly think that my experience stands quite alone; it, however, certainly goes to corroborate the too-patent fact that, with the mass of the public, membership of the Institute at present counts for little. Even in London some of the most gifted, as well as most distinguished architects, have never belonged to it. But with proper management, a future generation may see a different state of things, and to this end I think that suggestions for judicious reforms, especially from our brethren in the country, should be respectfully received, and carefully weighed by those who are responsible, at least to some extent, for the future status of the Institute.—I am, &c.,

A LONDON ARCHITECT.

CLERKS OF WORKS.

SIR,—It is good news to hear that "Another Clerk of Works's" experience is that the appoint-

ments of ratepayers' associations are only the exceptions to the rule, though the advertisement columns of the BUILDING NEWS scarcely bear out the assertion, and my experience of these associations is that the reputation of the architect, or the efficient carrying out of his views, are entirely subservient to the gaining of a victory in a paltry petty squabble among the doubtfully favoured few who hold honorary office under the vacillating sufferance of an electorate.

But I cannot agree that my position is altered, because a clerk of works and jobbing carpenter may take an office that a builder's foreman might decline. Possibly a poor struggling architect, did his pride permit, would often be glad of the regular earnings of a clerk of works, or even of this jobbing carpenter.

In the neighbourhood from which I write, there is a notable instance of an architect in practice entering the lists in the manner I have indicated, as a quasi clerk of works, and carrying out board-schools in the very teeth of the Board's architect, who, moreover, is a well-known school builder, and a prominent F.R.I.B.A. I think these anomalies of grade all tend to prove the clerk of works is of the profession, and not in the trade, where trade-unionism drags (or lifts, if you prefer the word) all its members to one uniform level, and most zealously guards against any such infringements. Neither does it signify that a man may be at one and the same time a bricklayer's labourer by trade, and a tin-whistler by profession.

Then as to the mutual advantages of association. A Landseer may, to his professional profit, ally himself with a Frank Buckland, or a keeper at the Zoo, or even with a "dawg"-fancier; but who would think of starting a society for their mutual benefit? So may a young doctor chum in with the chemist, or his pupil, or assistant, and circumstances may even force them to exchange situations, but through all, one is a profession and the other a trade. And although the individuals may continue the best of friends, the duties are inimical. The Custom House officer may get useful hints from the merchant's clerk, and so may the policeman from a thief; but society will never allow them to combine in associations for their mutual advantage. No, let us as a class stand by our employers, who are or should be the architects, and keep professionally aloof from the foremen, who are one with the contractors. The "builder himself" should be the last man on the face of the earth to make the selection to recruit the ranks of the clerks of works. We and the architects should take sufficient leaves out of the book of trade-unionism to arrogate to ourselves the choice of recruits, and there may come a day when a board would no more think of dictating to an architect who his clerk of works shall be, than they would, who shall be his perspective draughtsman.—I am, &c.,

ONE C. W. MORE.

SIR,—Continuing the subject relative to the establishment of a society composed of clerks of works and builders' foremen, allow me to say that it is most urgently needed. It is useless for your correspondent to say otherwise, or to try to instil into the minds of others that they should be separate; he is separate, no doubt, if he takes his stand as before even the architect, and I very much wonder indeed that he should condescend to notice my communication from his elevated point of view. As to the remarks made, that distance from his architect favours the builder to become dishonest, and that the chances are largely that he will, I do not assent to that at all; it is not to the builder's interest in the long-run to act so; usually he has to maintain the building some time after it is finished, and scamping work would then tell against him. Nothing whatever is said as to the unjust manner in which some clerks of works will act towards the contractors under them, which, in some cases that I have known, was tyrannical to a degree.

But we cannot establish a society by bickering amongst ourselves; rather should we hold together, those who are in the mind to go forward, having a bond of unity amongst us, and striving to pull together, with a determination to do and accomplish the purpose in view.

The position in which we at present stand, and as depicted by another of your correspondents in this week's issue of your paper, is, to

say the least, deplorable. That we should be obliged to go begging for work in the manner described is not at all satisfactory to my mind. Now, a society established, and in working order, one of its objects should be to take account of those members who may happen to be without employment and further their interests by placing them in work as early as possible. I am sorry for anyone who may be struggling to keep his head up and happens to be without an engagement. It may be urged, we shall degenerate into trade-unionism; but such is not in my thoughts. What I seek is the social well-being of my fellow leaders-on in the trade, and my best efforts shall be brought to bear for that purpose.

Should a meeting in London be arranged, I would endeavour then to propound a course of examinations that I think might very profitably be held. In the mean time, I hope others will come forward and give their views.—I am, &c.,

CHARLES SHORE.

7, Salisbury-terrace, West Fields, Newbury.
Dec. 27.

FULHAM INFIRMARY COMPETITION.

SIR,—We have little time—and less inclination—to answer the criticisms of unsuccessful competitors, except when they state what is not true. This is the case with a Mr. M'Lachlan who tells your readers that in our plan patients must go into the cold air to reach the w.c. and bath-rooms. The most cursory examination of the plan ought to have shown him that the balconies are not open, but glazed.

On the question of estimate it may be useful to this gentleman to know that ours is no guess-work, but the result of experience in recent tendering for similar works; and our views of cost were endorsed by the arbitrator, himself a man of great experience. The difference of 50 per cent. alluded to no doubt represents the difference likely to arise between one who *knows* and one who *guesses*.—We are, &c.,

JOHN GILES AND GOUGH.

GLASGOW MUNICIPAL BUILDINGS COMPETITION.

SIR,—As assessors should, like Caesar's wife, be above suspicion, would not that desirable condition be more assured if others than Mr. Barry and Mr. Carrick were appointed to adjudicate on the final competition? It is to be presumed that in the preliminary selections a strict incognita will have been preserved; that Mr. Barry was unable to identify designs submitted by his London brethren, and that Mr. Carrick was equally ignorant of the identity of Scotch designs. If, however, the same assessors are to adjudicate on the same designs in a matured form, it is evident that the authorship of each one will be known to them.

Assessors, or even city architects, are only human, and as, under such circumstances, a predilection of some one or other of the selected competitors may possibly be suspected to have some weight in the final selection, it would be only considerate to relieve these gentlemen from a position which might leave their action open to misconception.

In the Manchester Town-hall competition, for which preliminary sketches were first submitted and a selection from them made, the same assessor was not employed in the final competition.—I am, &c.,

"TORUS."

P.S.—If the services of Mr. Barry and Mr. Carrick are to be retained throughout, I think the adoption of your correspondent "A. B. C.'s" suggestion, that in the preliminary competition the order of merit of the designs selected should be declared, would afford some assurance to competitors, for then, any departure from this order should account for itself.

KNIGHTLEY v. LETT.

SIR,—With reference to this case I beg to call attention to an inaccuracy in your report. In your last issue you say that "The plaintiff did not attend the trial, and the defendant, after asking for and failing to obtain an explanation from the plaintiff, wrote to the Metropolitan Board of Works." No explanation was refused. The facts are as follows:—Lett sent a messenger asking me to take up the business for him, as he had commenced an action of ejectment against Miss Hambridge, which I declined; he then wrote

me that a letter was written and would be sent by a time he named to the Metropolitan Board of Works, exposing me unless I consented to do what he had asked me. To that I replied "I decline all private practice in my district," whereupon the letter was sent, subsequently withdrawn, and then returned with additions.

I wish it to be understood that all the parties were strangers to me, and that at no time had I had any business transactions with either.

The conclusion of your report is also not quite accurate: a rule only has been obtained.—I am, &c., T. E. KNIGHTLEY.

VALVE-CLOSETS AND THEIR TRAPS.

SIR,—I entirely disagree with Mr. P. J. Davies in his assertion on p. 822 that:—"Under all valve-closets, a properly-constructed ∞ -trap is the only one at present invented that will prove thoroughly efficacious." For my part, I consider "a properly-constructed" siphon-trap much better. The only case where the ∞ -trap might be better would be where there was no allowance for a ventilating-pipe being put in; and experiment has yet to prove the value of improved siphon-traps relatively to the ∞ -traps under such exceptional circumstances.

The siphon-trap Mr. Davies shows at Fig. 129 under his valve-closet is undoubtedly a badly-shaped one for the purpose; but he might have shown a well-shaped one—viz., one with its out-go more perpendicular, as it is often made, and with a deeper water-lock.

I here show one designed and used under a Bramah valve-closet by myself, which I believe won't momentum out, and neither will it siphon out if properly ventilated, and especially if applied under valve-closets led into a 4in. soil-pipe. The section at tongue at bottom may be ∞ .

In practice, where baths, basins, and sinks are frequently branched into the same soil-pipe as the valve-closets, it is often not the trap of the closet itself that gives the trouble, but the traps of the other appliances that empty when the valve-closet is let off; this bad effect being often caused by want of sufficient ventilation, both on the soil-pipe and the branch-pipes.

Of course I don't approve of this plan, and have often to rectify matters where it has been carried out.—I am, &c., W. P. BUCHAN.

21, Renfrew-street, Glasgow, Dec. 26.

THE LATE MAJOR MANT, R.E.

SIR,—Mr. Fotheringham, in your last week's issue, asks permission, *in justice to himself*, to say a few words relative to your report of my communication to the R.I.B.A. on the 5th inst.

Mr. Fotheringham seems only to substantiate what I said, except in one particular—viz., that he joined Major Mant in the middle of 1875, instead of in 1876, as I said.

Perhaps you will allow me also to state, *in justice to myself*, that I read over the whole of my paper to Mr. Fotheringham a week previous to my delivering it at the R.I.B.A.; that I added the paragraph respecting him at his dictation; and further, that on the Thursday following, December 1st, I placed the printed *volume* in his hands to read, the *volume* which you give in full, in which "1876" is printed, and not "1875." That Mr. Fotheringham did not correct it on these occasions is surely his fault—not mine.

I am very glad to hear that Mr. Fotheringham has been instructed by the Baroda and Kolhapur States to complete the working drawings of these palaces. There is none so capable as he is of carrying out these works.—I am, &c., R. PHENIX SMILES.

Carlton Chambers, 12, Regent-street,
London, W., Dec. 25.

ON THE TESTING OF CREASOTE OR DEAD OILS USED FOR "PICKLING" OR PRESERVING TIMBER.

SIR,—The oils used for the purpose of pickling or preserving timber are obtained in the dis-

tillation of coal-tar. That portion of the distillate which has a specific gravity ranging from 1.000 to 1.060 is collected in separate receivers, and after a portion of it has been treated for carbolic acid, the remaining oil is considered as creasote or dead oil. But commercial creasote oil does not consist of this portion of the distillate alone; all the oils obtained in the distillation of coal-tar, after they have been exhausted of their commercial products, if not otherwise saleable, are mixed with the creasote oil. Creasote oil is used in immense quantities by the railway companies for pickling railway "sleepers." Some idea of the extent to which this oil is used may be gathered from the fact that the probable annual produce of creasote oil, in Great Britain, exceeds 30 millions of gallons, and the great bulk of this is used by the railway companies and a few large timber establishments. Contracts for the supply of the oils are let by the railway companies and secured by tar-distillers for periods of from six to twelve months, certain conditions as to the quality of the oils supplied being specified in the contract,—the following conditions, drawn up, or laid down, by Dr. Letheby some 20 years ago, being the most general.

"It should have density between 1.045 and 1.055. It should not deposit any crystalline matter at a temperature of 40° Fahr., it should yield not less than five per cent. of crude carbolic acid to a solution of KHO, caustic potash, of the density 1.070 (14 Twaddell), and it should furnish 90 per cent. of liquid oil when distilled to the temperature of 600° Fahr."

The condition to which I wish especially to draw attention is that relating to the yield of carbolic acid. Many analysts, who have had disputed samples of oils submitted to them, have stated in their reports that the oil contained so many per cents. of tar acids, of which so many per cents. consisted of crude carbolic acid. Now, since there is no known method of estimating or separating crude carbolic acid from other tar acids, when dealing with such small quantities as are obtained in the testing of creasote oils, it would be instructive, and, no doubt, interesting, if some one of these analysts would kindly state the method adopted in determining the quantity of carbolic acid present in the crude tar acids. Again, the question arises, What is meant by crude carbolic acid, since crude carbolic acid is not a definite compound, but contains varying percentages of water, carbolic, and cresylic acids, and other higher homologues? The condition, also, that it shall yield not less than 5 per cent. of crude carbolic acid "to a solution of caustic potash of 1.070" is very indefinite, for it is well known that varying volumes of alkali will extract varying quantities of tar acids; and not only is this so, but the yield of acids depends also on the length of time during which the solution is agitated. Discrepancies may also arise from the fact that the solutions of alkali and oil have densities (especially after agitation) so nearly alike that it is impossible to get a fair result, owing to the imperfect separation of the alkali from the oil. This may, however, be obviated by the addition of petroleum or coal-tar naphtha after agitation.

It is usual, I believe, with many analysts to state the quantity of crude tar acids present as that shown by the increase in volume of the potash solution; but this is not so, since the water always present in creasote oils will, of course, during agitation, be taken up by the caustic potash, and would increase the volume, thus reading as tar acids. Some really remarkable results have been thus obtained by analysts, it being a usual occurrence for them to report that the oils contain 5 per cent., 12 per cent., and 25 per cent. of crude carbolic acid. One eminent analyst some years ago reported a sample of oil as containing 75 per cent. of carbolic acid. The remarkable nature of these results may be understood when we note that the price of creasote oil in bulk is about 2d. per gallon, whilst the price of ordinary crude carbolic acid in bulk, as made in the tar-works, is from 2s. to 3s. per gallon; thus the presence of 10 per cent. of crude carbolic acid would increase the value of the oil at least 11d. per gallon, and with the present high price of tar it is not to be expected that the tar-distiller is so blind to his own interest as to leave a 45 note in every 1,000 gallons of oil he sends from the works, which, figuratively speaking, he would be doing if he left 10 per cent. carbolic acid in the creasote oil.

Again, in regard to the quantity of naphthalene deposited on cooling to 10° F., there is no stipulated time during which this exposure to cold shall continue. Hence another reason for discrepancies.

It has never yet, I believe, been practically demonstrated that the presence of carbolic acid is essential for pickling purposes. The preservative property of creasote oil is probably solely due to the fact that the wood saturated with oil is more impervious to water, and in consequence of the pores on the outer surface being filled with oil, is better able to resist atmospheric influences. In my humble opinion, it would be to the interests of the railway companies to institute a series of experiments on the creasoting or pickling of timber

with oils of varying specific gravities. If the timber was first pickled with ordinary creasote oil, half the usual quantity, and afterwards with a heavier oil containing, in solution, coal-tar pitch, good results would, I believe, be obtained, though the wood would not absorb so large a percentage of oil. This would be compensated for by the greater length of time the oil would remain unvolatilised in the wood. The oils containing pitch on the surface evaporating on exposure would leave the pitch in the pores of the wood, and would thus, as it were, hermetically seal them, preventing the oil in the interior from reaching the surface and evaporating.—I am, &c., CHEMISTIANA.

Entercommunication.

QUESTIONS.

[6383].—**Estimate.**—Will some kind reader of the BUILDING NEWS kindly tell a young architect the mode of estimating the cost of a building at so much the cube foot? Thus I see in the BUILDING NEWS notice of the Fulham Infirmary Competition the following:—"The estimate is £33,750, calculated at 51. per foot." How is the 51. per foot got at? An answer would greatly oblige.—H. F. S.

[6389].—**Floors.**—I am about to design a floor, and have two methods suggested. A sample floor 81 sup. ft. area is taken, 9ft. by 9ft. No. 1 is made with 12in. rough deal boards, ploughed and tongued, resting on 8 joists, 9in. by 3in. thick, with 9in. bearings on walls, 12in. between joists. No. 2 floor is made with rough deals, 9in. by 3in., ploughed and tongued, with 4in. bearing on walls at ends, and in the centre resting on a beam 9in. by 9in., with 9in. bearing on walls. Are these floors of equal strength? What is the cost each? All the timber used is deal.—CARVITO.

[6340].—**Fir and Pine Timber.**—I have read numerous answers and articles in the BUILDING NEWS on the subject of fir and pine timber, and many books on the same subject; but unfortunately am still confused as to the nomenclature. "White deal" appears to be applied indiscriminately to the wood of the trees of two distinct species—viz., to yellow deal (*Pinus sylvestris* or Scotch fir), which has been tapped in the tree of its turpentine and resin, as well as to the wood of the spruce (*Abies excelsa*). Would some of your readers kindly inform me what are the ordinary London market names for each of the following:—(1) "Yellow deal" (or the red wood of the timber merchant, Scotch fir, botanically *Pinus sylvestris*)? (2) The same, tapped in the growing tree of its turps and resin? (3) The wood of the spruce fir, botanically *Abies excelsa*? To this kind of white deal the best Petersburg and Onega white goods are said to belong. *White deal* the South Kensington "Notes on Building Construction," Vol. III. If the 2nd is distinguished in name from the 1st in the market, surely it should also be distinguished from the 3rd, instead of being designated with the 3rd under the common name of white wood or white deal.—L. R.

[6841].—**Reservoirs.**—Will some one kindly inform me which is the best and cheapest way to cover in two reservoirs, 120ft. long, 50ft. wide, and 10ft. deep—one of them "puddled," the other a stone-walled reservoir?—RESERVOIR.

[6842].—**Water Distribution.**—Will some reader inform me of any reliable publication on the distribution of water to towns, &c., also giving details of fittings and general waterworks machinery?—MAXNESSEA.

[6843].—**Building Regulations in Ipswich.**—Can any correspondent inform me whether there are any special restrictions as to height of rooms, drainage, &c., of small houses in the borough of Ipswich; also as to the main points of a sheet of drainage instructions, published by Mr. Buckham, the surveyor of that borough, three or four years since, and favourably reviewed at the time in your columns? I have a small job to carry out in that town, and shall be glad of information.—MAX or KENT.

REPLIES.

[6324].—**Norman Woodwork.**—Mr. A. Nesbitt, in a current number of *Notes and Queries*, refers to the timberwork in the hall of the Bishop's Palace at Hereford as probably dating from the latter part of the 12th century. Can some reader of the BUILDING NEWS give further particulars relative to this ancient oak work?—HARRY HEMS.

[6726].—**Girdler.**—OMISSIONS AND MISPRINTS.—Page 809, second column, 29th line from top, after "From the upper," read "point C" &c.; 4th line from bottom, after "direction," read "to that they had," &c.; third column, 22nd and 24th lines from top, read "40 C" and "C C H" instead of "KGC C" and "C C H K." The letters or signs to the diagrams of the simple trusses to be considered as omitted. In the other diagrams, single lines represent tensile forces or pieces under a tensile strain, double lines represent compressive forces or pieces under a compressive strain, the treble line in the diagram of forces represents both tensile and compressive forces.—HUGO McLACHLAN.

[6760].—**Sp. G. and Crushing Weight of Stones.**—I thank Mr. Hems for his information as to the fact that there is a difference between "Corshill" and "Dumfries" stone. I however guarded myself by saying "probably the same" in reference thereto, being not quite certain of the fact. The fact that I gave in my answer as to the same stone being called by the two names is, I assure him, quite true. This is confirmed by a letter from Mr. Trickett to the BUILDING NEWS, July 30, 1875, when he says, speaking of Red Corshill stone, "sometimes called Northfield Red and sometimes Dumfries Red, with which latter stone it is frequently confounded." Not having seen this letter before, and know-

* Since making this trap I find it is not a brand new modification of Mr. S. S. Hellyer's Anti- ∞ -trap.

ing "Corsehill" stone to come from the county of Dumfries, my mistake was a very natural one. Mr. Harry Hems does not appear to have noticed my exception to the theory of the use of working stones increasing with their strength and hardness. I did not intend to imply that the labour of working Corsehill stone is about three times as great as working Portland, yet I believe it is the case that it is more difficult to work on Corsehill stone than Portland, notwithstanding the fossils and veins in the latter. Now Mr. Hems has again called my attention to the Corsehill stone, I fancy I was wrong in referring to it as having veins "like grain in timber," the stone I was then thinking of comes I believe from York-shire. Should be glad to know where any true Dumfries stone is to be found in London. I am not so much a native of Scotland as some imagine, having been born within three miles of Mr. Hems's birthplace.—HUGH McLACHLAN.

[6778].—**Drain.**—MISPRINT.—For "only" at end of second line read "also."—HUGH McLACHLAN.

[6785].—**Selection by Architect.**—An architect should in all cases avoid ordering goods which he selects, for in the event of client or contractor refusing to pay, or in case of bankruptcy of the latter, he would be liable for payment, though perhaps without chance of recovery. When he selects goods, he should state that they are to be ordered by the contractor and set aside for that purpose, at the same time writing to the contractor to order the goods, giving him a description or number to ensure correctness. If the contractor refuses to order, the architect can withhold certificate. An architect can only select goods according to specification and conditions unless the contractor agrees to his doing so. "Nodmel" should read the case on "Broken Bricks," reported in the "Legal Intelligence" of BUILDING NEWS, Dec. 2.—HUGH McLACHLAN.

[6787].—**Breaking Weight of Girder.**—The formula given by Mr. A. C. Hurley on p. 773 is a good and simple one. He, however, makes one mistake when he says "the safe load for wrought-iron girders is $\frac{1}{4}$ the B. W." This is only the case when the depth of the girder is one-fourteenth of its span or less. In the case given by "Indoctus," the depth being one twenty-fourth of the span, the safe load is $\frac{W}{16}$ or $\frac{B. W.}{16}$; a list of these safe

loads is given in Hurst's "Architectural Surveyor's Handbook." This formula allows for rivet-holes. That by Mr. W. J. Christie is similar to one in Molesworth's Handbook; the result is nearly the same as that given by Mr. Hurley, but it gives a smaller breaking weight. Is not Mr. C.'s allowance for rivet-holes too great? What formula of Molesworth's does Mr. Robinson refer to? Certainly, neither of the two to be found in the handbook.—HUGH McLACHLAN.

[6789].—**Scantling for Tile Roof Rafter.**—Five inches deep by two and a quarter inches broad.—HUGH McLACHLAN.

[6790].—**Clubs.**—The Travellers', Reform, Carlton, United Service, and other clubs in Pall-mall, are all generally considered to be well arranged, but I cannot say where plans are to be found. Plans, &c., of the following have been published:—Manchester Conservative Club House, BUILDING NEWS, Aug. 27, 1875; St. Stephen's Club, Westminster, BUILDING NEWS, Sept. 17, 1875; City Liberal Club, Wallbrook, London, BUILDING NEWS, Jan. 11, 1878; and Conservative Club, Preston, THE ARCHITECT, May 17, 1879. Many others have been illustrated without plans. I have not referred to them.—HUGH McLACHLAN.

[6792].—**Chancel Screen.**—In the Middle Ages Perpendicular screens were often erected in churches of earlier date, though they were then always carried out according to the style in vogue. This argument does not apply in the present day, when the furniture of a church should be in accordance with the style of the church itself, if style is considered. A practical reason for a Perpendicular screen in a modern Early English Church may be given, that it can be carried out in a lighter manner than if it were in accord with the style of the building.—HUGH McLACHLAN.

[6794].—**Problem.**—The answers to this seem to increase the difference of opinion as to the correct solution. One is obliged to say, with W. S. Daws, "all different but all wrong," and might add "some also very confusing." Is not the following the simple and correct answer?

Price paid by A. for lease	£1050
Increased rent last four years	200
	£1250

$\therefore 1250 \div 14 = 89\frac{3}{7}$ nearly, the proportionate amount each year. $\therefore 89\frac{3}{7} \times 4 = £357$ approximately as the amount B. should pay.—T. R. H.

[6797].—**Villa.**—A really good book on house-planning is "The English Gentleman's House," by Prof. Kerr.—HUGH McLACHLAN.

[6805].—**Bath.**—Neither Parian cement nor plaster of Paris will stand the water, as they are not hydraulic cements. I was, however, informed by Messrs. Hoig & Butler, of East Greenwich, who had a stand at the Brighton Exhibition, that there was a process now being brought out whereby cement could be coloured right through the surface. "Alba" had better communicate with them.—LEWES.

[6813].—**Water.**—The water by which "Urgent's" cellars are flooded is evidently subsoil water, the level of which will rise and fall according to the wetness or dryness of the season. The only satisfactory way of dealing with the case will be to drain the site, so as to permanently lower the level of the subsoil water. If that will ultimately be practicable, but is not at present, it is possible to raise the floors temporarily? To attempt to prevent the annoyance with cement, &c., in such a case would fail.—J. S. Manchester.

[6813].—**Water.**—I will guarantee the success of the method proposed by me in a former reply. I have cemented cellars near a river which were flooded in every high tide. Have also built them in gr and full of land-springs, and they are as dry to-day as when made, years ago.—LEWES.

[6813].—**Water.**—In this reply on p. 887, the illustration necessary to render the text comprehensible was omitted and placed by the printer in our article on "Ancient Floors," on p. 816, with which, of course, it had no connection.—E. B. N.

[6816].—**Cracked Sewer Pipes.**—It is the experience of most persons who have constructed and reconstructed pipe sewers of the sizes named by your correspondent "Obliged" at depths of 8 ft. and upwards, that frequently, from unknown causes, the pipes have afterwards been found to be cracked, even when the greatest care has been taken in the selection of the pipes. I have in some cases found the following causes at work. I. Laying pipes on rigid foundations such as rock, compact clay, and hard gravel, without cutting holes for the sockets. II. Lying on yielding foundations as upon sand or made ground. III. By laying them at too great a depth, and not taking sufficient care to insure the consolidation of the earth as it is filled in upon them, so that as soon as the cutting gets thoroughly saturated with water a sudden settlement takes place, and the pipes are instantly injured. IV. As well as by laying them at too shallow a depth. When it becomes necessary to insure the safety of the pipes by covering them with sin or 12 in. of concrete, it is advisable to consider whether brickwork should not be substituted.—J. S. Manchester.

[6817].—**Damp Wall.**—There are several solutions that render brick walls waterproof without concealing the bricks. Some, such as the petrifying process, are patented, others are simple applications, viz., soft soap and alum, size and boiled oil, &c., and appear to be effective when properly done. Brickwork must be set fairly dry, and holes stopped with putty. In very exposed situations several applications are necessary. It is better to make provision in building south west walls than depend on any solution; nevertheless, I have found solutions very useful in several cases.—T. R. H.

[6831].—**Damp Wall.**—If "J. D." will try three or four coats of transparent duresco, made by the Silicate Paint Co., 46, Cannon-street, I think it will have the desired effect, without altering the colour of his brickwork, except to a slight extent.—LEWES.

[6832].—**Soil Pipe.**—I should say that a galvanised iron soil pipe is superior to one not galvanised, provided the spelter used is pure and properly applied; because even if the zinc becomes corroded by sewage vapour, &c., it would be the work of time, whereas unprotected iron exposed to moisture and the free access of air is liable to rapid decay from rust. I am supposing that the soil pipe will be tolerably well ventilated, for zinc in an atmosphere polluted by sulphuretted hydrogen or vitiated by dilute acids, is soon destroyed, no matter whether it stands alone or forms a coating to another metal. The galvanic action between the metals will be to the loss of the zinc and to the benefit of the iron, inasmuch as it will tend to protect the latter from oxidation. The durability of a galvanised iron soil pipe seems to me to depend first upon its quality, the absence of minute cracks and pinholes, and an unbroken and uninterrupted hold between the iron and zinc; and, secondly, upon its occasional external painting and thorough internal cleansing and ventilation.—W. J. Christie.

[6834].—**Damp Walls.**—Possibly no wet comes in, and the indications of damp are caused by a humid atmosphere, especially after a sudden rise in atmospheric temperature, acting on new walls. Possibly the walls are disintegrated or pored, in which case the animal matter of the size and the vegetable matter of the paste having affinity for moisture, cause alarming patches, which, however, are only superficial. A little time for the walls to season, and this action will gradually cease.—T. R. H.

[6836].—**Damp Walls.**—If your cementing has been properly executed you should have no damp. There are probably some small cracks through which the rain penetrates. The wet, no doubt, goes right through brickwork of chimneys. If you do not care to cement them, try three or four coats of transparent duresco.—LEWES.

LEGAL INTELLIGENCE.

COVENANT TO REPAIR.—THE GOLDSMITH'S COMPANY AND THEIR TENANTS.—An inquiry as to alleged dilapidations in certain property of the Goldsmiths' Company was brought to a close on Thursday, Dec. 22nd, before Mr. T. Chaffield Clarke, F.R.I.B.A., to whom it had been referred by Mr. Justice Field. The inquiry arose out of an action for ejectment, in the Court of Queen's Bench, in which the question arose whether the defendant had properly performed his covenants to repair, or whether he had by his neglect sufficiently to carry out the repairs needed by the plaintiffs, rendered himself liable to ejectment under the terms of his lease; and there was the further question whether the repairs which the plaintiffs required the defendant to execute were such as came properly within the covenants he had entered into. The plaintiffs were the four trustees of the Cotton estate, Mile End, Middlesex, and the defendant was Joseph James Grinyer, the tenant of the premises, 146, Turner's-row, on the estate. The statement of claim by plaintiffs set forth that the lease under which the defendant had possession of the premises contained repairing covenants which defendant had failed to observe; that he had allowed the house to get into a state of dilapidation, and that in consequence of this neglect on defendant's part the plaintiff served him with notice to repair on March 15th, 1880, together with a schedule of dilapidations, and that notwithstanding that, the defendant had failed to repair up to the present moment. This action was accordingly brought to recover possession of the premises. The defence was that, although the premises were somewhat out of repair before, they were not so at the time of the commencement of this action, that every-

thing had been done by defendant that he was bound to do by the requirements of his lease, and that he had spent a considerable sum in carrying out such repairs as were actually necessary, that he could not reasonably or legally be called upon to do more, and that, therefore, the plaintiffs had no power to eject him. Mr. Chaffield Clarke was directed by Mr. Justice Field to inquire and report as to the fulfilment of the covenants to repair, the cost of the repairs specified in the plaintiff's notice to repair, whether those repairs were such as the defendant was liable to do under the covenant of the lease; whether at the time of the commencement of the action the premises were in repair in accordance with the notice, and what was the cost of the repairs which had actually been done by the defendant. Evidence was given on behalf of plaintiffs as to the dilapidated state of the premises, and as to the repairs mentioned in the schedule to the notice served upon the defendant being such as he was bound by the terms of his lease to carry out. The witnesses called to support plaintiffs' case were Mr. T. Holmes, John-street, Adelphi, surveyor; Mr. C. Dunch, Clemeut's-lane, architect and surveyor; Mr. J. W. Penfold, Great George-street, Westminster, surveyor to the Goldsmiths' Company, and Mr. H. Beadel, of Messrs. Beadel and Sons, Gresham-street, surveyors and land-agents. Rebutting testimony was given on defendant's behalf, to the effect that all the necessary repairs which defendant was legally called upon to perform had been carried out, and that at the date of the action there was no such neglect as would entitle the plaintiffs to exercise the powers of re-entry given by the lease in case of non-performance of the covenants. The witnesses called on defendant's part were Mr. H. T. Freshwater, Maldon, formerly of the Adelphi, architect and surveyor; and Mr. R. A. Edwards, Devonshire-chambers, Bishopsgate-street, architect and surveyor. The defendant himself also examined and cross-examined at considerable length, and a number of tradesmen were called upon to depose to the work they had done on the premises. The arbitrator having heard the addresses by counsel on both sides, intimated that he should take time to consider his decision.

IN RE WILLIAM ALLPORT.—(Before Mr. Registrar Pepps.)—The debtor, described as of Queen Anne's-gate, Westminster, architect and surveyor, had filed a petition for liquidation; and Mr. Bigham applied for registration of the resolutions passed by the creditors. The debts were stated in the accounts at £1,134, and assets £291. It was resolved that the estate should be liquidated by arrangement, and Mr. T. S. Evans, accountant, was appointed trustee. After some opposition by Mr. McIntyre on behalf of creditors, the registrar on Tuesday ordered the resolutions to be registered.

WATER SUPPLY AND SANITARY MATTERS.

CARNOUSTIE, N.B.—The new works of water supply for this village were inaugurated by Mr. Barclay, M.P., on Monday week. Mr. McCulloch, C.E., of Dundee, made the preliminary investigations and report, and Mr. J. F. Bateman, C.E., of Westminster, was consulted, and approved of the proposed source of supply. The works are situated about two miles north of Carnoustie on the lands of the Earl of Dalhousie, to the south of Panmure House. The scheme is an underground one—that is, the water instead of being obtained on the surface in the usual way, is all collected in a novel manner below ground. The nucleus of the supply consisted of the Brax Spring, one of the feeders of the Lochy Burn, and by means of some 1,500 lineal feet of adits cut into the upper bed of the old red sandstone formation at an average depth of 12 ft., an abundant supply has been obtained, the adits serving as natural reservoirs for the storage of about 7,000,000 gallons of water. Besides this, a reservoir, with a capacity of 6,000,000 gallons, being 20 ft. square by 20 ft. deep, is provided a quarter of a mile away. The springs yield about 300,000 gallons per day, and the water passes by gravitation into the village. Offers were invited for the construction of the works in five separate contracts; but the tenders of Mr. George Mackay, contractor, Broughty Ferry, were accepted for the whole of these. Messrs. Robert Maclaren and Co., Eglinton Foundry, Glasgow, supplied the iron pipes, and the Glenfield Company, of Kilmarnock and Paris, supplied the special castings, sluice, and air-valves. Mr. Robert Gellately, Loches, acted at the outset as inspector of works, but resigned from ill-health, when Mr. David Peter, Dundee, took his place. The total outlay has been about £7,000.

NEWHAVEN AND SEAFORD.—The experimental borings for a supply of water to the districts of Newhaven, Denton, Seaford, Blatchington, and Bishopstone by a private company have just been crowned with success. The well was sunk some

months since on the Bullock Hill, Blatchingdon, to a depth of 175ft., and was pronounced on analysis to be of excellent quality, but the quantity yielded was quite insufficient for the purposes of a scheme. The engineers then had headings driven in various directions for total lengths of 500ft., with heights varying from 6ft. to 26ft., but the supply was still insufficient. It was, therefore, resolved to continue the boring, and at a further depth of 116ft. an abundant supply was struck, and has been shown to give, on pumping, some 400,000 gallons per 24 hours, four or five times the quantity required. The directors last week accepted the tender of Mr. Lutley for laying the mains within four months. Messrs. Easton and Co. are the engineers.

Our Office Table.

THE *Times* concludes an article in its issue of yesterday on Mr. Street, by declaring that "there are already indications of a general dissatisfaction with all architecture in which some purely ideal beauty leads the way. Are we," asks our contemporary, "to go on for ever hampering or blocking our Christian auditories with pillars, aisles, and deep chancels? Are we to impress on the building itself the distinctions of rich and poor? In no other kind of building do we retain pillars if they can be avoided; and in the present state of the constructive art they can always be avoided at a slight extra cost. There can be no reason for so neglecting the form of the basilica, certainly the first form of the Christian church. That, of course, involves a row departure as to style, but it need not be either elaborate or expensive. Indeed, the simpler the basilica the better."

THE works in connection with the Channel Tunnel experiments at the new heading in Shakespeare's Cliff, Dover, have been so successful that the first quarter of a mile is now completed. The engineers have been able to gradually increase the rate of progress, and have now attained the average of 36ft. per day. The soil is quite dry in this boring, there being a total absence of the springs which occasioned so much delay and expense in the Abbot's Cliff heading. About 80 men are employed on the works. They are at work in two night-and-day shifts; but it is proposed shortly to have an extra shift, all working eight hours each, to expedite the work. No boring is done on Sunday, the men being chiefly employed on that day in lengthening the double line of metals on which the trolleys carrying the output travel. The tunnel has now advanced several yards under the sea in the direction of the Admiralty Pier.

THE leaning tower of the church of St. Lambert at Munster, in Westphalia, is being pulled down, as several large cracks were discovered at its base, and the inhabitants of the neighbouring houses have been obliged to leave. The scaffolding used for the completion of the towers of Cologne Cathedral has been erected, and the first part taken down was the wooden cupola, beneath which stood for upwards of three centuries the iron cages in which were exposed the bodies of the three Anabaptist leaders who had been put to death on the 22nd of January, 1536. One of these was John of Leyden, the fanatic who proclaimed himself king and prophet, and who, after having been taken prisoner by the Bishop of Munster, whom he had dispossessed, was carried about from town to town, and eventually put to death with two of his associates at Munster. The bodies were then placed in iron cages, and the cages were hoisted up to the top of the tower of St. Lambert's Church, where they remained until last week. They will, together with many instruments of torture, be exhibited in Munster until the completion of the new tower, which is to be built out of the materials of the old one.

THE surveyor to the vestry of St. Luke, E.C., Mr. A. Allen, jun., has reported that after careful inspection of the wood-paving in Bunhall-row, he finds evidence of a somewhat rapid deterioration. This he attributes to the fact that the levels of the thoroughfare have so little variation that the water cannot escape so readily as in a case where a moderate gradient exists. Hence the wood becomes charged with an undue proportion of moisture, which, combined with the heavy traffic to which the paving

is subjected, materially assists in the deterioration observed. The work reported upon was executed in the winter of 1875-6. The surveyor suggests that to prevent this deterioration, boys be stationed in the thoroughfare during the day to sweep up and collect the horse-droppings, as in many of the City thoroughfares. The vestry has resolved to call upon the Asphaltic Wood Paving Company, under their maintenance contract, to execute works of re-instatement in the thoroughfare, but has deferred the consideration of the surveyor's suggestion to employ boys to keep the paving constantly swept.

IN 1800 (remarks the *Farmer*) there were 564 inhabitants to every 100 houses. In 1880 there were 537 inhabitants to every 100 houses. We take no note, in either case, of houses uninhabited or in course of building. In 1800, the uninhabited houses in England and Wales amounted to 3.1 per cent. of the inhabited houses. In 1880, the proportion had risen to 7.8 per cent. When we compare the visible improvement in size and accommodation which has taken place in both urban and rural domestic architecture with the fact that there were 4.8 per cent. fewer inhabitants in every average house, and that there are more than double the proportion of empty houses from which to choose a residence, it will, we think, be tolerably clear that the accommodation for the individual now offered is in advance of that which was the case at the commencement of the present century; and, where an architect has been employed, an advance also in the direction of comfort.

IN a gloomy, ill-lighted, and somewhat evil-smelling booth at the corner of Blomk-street, Sheffield, according to a local paper, is a model of Ely Cathedral, carved in English oak three centuries old, by M. G. Strapps and Son, of Wisbech. The writer asserts that the model is marvellous, and it is a shame that so choice a specimen of patient toil should be shown in a place so unworthy of the work. It is 8ft. 4in. long, 4ft. wide, and 3ft. 6in. high. More remarkable than the size is the carefulness of the detail in every part.

AT the last meeting of the British Association, at York, in September last, Dr. Phené, F.S.A., &c., read a paper before the Anthropological Section on "The Serpent Mounds on the Scottish Border." A Scottish gentleman (Mr. Allan Cochrane, manufacturer, Fairknowe) had his attention directed to Dr. Phené's paper, and, aware of the existence of a seemingly artificial mound in Gala Park, near Galashiels, communicated with Dr. Phené, who last week came down from London to make a personal examination. It was a circular, flattened mound, 27ft. in diameter. The proprietor, Mr. Scott, of Gala, was made aware of the circumstances, and readily consented to the opening up of the mound, giving the assistance of his workmen for the purpose. Dr. Phené said if sacrificial or other barbarous forms of worship had been practised a deposit of charcoal would be found in the centre. A cutting was made, and exactly in the centre and 3ft. below the surface, the expected charcoal deposit was found. Dr. Phené's report will, no doubt, be awaited with interest.

THE "Wandering Exonian" gave his usual Christmas feast to some of the aged poor of his adopted city on Monday last. The gathering partook also of the nature of a "house-warming," being the first day of a new residence being used by its owner Mr. Harry Hems. The "Wandering Exonian" occupied the head of the table, and was faced by W. Daniel Ross, of Dix's-fields. The ancient guests assembled at one o'clock, and did justice to the substantial joints of beef, and the roasted turkeys, geese, fowls, &c. The host gave "The Health of the Mayor and Mayoress," and the Mayor, in responding gave, in very complimentary terms, "The Health of the 'Wandering Exonian.'" Dancing followed in the evening; the mistletoe bough which hung from the centre of the ceiling was well patronised, and all the ancient dames present, some of whom were particularly comely—kissed the blushing "Exonian" beneath its berries.

DEALING with Mr. Street's more personal characteristics, a correspondent of the *Times* remarks that it may be said that the mediæval spirit which gives such life to all his works was no less conspicuously present in his way of working. His independence of others was

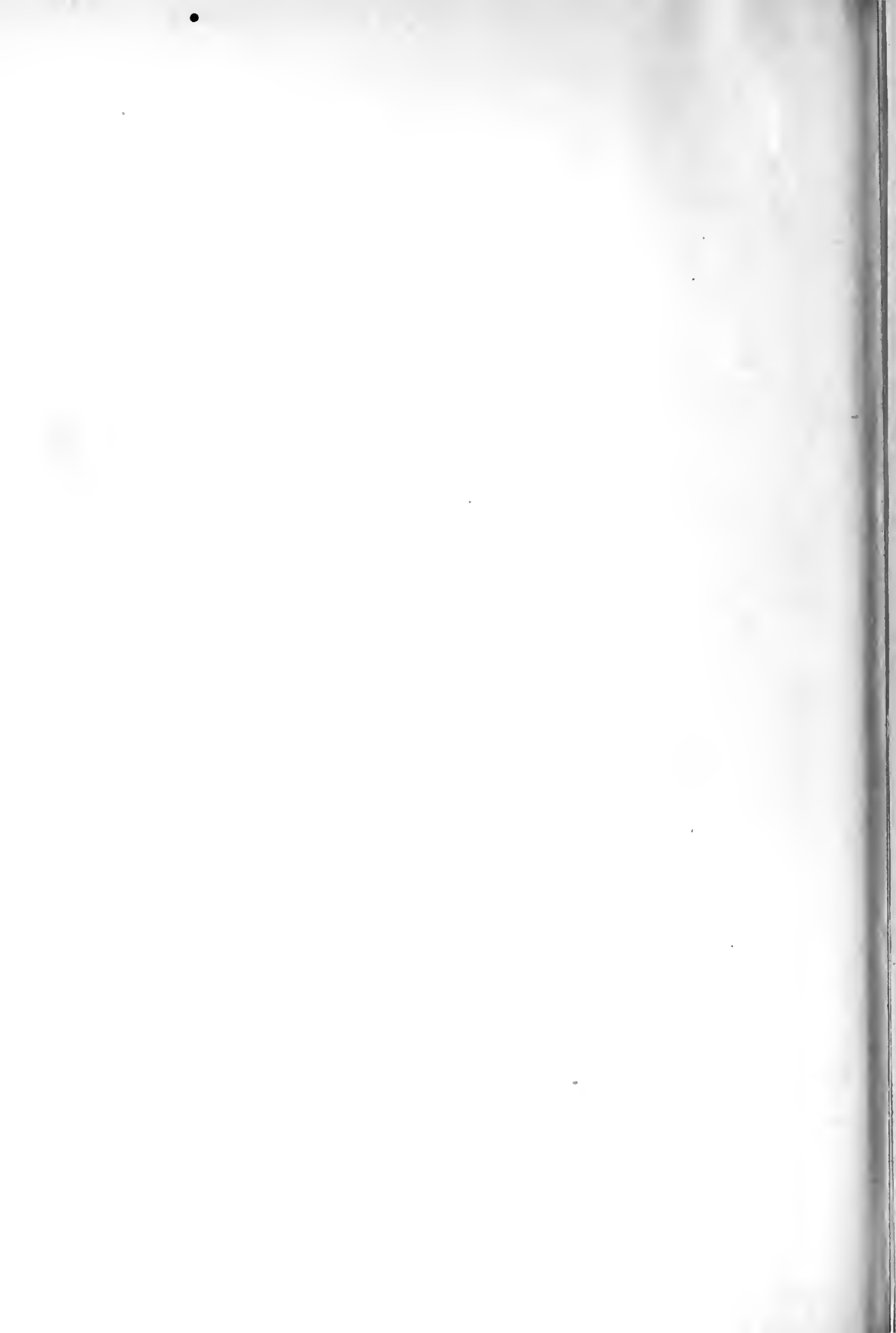
absolute, his reliance on himself implicit; as far as he, indeed, from putting himself in the least degree in the hands of his assistants that was probably a standing grievance with him that any such assistance was required. For considerable time he drew all his full-size details in brown ink, in order that the time spent by his clerks in inking in his pencil lines might be economised. In this way, also, he insured getting absolutely what he wanted. The deviation of a hair's breadth from his own pencil line caught his eye at once, and he would say instantly, "That was not my drawing." This points to a self-reliance and trust in his own powers which, justified as it was, must have had no small share in impressing others with his masterly qualities. His complete personal superintendence of every smallest and least important detail has been equalled only by those predecessors whom he set himself so earnestly to emulate. But in one important particular he did differ widely from his prototypes—namely, that, whereas they had, as a rule, devoted a lifetime to one building, he was enabled by the times he lived in to attend most minutely to the Courts of Justice, Christ Church Cathedral, Dublin, and other large works at one and the same time, without any detriment to them.

M. MASPERO, the director of the Egyptian Museums, has determined on opening all the Pyramids that have not yet been explored, and on further searching those that are not thoroughly known. Among the Pyramids situated on the borders of the Libyan desert is that of Meydoum, said to be the most mysterious of all. It appears that its entrance had never been discovered. It is to this Pyramid that M. Maspero is now devoting his attention. By removing some of the ground on the north side of the artificial mound which surrounds the Pyramid he has succeeded in uncovering all the points where an opening might be revealed, and the result has shown that his calculations were well founded. Thirteen days of active labour, with skilled workmen, have sufficed for the discovery of a secret which was believed to be undiscoverable. The spades of the fellahs have exposed to view the opening, which is situated nearly at the top of the artificial mound. On entering the Pyramid the visitor passes through a corridor, admirably constructed, which takes him about forty yards in a gentle decline, as is the case in the great Ghizeh Pyramid. Here, for the moment, he is stopped by the debris, which is being rapidly cleared away.

THE timber of the pear-tree is of a yellow colour. Gerard says the timber of the wild-pear is so very firm and solid, and good to be cut into moulds. The plates for his "Herbal" were cut out of this wood, as were, says he, breast-plates for English gentlemen. In the present day, according to *Science Gossip*, it is much used by the turners and pattern-makers; the blocks with which the designs for floor-cloths are painted are made from pear-wood. When dyed black it can scarcely be distinguished from ebony. Handles for carpenters' tools, measuring rules, &c., are made from this wood. The wood of the pear makes excellent fuel, giving out an intense heat with a bright flame.

THE mural decoration of the sanctuary at Hughenden Church, which has been in hand since October 11, has been completed. The work consists of a dado of dark red, bearing a vine pattern in lighter red with golden grapes; above the string-course are the four Greater Prophets, then a band of pomegranates, and then the four Evangelists on gold ground in rich canopy work, while round the head of the window are medallions, with the nine orders of the angels and the seven gifts of the Spirit, all the figures looking towards the central figure of the east window, our Lord in Majesty, surrounded by the glorious company of the Apostles; the goodly fellowship of the Prophets; the noble army of Martyrs; the four Latin Fathers; the four Greek Fathers, and the British Bede and Edward the Confessor, as representing the Holy Church throughout all the world. Around the altar runs a band of gold on which is represented the wheat and the passion-flower, while the reredos is a mass of elaborate decoration in gold and black inclosing three panels of sequoia wood, bearing the lily, frankincense, and rose, exquisitely painted. The rest of the wall is covered with the vine, pomegranate, olive, frankincense, hyssop, lily, and fig.





APR 4 1961

737690

Building News and Engineering Journal.
v.41(1881, July-Dec.)

P
Tech
B

University of Toronto
Library

DO NOT
REMOVE
THE
CARD
FROM
THIS
POCKET

Acme Library Card Pocket
LOWE-MARTIN CO. LIMITED

