the experiments having been completed, and the commissioners having other works in the neighbourhood, where 12 inch pipes were required, the pipes in Upper George-street were used instead of purchasing new ones, to *save the public expense.*"

We will also add, respecting the ventilation of sewers, part of a note from the surveyor to the Hull corporation, Mr. D. Thorp, forwarded to us sometime ago, and accidentally mislaid. Mr. Thorp says,—

"In the first place I may mention that I have trapped 360 gully holes in the old town of Hull, which is that part of the town within the docks and harbour, and within that area, which comprises 87 acres very closely built upon, we have about 180 more to complete.

"Now, it required much consideration in doing this to get rid of the effluvia which would naturally be pent up in the sewers as we proceeded trapping, and which was fully proved by my men not being able to proceed in the first outset with more than one street at a time, and then not without being ill. This induced me to apply the provision made in one of our bye-laws, viz., to compel all parties to *connect the rain pipes in the fronts of their houses with the main sewer, by means of either brick or tubular glazed drains* (the latter of which are much to be preferred), thereby making so many flues for the escape of foul air to the tops of the houses, and I may say that this plan has acted admirably."

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After the foregoing article was in type, we received a list of the parties, thirteen in number, to whom the new commission has been directed, and here it is:—Viscount Ebrington; Major-General Sir John Burgoyne, K.C.B.; Sir Henry de la Beche, F.R.S.; Mr. Robert Stephenson, M.P.; Mr. S. M. Peto, M.P.; Lieutenant-Colonel Alderson, R.E.; Mr. Philip Hardwick, R.A.; Captain Vetch, R.E.; Mr. J. M. Rendel; Captain Harness, R.E.; Mr. Thomas Hawes; Captain R. K. Dawson, R.E.; and Mr. Edward Lawes, Barrister-at-law.

It will be seen that all the more prominent opponents on each side have been omitted in the new arrangement, the number of commissioners has been reduced, and the correctness of our views has been unconditionally recognised by the infusion of professional and practical men,—the abandonment of the absurd principle that architects and engineers were not fit for Sewers' Commissioners, simply because they *were* architects and engineers. The builders, too, are represented. Of the credit of obtaining this result we claim no small share: we fought the fight alone,—so far as we know, no word upon it has been elsewhere uttered, and we venture to think, with all modesty, that the profession owe us thanks.

Beyond what we have said we offer no opinion at present on the goodness, or otherwise, of the selection, or as to the omissions, but wait to see the working of the board.

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Birmingham Workhouse Competition. —Were your correspondent, as he styles himself, "A Lover of Fair Play," he would have hesitated before making such statements as those contained in his letter, appearing in The Builder of the 29th ult.; but as his assertions may gain credit with some parties, if suffered to pass uncontradicted, I beg to say:—1st. That I most emphatically deny ever having canvassed the Birmingham Guardians in favour of Messrs. Drury and Bateman, either during the first competition, or at any other period, and challenge him to produce or name any one guardian so solicited by me. 2nd. That I saw *no signature or name* upon [illegible], except the motto appended. 3rdly. [illegible] selection was made, in every respect, [illegible] accordance with the instructions of [illegible]ians.—Charles Edge, Birmingham, October 3, 1849.

## ON CIVIL ENGINEERING AND ARCHITECTURE.

### AN INAUGURAL LECTURE.*

I have said that both architects and engineers must possess a knowledge of the strength and nature of the materials with which they have to work. This I think is self-evident, for the money to be expended is always one great element in their calculations; and the quantity of materials that can be usefully employed can only be ascertained by calculations based upon an intimate knowledge of the strains and forces they will have to resist, and the capabilities of the timber, the stone, the iron, or other substance that may be employed to resist them. Both Tredgold and Barlow have furnished us with admirable works from which the theoretical knowledge of the properties of all the materials used in building can be learned. There is no excuse, therefore, for failures of work arising from actual want of strength; but failures do sometimes occur, notwithstanding every precaution may have been taken to give to the materials, both theoretically and practically, their proper size and form, and proper distribution in the work. In engineering especially, circumstances are occurring every day, features constantly present themselves, of which even the oldest practitioner may have had no example previously; and other means taken to obviate evils that may and do thus arise may be the best that both science and art could point out, and yet fail in their object. I say that these are misfortunes only, not faults; but when they occur with a man unqualified with scientific knowledge to deal with them, they are very serious faults indeed, and should be visited with the utmost censure. Engineering is of all professions (says Mr. Hyde Clarke), the military excepted, that in which a new adaption of expedients to unforeseen occurrences is ever most imperatively required, and in which a mere knowledge of past efforts will be insufficient, unless the mind be competent to invent new processes, as well as to avail itself of the best manner of old ones. No man can go upon a spot and say, I will do such and such things at such expense; some unexpected variation of nature beneath the surface will often thwart the best-calculated plans, and render all attempts at economy abortive. It is practice, aided by scientific knowledge of the highest kind, that only can properly preside over the just application of materials to the ever-occurring variations which spring up in the course of an engineering undertaking. And if science and practice sometimes fail in effecting their object at once, what must be the result when ignorance attempts the work? Failure, certain and disastrous failure, heaping disgrace upon the head of the quack practitioner, and often ruin upon his employers. I use the word advisedly, for although neither architects nor engineers unfortunately need diplomas of practice to give them a right to the use of C. A. or C. E. after their names, they yet have morally, and in common honesty, an obligation, which should bind them to certain spheres of work which they feel themselves qualified to undertake; and every man knows his own capabilities, depend upon it.

If, then, men calling themselves engineers or architects, undertake a work they know they are incapable of performing without the assistance of a dry nurse, in the shape of a good "clerk of the works," they are quacks in every sense of the word, quacks as much as the charlatan who practises medicine without the consent of the colleges.

The demand for engineers, caused by the late wild railway speculations, has filled the profession with unqualified persons, and has tended to lower it below its proper level, and although the present times are, I am rejoiced to say, weeding them out pretty fast, it will, and must, be some time before it reaches its healthy state again.

It is true, the Institution of Civil Engineers and the Institute of Architects exist, and men to become members of either must present proper qualifications; but there are numerous practitioners who are not members, and who seek and gain employment. But I hope to see, ere long, by legislative enactment, both architect and engineer obliged to take out a diploma before being allowed to take upon themselves the responsibility of any work, when lives, or a sum of money beyond a certain amount, are at stake,—a diploma granted only after a severe examination as to scientific acquirements, and a practice under others of at least seven years.

I here beg permission to quote some passages from a paper written by Sir John Soane, which appeared in the *Artist* of June 13th, 1807,—as quotations from this high authority will give strength to what I have ventured to suggest myself:—

"An artist (architect), strictly so considered, is not sufficiently employed; his profession is too open to the assumption of persons who have no claim by education or ability; and these are admitted to that patronage without which the architect has no chance either of emolument or fame. There are, therefore, very few persons engaged solely in the practice of architecture. The great mass of those whom we here call architects, though many of them respectable in talents as artists, are under the necessity of combining with their study of the science pursuits not strictly analogous, and are, in consequence, and to their great discouragement and mortification, assimilated with another description of professional men called surveyors,* and that name is again assumed by sorts and classes of building workmen and others, until it becomes utterly contemptible."

After enlarging somewhat (and in language by no means mild) upon the difficulties which beset an architect when carrying out a design, through the interference of public boards, and complaining, justly, that unqualified persons are allowed to enter into competition with him, by the aid of pilfered plans, Sir John concludes thus:—

"Before the state of architecture can be improved, and the professors excited to that species of emulation which only can make them eminent, strong and marked distinctions must take place. Those who have patronage must consider it a sacred trust and deposit,—the meed only of science and genius. The claims of the untaught, ignorant, and presumptuous, must not only be disallowed, but repelled with indignation and contempt, till at length they are consigned to that obscurity whence they ought never to have been suffered to emerge."†

Both engineer and architect must also be men of business; and to the knowledge of the uses and relative advantages of materials must be added the knowledge of their commercial value. The sum to be expended in any undertaking is always a marked feature; and the reputation of an engineer, especially, will be raised by the commercial success of his work. Harbours, roads, canals, and railways, before they are commenced, must show that the traffic or dues from them will amount to such a sum as will insure to their projectors a proper return for their money. The first estimate of the engineer is the document from which the probable amount of returns is calculated. The statistical calculations, or the quantity of trade that will arise, is not, strictly speaking, in the department of the engineer, and he is not answerable if the scheme is not a paying one, from a deficiency in the traffic returns ur duce: but if it fail through any excessive expenditure over and above his estimate, he is answerable.

His estimate and schedule of prices, fixed through knowledge of local charges and custom of labour—through his close observation and acquaintance with the geological nature of the spot, and through his knowledge of the best districts from whence to draw his foreign materials—must be so worked out in detail, and capable of being referred to precedent, if precedent exist, or borne out by the opinion of others, that it will bear the investigation of a Parliamentary Committee; for, be it remembered, that estimates are the most vulnerable points in which opponents can strike you in the "House;" and if the said estimates do not carry on the face of them the handiwork of a man of business, they will be the first and last work of the scheme, for the session in which they are brought forward at all events.

Perfect knowledge of the business habits of contractors, and of the working habits of arti-

* By Mr. Clegg, at the Putney College. See p. 472, *ante*.

* A comment seems called for here, but we have not time to make it.—Ed.

† This is the right test; not a mere name.—Ed.