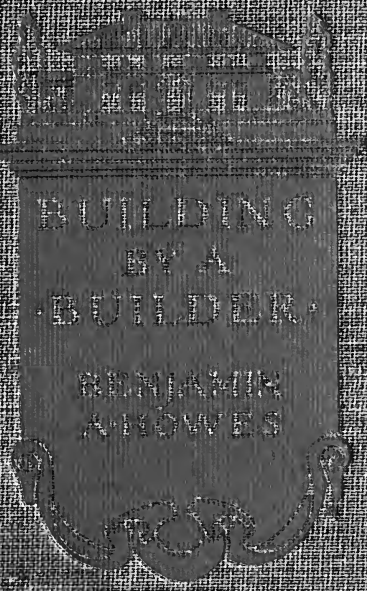
BUILDING
BY A
BUILDER
BENJAMIN
ANDREWES

BUILDING
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FIG. 1. LIVING-ROOM ON TERRACE AND GARDEN

BUILDING
BY A BUILDER

Practical and Economical Considerations for the Man About to Build

BY

BENJAMIN A. HOWES

Illustrated

DOUBLEDAY, PAGE & COMPANY
GARDEN CITY NEW YORK
1914

PREFACE

This little book is addressed to the man who is about to build his own house for the first time. It does not seek to take the place of a popular manual, but aims to answer his first questions, to suggest to him the matters he ought to ponder and settle for himself, and the others on which he will need expert advice. Its principal claim to originality lies in its effort to help him to a definite intelligent choice of possibilities.

The one point where the homebuilder calls for aid is the point where he must decide between several courses, all of which invite. Any amount of building lore is spread before him; half of it full of detailed application to modern problems, but frankly in the service of specific manufactured articles; half of it authoritative, colorless, carefully impartial — too impartial to be of use. Comparisons are odious; yet practical building is impossible without comparing, sifting and rejecting. No building material and no type of construction is the best in every situation; yet

for every situation some definite combination is best. The homebuilder's anxious question is not, "What is there to choose from?" It is, "Which should *I* choose?"

These essays do not pretend to cover all the types of cases; but they do aim to indicate some typical problems and solutions, and points of divergence leading to other solutions. The book means, in short, to help the homebuilder to lay his own course in a crowded, shifting fairway.

I wish to record, therefore, my gratitude to the architects and fellow-engineers who have generously given me of their experience, and to the manufacturers' representatives who have entered with me into frank discussion and exposition of building conditions.

B. A. H.

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BUILDING
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CHAPTER I

How to Approach the Question of Building

ONCE upon a time there was a famous author who wanted to build a house — to build a home, as the real-estate advertisements put it. He had plans drawn by an architect and got bids for its construction in permanent and fireproof material. When he heard the amounts he was shocked. "But that's half as much again as I have allowed!" he cried. So it was decided to build in cheaper construction and "by day's labor," with the direct supervision of the author's family, thus saving the contractor's profit. When the house was finished — and it was very attractive, even though it would never be a family homestead, because it would hardly last long enough for that — and the famous author was happily ensconced, he was asked: "And was the house built for your original allowance?" "Half of it was!" replied the famous author.

As regularly as the return of spring and fall every man who has dreams of building a home, encouraged thereto by a swarm of little magazines, begins to plan to beat the building game. If he tries it he will be lucky to do as well as the hero of our opening tale. Hope springs eternal in the human breast, however, and a new home builder is born every minute.

A high-minded gentleman bought some land from other very honorable gentlemen who were developing a highly restricted community where they owned their own homes. They were also backing a building company to erect houses on it, and they patronized a talented and apparently reputable architect who had drawn the plans for most of the houses. The first-named gentleman thought he couldn't do better than accept their recommendation of their building company and pet architect, especially as these latter were willing to build just the house he wanted at a price he could afford to pay. It was to be built for the cost of materials and labor plus a specified percentage, but was not to exceed a certain sum. He didn't scrutinize the exact terms of this guaranty very closely, perhaps; but then the plans had been very carefully worked out, and by this time

they were all friends and he and his wife had been charmingly welcomed by the little community.

When the house was well under way, however, and some of the material going into it seemed to the owner very defective, the architect didn't get round to insisting that the contractor should replace it. And when the cost of the house ran up and up, many thousands over the original estimate, there seemed to be no way of exacting satisfaction. The contractor appealed to the architect, and the architect simply faded away. And the original honorable gentlemen of the select community — why, he couldn't sue them; not if he expected to live there, anyway.

In the end the straightforward man who had been above doubting the responsibility of his new friends, realizing that his guaranty was nothing more than a gentlemen's agreement, and unable to keep the house which had run him deeply into debt, made arrangements to sell. An expert whom he called in found that the house was really worth nearly what he had paid for it. He had not been cheated, except into undertaking a proposition twice as costly as he could afford. His own lack of experience had prevented his recognizing as a forty-thousand-dollar house what had been

promised to him for twenty thousand. He had taken an unsupported estimate seriously, without investigating the business reliability of either architect or contractors.

There is just one way to beat the building game, but that is a way which the canny American consistently refuses to take. He has heard plenty of such tales as those above, but he is perfectly sure that no one is going to get the better of him — rather the other way about. And it is just the canny American who is worst stung. A very astute real-estate man in a Western city decided to build a large house for himself on some land he owned. He was determined to have a house of a certain size and of a certain excellent and solid type of construction, but not to spend too much money for it. None of your extravagant commissions for him! So he found a young architect who was willing to shade his percentage a good bit, and who worked very hard indeed to simplify details and cut down all non-essentials, though keeping all the other points demanded. The specifications were duly drawn up by the young architect and sent out for bids. The result was curious. One very well-known builder declined to put in a figure, without comment. Another

reputable contractor put in a bid much higher than the owner proposed to go, but intimated politely that he hardly hoped to do business with him "under those specifications." Two or three other obscure firms, who had pressed for the opportunity, bid somewhere near the owner's ultimatum.

The astute real-estate man thought he was making a good bargain in taking up with the low bidder; but from that day to the present the job has been in hot water. The principal sufferer has been the architect; for when the owner has clamored at something he didn't like about the house the contractor has retorted: "Not called for by the specifications!" or "Nothing in the specifications to forbid that!" And there wasn't. The experienced firms had seen that you could "drive a coach and six" through the loosely drawn specifications of the young architect, and that an irresponsible contractor would certainly greatly underbid them and then do shoddy work to his heart's content. Honestly built — the only way they were willing to work — the house would have cost more than the owner would pay; so they let it alone. In the end the owner will probably blackguard the architect, get into a

lawsuit with the contractor — which he will lose — and start all over again; but he will deserve his troubles.

A prosperous business man and his wife proposed to build a large house in which to end their days. It was to be a real home in their old home town, and was to be "just as she wanted it." They, too, had a young architect, who was obliging and conscientious. They, too, wanted to build a sixty-thousand-dollar house for forty thousand dollars. They were much more businesslike, however; they made none of the mistakes just chronicled. They found a contractor, with a reputation for skill and honesty, who was needing work and willing to meet them halfway. The specifications were properly drawn — partly, to be sure, because the builder wanted "to do a fine job" and worked with the architect to get the best construction for the least money; but the owners insisted on a very low figure for the house — so low that it covered practically the bare cost of the job. The builder had no intention of dropping the standard of his work; but he foresaw that human nature, as he had observed it in the somewhat autocratic pair, would work on his side. He made it clear to them that all details must be

exactly what they wanted before signing the contract; that changes or extras could be inserted only on order signed by both owner and architect, for a sum specified in each order. Nevertheless, as the house developed, the prospective mistress saw innumerable improvements possible. She would have them all. She did not like the extra charges; but, as it turned out, the "extras" she authorized were the only source of profit to the builder.

On the whole, it may be said that these last homebuilders did well. They got exactly what they wanted, in good construction, at a fair price; but the incident shows the difficulties under which the conscientious builder — and there are a few — suffers. Failing the extras, he could have either lost money on the work or refused to take it at that figure. The owners then doubtless would have closed with a less responsible firm, who would have "skinned the job" to make their profit. If these homebuilders had been willing to trust their architect and builder — as at heart they really did — they could have got the same results with less friction by building their house at "cost plus percentage," which usually implies the right to make changes without extra charge.

Under the present system of letting contracts, the architect prepares plans, including working plans, and detailed specifications for the work; these plans and specifications are submitted to a group of building contractors — sometimes as many as twelve to twenty. Some of these are probably well known in that particular architect's office; some are known to the owner; some have asked, either from owner or architect, the privilege of bidding.

The common custom is to bid a certain lump sum, which represents the estimated cost to the contractor plus his margin for profit. Sometimes he figures on doing all the work himself; but he usually has obtained bids for special parts of the work from subcontractors — such as for the heating, plumbing, electric-lighting, hardwood floors, painting, and so on. In an elaborate house the ramifications may be more minute. These subcontractors' bids represent some elements in his cost; to them will be added all the work done by his own workmen, and the proportionate office and travelling expenses. This lump-sum form of contract, however, is not invariable.

Another form is the cost-plus-percentage contract, by which the architect's part is the same,

but the contractor does the work for its cost to him plus a percentage on the cost, varying from $7\frac{1}{2}$ to 15 per cent. In this case, of course, the owner is supposed to be furnished with complete vouchers for all expenditures. A variation on the cost plus percentage, much in vogue among simple-minded owners, is the day's work plan, by which the owner pays, through the contractor, for the labor and materials employed, plus 10 per cent. on the cost of the latter.

The objection to the old lump-sum form of contract is, of course, that it offers a premium on "skinning the job." Some contractor will surprise and delight the owner with a low bid, thus securing the contract — unless the architect objects — trusting to his own devious methods to wrest a profit from construction as cheap as he can get the architect to accept. The casual wanderer in these fields will say at once "the dishonest contractor" will do this; but in truth it has become almost an understood procedure in the trade, forced upon the contractor by the owner's usual insistence on giving the work to the lowest bidder, and by the architect's tendency to plan a house more elaborate than can be well built for the appropriation. The tendency of the contractor

to get below the specifications when he can and the consequent necessity for coercion and police work on the part of the architect are absolutely logical results. The contractor is always working, though the architect or his inspector sees only part of what is going on.

It is pretty well understood that, even with the most careful specifications and the most rigid attitude on the part of the architect, the contractor can cheat if he wants to. Some dissatisfied owners are inclined to suspect their architects of collusion; but that is a mistake. It can probably be said with truth that there are no corrupt architects — or practically none; but there are some weak-kneed ones. Plenty of artistic temperaments will accept more or less shoddy work rather than fight it out with a blustering contractor. And they, of course, reflect with truth that it is all the owner's fault, anyway, because of his wanting to get a big house in return for a small outlay.

The great objection to the cost-plus-percentage contract in the mind of the layman is his expectation that the irresponsible contractor will run up the cost in order to increase his percentage. This, however, is what happens least often. In this

case the contractor is not forced, as under the lump-sum contract, to get his profit as it were by stealth. It is presumed that he will be allowed by the owner a fair price for good work.

This understanding, however, opens the door to certain trade customs which generally prevail, though not among all the firms of highest grade. In the first place, costs are seldom returned to the owner as original vouchers. It is rather the habit of the contractor to "put in a statement," in which materials and labor are set down at a fair retail price indeed, but not exactly what the contractor is paying.

Exactly the same practice is followed in the day's-work form, where the owner pays for materials and labor according to the contractor's accounts. The latter, however, has probably hired these workmen at a price giving him a profit of 25 to 38 per cent. on their wages; and is getting his regular discounts from the material men besides.

The only thoroughly straight and satisfactory arrangement, under the cost-plus-percentage form of contract, is to have it clearly understood whether or not the contractor is giving the owner the benefit of all his discounts. If he agrees to do so he buys the materials — as the owner

could not buy them — pays for them, and sends the owner the original voucher from the man who got the money — not a copy. He also turns in the original time-sheet — or labor payroll — signed either by the laborers themselves or by the foreman and timekeeper on the job, showing hours of labor and rate of payment for each man. He may also make an agreed-upon charge for office work, personal expenses, and so on — either a fixed sum or a small percentage charge. When this plan is fully lived up to it is the ideal one, both for owner and builder, reducing the possibility of disputes to a minimum and insuring, as no other does, a good quality of work. When it is combined with the stipulation of an "upset price," beyond which the contractor must meet all costs, it would seem that the owner is absolutely protected. Still another variation is the "cost-plus-a-premium" form, in which the amount of the contractor's compensation is fixed beforehand.

Some architects occasionally recommend the plan of several separate contracts, let on a competitive basis, for carpenter work, masonry, plastering, painting, and so on, with the idea of saving the general contractor's profit on these contracts;

but this expectation is mostly illusory. In the first place, this method of building requires a highly competent and well-salaried clerk-of-the-works, who must carefully watch all operations; and the continual disputes as to responsibility and mutual interference between different contractors, with the consequent loss of time, usually eat up the rest of the saving.

Moreover, it is highly probable that even the competitive bids given to an owner are appreciably higher than a general contractor could obtain, the separate contractors anticipating the usual conflicts as to time, and so on, and recouping themselves in advance. Any one who has had to adjudicate between dawdling painters who said they were waiting for the plasterers to finish, and plasterers who in turn accused carpenters of keeping them back, and carpenters who "couldn't set the trim until it was painted," knows the evil possibilities of this situation. If the owner is prepared to spend all his own time on the job, to ward off every possibility of confusion in the order of operations, he may come out all right; but, unless building is for him a pastime for his leisure, this will hardly be possible.

Some one whispers: "There are people now

who will do all the architect's work and the building and furnishing for you at a sum you settle on beforehand. Doesn't that save trouble and dispute?" Well, it depends on what you want and on how much you have to spend, for such an arrangement requires a pretty large investment.

The method is usually this: The plans are the work of some young architect at wholesale rates — usually not bad; never very good. The building is fairly well done — usually turned in at about cost. The profit on the affair to the firm is in the decorations, including the furniture, which in such houses always turns out to be excessive in quantity on the persuasions of the salesmen, and is, of course, provided at a profit of anywhere from 50 to 500 per cent.

The decorator in these days is as much overpaid as the architect, with his beggarly 6 to 10 per cent., is under paid, and on a transaction involving a house and its contents he can reap a handsome profit on the whole from the decorations alone, provided there are enough of them. For people who don't object to upholstery and have no particular individual tastes, the method seems a fairly good one, and at least involves no chance of such difficulties as I have related above; but it

is not often followed by people of simple or severe tastes in interiors.

As for the people who are rash enough to think they can build without an architect, they do not, to my mind, deserve all the sympathy they get. Of course, with a set of stock building plans and a builder of supernal honesty, they may not go so far wrong; but the second ingredient in the combination is the important one. The difficulty with such building plans accompanied by estimates is that the specifications are so loose that the poorest work will meet them — thus accounting for the estimates!

A lady in an Eastern city found in one of the magazines a prize design for a charming house, drawn "to cost not over seven thousand dollars." To her surprise and joy she found that the architect lived in her city and that she knew him. The house was "exactly what she wanted." So she went happily to give him the commission to get out the plans, and so on, for bids after the usual method, and found him strangely unresponsive.

"Oh, you don't want that house!" he said. "Now let us do it this way, and change that wing —— "

"But I do want that house," she interrupted.

"I want that house line for line — it is just my ideal!"

Well, to cut the story short, she found that he would not undertake to find her a contractor for "exactly that house" under fifteen thousand dollars. She was not surprised that his "house for seven thousand dollars" had taken the magazine prize!

The only way to beat the building game is, first, to find an architect who has some strength of character and business sense, and a contractor who has a reputation for good work; and then — not to corrupt the contractor by demanding that he forego his profit in too low a bid, or overstrain the architect by thus forcing him to play policeman. The whole matter reduces itself to the willingness on the part of the owner to make a rigid and searching investigation into the contractor's record and character — and his pecuniary circumstances are not less important. The architect isn't going to do it; he isn't going to shop round indefinitely to save the owner's money for the small fee he can charge — architects are greatly underpaid if they do what the fond owner thinks they ought to do. His duty at this stage is done if he weeds out the bunch of contractors. And, in

spite of the fact that there are no corrupt architects, their interest in the choice of a contractor is not always precisely identical with the owner's interest.

Architects as a class are intensely sensitive and intensely susceptible to flattery — probably the last trait is a consequence of the first. They are sensitive because they are too often without honor in their own country; they are underpaid for the responsibility they carry; they see their province encroached on every day by the speculative builder from stock plans; by the great engineering firms who finance and design business buildings without them — or without them except nominally; by the decorating firms who take on the whole-house proposition. The largely historical and esthetic character of the architect's training and its lack of emphasis on construction and the business problems of building have put many architects at a great disadvantage in dealing with building contractors.

In the vast amount of literature on the subject of house-building written by architects you will never find a hint of the real reason for many building disputes, in which, of course, the owner is the sufferer — the vague specifications and unbusi-

nesslike methods of the architect. They know how things ought to look but not always how they ought to be done or what they ought to cost — and they resent being informed for the reason above suggested. The tradition of the architect's infallibility must be insisted on.

This peculiar sensitiveness of architects is well understood among builders and the unscrupulous among them play upon it. "If you treat So-and-So as if he were a young god he won't bother you," said one of this ilk to the writer. They find it pays to take an attitude of discreet humility and silently accept or remedy the architect's mistakes, with the expectation, sometimes justified, of becoming favored bidders for future work.

Since, in general, then, an architect's business acumen is quite likely to be less than his artistic ability — and since, in any case, if the contractor is dishonest he can cheat — the one absolutely essential element in the successful conduct of the game is to find a good builder; and by good builder I mean one who will respond to fair treatment by good work. No human being will do good work for the man who is determined to get something for nothing. Since, as I have shown, an exhaustive search is not the duty of the architect, it

must devolve upon the owner; and if he lacks knowledge of character and business judgment to such an extent that he can not size up such a proposition when he actively puts his mind to it, then he would better rent.

A short time ago one of the small homebuilding magazines contained a tragic story of some young couples who bought some apparently charming houses — concrete and shingle cottages de luxe with English brick fireplaces, chestnut wainscoting and ceiling beams, small-paned windows, and so on — which began to go to pieces as soon as lived in and were only made habitable by vast expenditures; and it enlarged on the cruel treatment by the wicked contractor of the young, ambitious to own a home. Now I know nothing of the facts in this case, but I would wager something that those young people would have turned away with scorn from houses on which the sum they were willing to pay had been expended to make a really good job. If those ambitious young people hadn't wanted twenty-thousand-dollar-looking houses for ten thousand dollars the wily contractor would not have deceived them. Half as much examination as the young head of the house would have put on his new automobile

might have made them wiser, but I doubt if it would have changed their action. They didn't want small, plain, solid and well-built little houses. I think they did get about what they bargained for.

If you, Mr. Owner, have a definite amount of money to spend — and no desire to "do" your contractor — probably your safest procedure is about as follows:

First, choose your architect, preferably young and not yet too successful, whom you know well enough to have some idea of his business sense and equipment of backbone; not too fashionable, because, if still modest, he will give your plans careful individual attention instead of handing them over to an underling in his large office. Give him your sketches — including dimensions — and ideas, for, of course, you will have some; tell him how much you can spend, making it clear that this sum must cover all equipment of the house exclusive of furniture — that is, lighting and heating plant and fixtures, kitchen range and laundry stove, hardware, screens, awnings, papering, painting, and so on. Ask him for preliminary sketches, including an approximate estimate from some trustworthy builder,

and have it understood that these sketches are to be paid for separately. For a ten-thousand-dollar expenditure these plans would probably cost in the neighborhood of two hundred dollars, and there is nothing in the situation to prevent your trying out more than one architect in this way.

For the traditional types of construction, however, if the sketches please you and the estimates fall anywhere near your appropriation, you may commission the architect to go ahead with the complete working plans — in writing. Here is the place to warn you never to give verbal directions after signing the building contract; or, if given, to confirm them by letter at once. Your wife will probably feel hampered by this restriction — until she has unwarily ordered changes in construction in the course of chats with architect or contractor, which will bring in a heavy bill of extras. Have a written contract with your architect as to the amount of service he is to give you, the frequency of his inspections and the commission he is to receive, including a provision for changes, cuts, or unexpected increases in the cost.

Then, when at last you have the detailed plans

and the typewritten specifications before you, go over and over them with your wife and other members of the family. See whether all the closets she wants are included — all the shelves, laundry and ash chutes; whether the servants' quarters, especially the sanitary arrangements, are adequate — service and cellar stairs properly placed; whether the passages from kitchen to dining-room, and kitchen to front door are planned for silent and quick service; whether there is sufficient storeroom; and whether the radiators and electric-light outlets are well placed for use and for appearance. The specifications should be read principally to be sure of the inclusion of all necessary equipment, especially for kitchen and dining-room. In these days of built-in refrigerators, specially designed screens, and so on, all these should be carefully scrutinized.

Now comes the great question of the fair estimate. I have tried to show the influences leading contractors to bid too low for good work and the reasons why architects are not necessarily authoritative here. The owner, however, may rejoin: "How am I to know whether the bid or estimate for my house is too low or too high if the architect cannot tell me?" A method that is too seldom

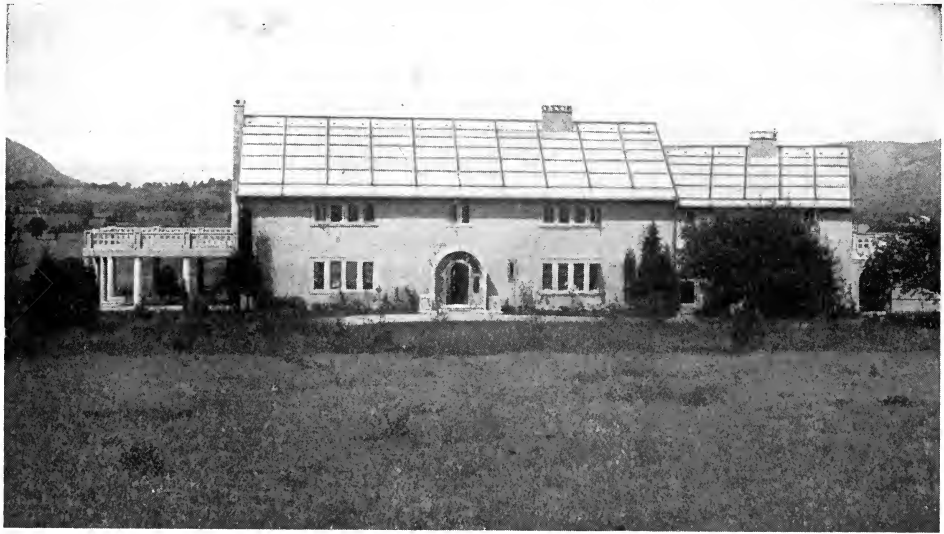

FIG. 2. "THE GARAGE A HARMLESS EXTENSION"

followed has always been productive of good results — that is, to get a disinterested estimate from a good consulting engineer who has experience in building. Then, when one bidder gives you a figure very much higher and another one very much lower, you will be justified in rejecting the second and using all pressure to bring the first down. Possibly the low bidder may be able to convince you of special circumstances by which he is able to save money — such as, for instance, his intention to be his own foreman on the job; or his nearness to the seat of operations; or his chance to use certain workmen; or you may have outside testimony as to the sterling character of his work — but, except under such conditions, beware of the very low bidder.

This counsel is especially to be followed in the case of one of the modern types of construction, which are not very well understood by the contractors of the old school. Many of these have come to grief by putting in a low bid out of sheer ignorance of the costs of construction of concrete and its various combinations. Here, too, the risks of poor construction are greatest; for the contractor who has put in his bid in good faith but with inadequate knowledge, and finds his costs

running up unduly, is more than human if he is not tempted to skimp cement or steel, or substitute poor tile or brick.

The owner who wants a fireproof house in concrete or tile would do well always to consult an engineer on the cost of construction, for these matters are not yet common knowledge in the building trades.

"Is there any definite point where the home-builder should choose one type of contract rather than another?" I was lately asked. The answer for suburban or country work is — the point where an enthusiastic local man can't be found to take the house at about what he thinks it ought to cost, plus day's wages for himself. That is about the way he figures, and for construction that he understands he will give the most economical result. That's a straight lump-sum contract, of course — but if the local man is honest, he has a local reputation to maintain. If the undertaking calls for a larger outlay, say over fifteen thousand dollars, it is safe to expect that the newer types of construction, fire-resisting materials, and fine quality of workmanship and equipment will be required. In that case it will probably be out of the local builder's class, and outside or metropolitan

talent must be called in, with all the reasons above set forth in favour of some form of the cost-plus-percentage contract.

The supposedly reliable and carefully investigated contractor having been chosen and the work under way, the next care of the owner should be that there are no misunderstandings as to details. If materials are not up to standard he has a clear case, and can demand of the architect that he force the contractor to replace crumbling concrete or ill-matched hardwood flooring, for instance.

A failure, however, to get just the shade in staining wood or tinting plaster, or just the texture of an artificially roughened plaster surface, or just the colour on a concrete wall, which the owner had in his mind's eye, may occur with the best intentions on both sides. All such work should be based on small samples accepted by the owner, and every reasonable contractor will be glad to furnish them.

CHAPTER II

Choosing Your House

ON THE shores of Long Island Sound there stands among green fields what looks at a distance like a magnificent white and shining mansion. It was built a few years ago after the plans of an all-but-famous architect at a cost which only a multi-millionaire would endure. Go nearer and you will see that the white surface is cracked and apparently moth-eaten, the charming classical decorations crumbling; the present owner will tell you that he has already spent the price of a small house in a vain attempt to repair the disintegrating outer plaster. Within, the great rooms are delightful to look upon, with their polished wood panelling and carved details. What the present owner probably does not dwell on, however, in addition to all his troubles, is that something has only to go a little wrong in the far-flung ramifications of the vast heating-plant, or the complicated electric installation, and all

this inner beauty will go up in an hour's conflagration.

Not far inland from this truly tragic spectacle you will come upon the small house of a business man on a moderate salary. You will note that the walls are of solid concrete of a not very inviting colour or texture, and that here, too, there are traces of cracks and of the devastating effects of water in those cracks. Interview the mistress of the house and she will tell you they had been saving for some years to build a country home, not necessarily for the rest of their lives, but —"We wanted to take the children to the country." They had read much in magazines and newspapers of "the coming concrete house," and had thought it would be just the thing for them. Of course the United States is full of people who try to think they already have "concrete houses," because that has always been the cant phrase for any house on which can be discerned some square feet of cement work. But this was to be complete throughout of the only real concrete, of stone and cement. They had bought some stock plans and had been recommended to a contractor by the development company from which they got their land. They had put into it a thousand or so more than they

could really afford. And now it was leaking and crumbling! Their roof loggia had caved in, rain drove through their nursery; and as for their opinion of concrete — the less said the better!

The judicious reader will understand, of course, what was amiss in both these cases. In neither one had any real thought been expended on what the situation — of place and of money — demanded. In neither one had any effort been made to "choose their house." The millionaire had evidently been carried away, by the delightful design of the enormous house, into putting vast expanses of surface into a material that was bound to disintegrate, no matter how careful the work, in sea-air. Moreover, those exquisite, elaborate Greek capitals had been cast, to save trouble and expense, with a lot of plaster of Paris in the composition — and plaster of Paris melts away in wet weather like dew before the sun. It was his bad judgment and not his lack of knowledge, of course, that was responsible for risking a wooden frame within a rambling palace.

As for the other unfortunate, it was a case of that little knowledge which is a dangerous thing. The "coming concrete house" for the single builder — who is at the same time a small builder — is

not economical at all, but dear in comparison with other constructions. The optimistic clerk and his over-eager contractor, who had probably not much knowledge of concrete costs, had innocently enough met on too low a price. The contractor had doubtless used the sand and cement and stone that came to hand, without the usual professional tests; had employed his ordinary unskilled labourers and, worst of all, had used too little of the high-priced supervision that is absolutely necessary for good concrete work. The result was the sinking of more money than the owner could afford into a type of structure which, if good of its kind, would have been beyond his needs, but, poorly built, had become a cruel incubus.

The lesson of these two cases is the obvious one of the absolute need of complete clearness in the mind of the owner as to what he wants his house to be capable of. In these days of copious advice to intending and anxious homebuilders, surprisingly little has been put forth of the relative advantages and suitability, to the financial and geographical situations of their prospective owners, of the various materials and types of construction for houses. Yet nothing is of more fundamental importance. If it was suicidal for the

millionaire to build in wood it was no less so, in my opinion, for the clerk to build in concrete — real concrete; but no one has told them so. Not long ago a highly popular magazine had a graceful article on the first glimmers of taste — or words to that effect — in American domestic architecture. Not one syllable was said of any relation between a house's situation — including pretension — and its material, or between its material and its architectural type. It was apparently the feeling of the architect-author that such prosaic considerations could be ignored; in fact, the one house unreservedly praised by him as an ideal to be approached by American architects is known to be of most perishable material; and the editor of the department in which the article appeared indignantly repelled the suggestion that any judgment in regard to architecture must take account of materials as well as form and line.

Even if the type of construction is considered, it is usually only as a question of taste or appearance. The trouble with us Americans is, we are completely hypnotized by names. We speak of a stone or a brick house with bated breath, as of a monumental structure; or proudly of a stucco, tile or concrete house — as though we actually

had any idea whatever of what kind of structure those terms denote! The brick house may be a thin veneer on a cheap wooden frame; the stucco, plaster on flimsy wood-lath; the concrete, only a rough crude structure. The real-estate advertisers are careful to leave to the imagination the true inwardness of "Modern cement houses, moisture-proof and vermin-proof!" — "Elegant two-family brick dwelling!" — "A ten-room stucco house for eight thousand dollars" — and so on. Just exactly as well one might speak of "A ten-room paint house," for paint has as much relation to the real construction of the dwelling — and to the effective protection of the surface, too — as has stucco. Yet the fine brick house, of unburnable construction, and the real standard concrete house are noble and permanent structures, worthy of all respect. Let us, then, ignore the glib catchword once for all, and learn to look for the real materials of a building, inside as well as outside, and to consider their peculiar properties.

Is your house to be a modest suburban dwelling for your young family to grow up in, or the palatial mansion you dreamed of building when you made your fortune? Do you look forward to making it a family homestead for your grandchildren to come

back to, or is it to be just the pretty house to which you wish to be able to ask your friends until you are ready to build "for keeps" farther away from the city when your business is less confining? And do you mean to get your family homestead for twenty thousand dollars or two hundred thousand, or to spend ten thousand or fifty thousand on your halfway house? The range of permutations and combinations between your social intentions and your appropriation is almost unlimited; and a third variable must be added for the place — whether city, suburb, country town, mountains, lakes or shore. It is of the utmost importance to your purse and your comfort, however, to fix on the type of construction most economical in your very special conditions. I cannot pretend to exhaust the subject, but I shall try to suggest the types of buildings which, for the several great groups of home seekers, are truly economical and satisfactory in the long run.

Suppose we begin with the rising salesman, who can venture to spend six to ten thousand dollars for a country home, exclusive of the land. It is a mistake, in my opinion, for such a man to feel that he must build in fireproof construction. It is a still greater mistake to think that he has built in

fireproof construction if he has incombustible walls and roof covering. Remember that fireproof construction means fireproof interior structure! A plaster surface and asbestos roof would doubtless protect you if a terrible prairie fire, carrying brands on its hot breath, were to sweep your green suburban fields — but not otherwise. The real fire risk, which in nine tenths of the cases is a matter of electric wires, or heating-plants or careless matches, is very small in the little house, where the electric wiring and the heat piping are confined to a small space, and where the nose of the good housewife is always attuned to the smell of smoke.

Many plans and estimates for the small house of hollow tile or concrete exterior are extant in which the floor and partitions are of wood. Needless to say, this construction may be chosen by the owner for its outside appearance or from a desire for novelty; but it should be with the full understanding that, without unburnable floors and partitions, the small hollow-tile house has little advantage over wood as regards fire. The house entirely of hollow tile, including roof structure, stairs, and floors, with stucco surface, is attractive, unburnable, and in the neighbourhood of New York not so very much more costly than

wood — say 20 per cent.; though in the South, or far New England it may run to an increase of 40 per cent. If, however, it is a question of sacrificing, say, the best plumbing and heating, fireplaces or service conveniences or needed dimensions, I should advise — in a small house — giving up the unburnable quality and getting the comforts. The vaunted "no repairing required" of stucco is, of course, advertising license — since the stucco inevitably requires attention in a few years. An acquaintance who has built, for seven thousand dollars, in a Massachusetts town, a well-equipped and roomy shingle house, twenty-five by forty feet in dimensions, assures me that for the fifteen hundred dollars saved by giving up the complete hollow-tile house he had originally planned on the same lines he has two extra bath-rooms, a portable garage and an electric washing-machine!

Of the exterior stucco — cement plaster — on wooden lath, with wood interior, often referred to as "the concrete house," I would say to the small builder: "Stop, look and listen!" In any except the mildest, dryest climate it begins at once to disintegrate. It has no fireproof quality, of course — except against the prairie fire — and has no other

advantage over good wood construction; and it is, in fact, much less lasting. It is, indeed, regrettable that, by the careless use of the terms "concrete" and "cement" for these flimsy houses, many people have invested their modest means in the expectation of getting the permanent and indestructible concrete.

The pretty wooden house, well kept up, with its large dimensions, will prove as satisfactory and as salable as any other with an expenditure of under ten thousand dollars. It fills the requirements of a suburban house that is to be lived in almost all the year round, but is not meant for a family homestead of permanence. The man who does want a family homestead of assured permanence on which he has less than ten thousand dollars to spend, has a problem so complicated that it needs another chapter, the following, for its treatment.

So much for our first set of variables! Suppose, however, you mean to spend up to ten thousand dollars in an entirely different way — say, for a camp in the Adirondacks, by the lake you loved as a boy and courted your wife on and mean to return to for the meditative angling of your declining years — a camp you don't want to have go up in smoke some January night, carrying with

it your mooseheads and your fishing rods, and all your other *souvenirs de jeunesse!* Well, that camp ought to be built either of rough native stone, with concrete floors, or of rough unfinished concrete — it will be understood that concrete is always used in these pages in the correct sense of the mixture of cement, sand, stone and water, cast in a mold or form. Such a structure will not be so very large, but it can be built by an experienced builder, and have good plumbing and heating, for ten thousand dollars; and if so built it will hold tight against the forest fires and winter storms of a hundred years — or more.

Even if not built by an experienced builder it may serve. I have in mind the camp of a college professor who was brought up on a farm — that untouchable combination! He planned his own house and it was partly constructed for him by a local carpenter who had never seen a concrete wall! He did many details himself, and I believe mixed the concrete with his own hands — "With brains, sir!" This camp, however, even though it is of an extraordinary homemadeness in appearance, has many rooms, cost very considerably under ten thousand dollars, and will be a joy forever to the numerous children of the family.

To the person prepared to spend from ten thousand to twenty-five thousand dollars, my counsel will be quite otherwise. Such builders fall, on the whole, into two classes: First to be considered is the prosperous business man who expects to make a permanent home in a pretty "residence centre." This man will want all the conveniences for his wife and servants: plenty of electrical devices, heat in every room, a garage near by. He will collect good books, will run to old mahogany, will expect to plant his affections in the garden and by the fireside. To such a man, entire permanence of material and all but complete fire protection will be a necessity. To him I should say, build a house of brick exterior in the new soft textures — or, if in a convenient locality, of the picturesque native stone — with hollow-tile interior structure and asbestos shingle or tile roof. A semi-fireproof possibility would be one story of concrete, with concrete floors, with wood above, and a tile roof. When hollow-tile interior structure is referred to, the use of the usual so-called "combination floor" of reënforced concrete filled in with hollow tile is always to be understood; in fact there is no economical way of building an unburnable floor without reënforced concrete;

and this "combination floor" is the most practical for any unburnable house that is not of reënforced concrete throughout.

Such a house, of the soft-texture brick, thirty by fifty feet in dimensions, was lately built in a good Long Island suburb for fifteen thousand dollars. It has a veranda and a roof loggia, with a fireplace, a small reception-room, living-room, dining-room, and kitchen on the first floor; four bedrooms, library and a bath on the second floor; and one bedroom and bath, with an attic and place for another servant's room, on the third. The owner has strong views on devices for easy living, and the house is arranged so that the work for four persons may be done by one servant. *Terrazzo* floors, requiring no attention, are laid over the "combination"; the trim is hardwood — oak, cherry and birch — varnished in a dull finish— no cleaning of paint! There is a clothes chute from the top floor to the laundry in the basement, where there are two set tubs and a washing-machine and wringer, run by electric motor, in the place of the usual third tub. A combination gas-and-coal range and electric irons complete a very satisfactory equipment for saving labour.

A thoroughly permanent fireproof house of this

kind, of approximately forty by fifty feet in dimensions, ought to be built, including all domestic equipment, in the neighbourhood of New York, for twenty thousand dollars. It should be said that all the figures I have given include all those necessary items of equipment which in a previous chapter I advised including in the building specifications, and in case comparisons are made with other estimates this should be taken into account. Magazine and advertisers' estimates frequently do not include finish and equipment.

In the second great group, with an appropriation of ten thousand to twenty-five thousand dollars, should be put both the man who is setting up, more or less consciously, the halfway house in his upward career, and the man of wealth who is building a dainty country house for temporary occupation. These regard the expenditure less as a permanent investment than as an outlay to be largely absorbed and justified by the pleasure they get out of the house during occupancy. Such houses are in no need of the most expensive and permanent construction, though they should be reasonably protected from fire. For the country house — the play house pure and simple — plenty of bedroom space, large and airy rooms and general

freshness of aspect, with little fire risk, are the essentials. Probably the greatest dimensions involving these essentials can be secured for a given sum in a structure of exterior stucco on metal lath and interior plaster on metal lath, care being taken that the wooden frame be more substantial than is customary, and that the plaster be one that conserves the metal and contains no disintegrating elements.

An example of this type, whose owner will occupy it only a part of the year for a few weeks at a time with a gay party of young people, was built not far from New York. It was of stucco on metal lath — exterior and interior — of irregular shape, but covering about three thousand square feet, and cost twenty-five thousand dollars. It had a den and laundry on the first floor in addition to the usual living and service rooms; seven bedrooms and three bathrooms on the second floor, and four servants' rooms, with bath, on the third floor. In New England it could have been built for about twenty-two thousand dollars, and in some parts of the South, where no cellar and little heating is required, for seventeen thousand dollars.

The owner was anxious that the fire-stops be carefully looked to, though he did not wish to go

to the expense of entirely unburnable construction. The insurance companies tell us that fires start mostly in the kitchen and in closets, and mount in the hollow walls. Therefore the hollow space behind every baseboard was filled a foot deep with cinders mixed with a little cement and water in the proportion of ten to one — just enough to keep the cinders from sifting through. Sand mixed with cement in the same way, or mineral wool, would have done as well. This was to prevent the upward rush of flames. Besides this, the cellar ceiling and places about the heating plant were plastered with Portland-cement mortar on metal lath, and all electric-light wires were run in metal conduits, with standard outlet boxes. As a finishing touch a slate roof in fading tints was added as an additional precaution.

The exterior stucco was carefully painted. Experimental tests have lately established that if the stucco is rich enough in cement to keep water from rusting the metal lath it is of a consistency that inevitably expands and contracts in changes of weather — and cracks; though if "lean" enough not to crack water drives straight through it — that is, no matter how good the workmanship, stucco on metal lath cannot stand bad

weather unless kept protected by a coat of paint; sometimes by a paint made of Portland cement, which cracks, indeed — but all over, infinitesimally — so that water is kept out. With such protection, such a house as I have described will do very well for a term of years — for a good-sized house which is to represent expenditure, not permanency.

The halfway house owner, though not intending to build for all time, will make his house a home while he lives in it, and will require complete safety for his lares and penates. He will probably get the most for his money, under the circumstances, in an exterior of stucco on hollow tile or cheap brick, with a hollow-tile interior. In the neighbourhood of New York an entire hollow-tile house forty-five by fifty feet, can be built for a little over twenty thousand dollars — that is, under ordinary conditions the owner can reckon that he will pay nine dollars a square foot of ground dimensions for this construction, including all equipment. The aspect of these houses is very fresh and attractive for some years, though it should be understood that stucco comes off of brick quite as freely as off of metal lath. Water gets in behind the stucco surface sooner or later; and, with resulting expansion, followed by con-

traction, augmented, of course, where frosts occur, the coating cracks and peels. The effects of dampness on stucco over brick or stone are strikingly shown in the famous cemeteries of New Orleans, as is also the case in many buildings about that city; but for houses to be enjoyed for a limited term such comparative lack of durability will not matter.

Above twenty-five thousand dollars, the problem becomes more complicated as the possibilities of construction open out. The reader may have been surprised that up to this point little has been said of reënforced concrete as a material for houses. That is because, except under unusual conditions, such as are given by the building of a group of such houses, or high freight rates on brick and tile, or the willingness to accept crude work, the economies of this material do not appear under an expenditure of twenty thousand dollars. The expert knowledge involved in the proper control of sand and cement — in the choice of proportions, in the mixing, the design of steel reënforcement, the laying of the concrete and the finish of the surface — make imperative a professional direction of the job. Professional service is too heavy a charge on a small operation, however,

which is the reason why it is not at all economical to build the individual modest house of concrete. In view of this undoubted fact, it is regrettable that reputable journals continue to publish — to the hurt and disappointment of countless small homebuilders — such statements as the following: "The monolithic concrete method lends itself admirably to the small house and many schemes have been devised for the speedy and economical erection of them. They are but little more expensive than a frame house."

As the man of the present type of carpenter-builder becomes more and more skilled in the use of concrete and reënforced concrete, this construction will more and more appear in the small house. It is a revolution devoutly to be wished, but it is going to be a slow and gradual development. Cement enthusiasts are well meaning and know that modern Portland cement is a superior material which all the great engineers are using, and they are apparently impelled by the fact that if enough people get started spending each his little bit on some form of concrete or cement construction there will be satisfactory results attained in the long run, and a further big market opened for cement and concrete construction. But I am sure

they do not realize how much soul-anguish is entailed on the small homebuilder by this kind of forced evolution. At any rate the man of limited means should have the alternatives of the present clearly before him: fine concrete construction with a professional supervision which makes it disproportionately expensive for small work; or taking chances on educating the carpenter-builder.

The lack of this professional knowledge in the builder is what has occasioned most of the erroneous impressions about concrete. Nine tenths of the people I meet ask me of the concrete house: "But isn't it damp — or porous — or cold in winter?" and so on. Now, first, the concrete wall needs furring — or lining — just as much as any brick or stone wall. No properly built house of brick or stone is without an air space between the wall and the surface which receives the plaster. To-day this space is provided by the usual furring of hollow tile, which prevents the cold of the outer wall striking through and causing the moisture of the warm air within to condense on its surface; but the early experimenters in concrete often failed to provide this necessary lining, with the result that in very cold weather the walls appeared to be damp. The standard six-inch

concrete wall, furred, is just like any other masonry wall.

Porosity, on the other hand, is a mark of poor concrete — the result either of poor cement, or of wrong proportions in the mixing, or careless laying. In New England, in New York and New Jersey I have built watertanks in concrete houses which contain up to five thousand gallons — and with no waterproofing. The man who feels that he must put on his concrete surface one of the so-called "waterproofing mixtures" thereby confesses that his concrete is of faulty workmanship. The fact is that concrete which is up to professional standards is completely watertight. It may not be generally known that the American Concrete Institute, the American Society of Civil Engineers, and the American Society for Testing Materials have worked out very detailed standards of quality in cement, sand, and gravel, of mixtures, and of methods of finish, which rival in exactness the engineering formulæ for steel construction.

Over twenty-five thousand dollars, however, the professional element engaged for building sinks to a reasonable proportion of the cost, and the other great economies emerge. What is so widely

published of concrete — and unfortunately also believed of stucco "cement" — that it requires no repairs, grows stronger with the years, can be flushed out with water, is a non-conductor of heat and electricity — is all true. The surface is not absolutely untouched by weather unless it is finished "exposed" — that is, with the surface cement scrubbed out to show the component of stone; but such a surface is permanent.

Good construction in concrete, at the twenty-five-thousand to thirty-thousand-dollar level and over, costs approximately the same as good brick unburnable construction, reckoned at about ten dollars a square foot, including equipment. It is difficult to make this comparison, because the "good brick construction" of common parlance is not fireproof, but has timber frame and floors, and is, of course, not really good for a large investment. It is far better to stand the extra cost of fire protection, for "a cured patient is better than a cheap funeral."

Only let the wealthy owner beware of lining his unburnable house with inflammable decorations! In insurance circles the most famous fire of the generation is that of the magnificent dwelling of a well-known man in Boston, which at the time

of building, with its stone and tile walls and floors, and reënforced concrete stairs, was supposed to be the last word in unburnable construction; but this house was then entirely lined with very elaborate and massive panellings, carvings, casings of wood, as well as wood floors. And one day between seasons, that fateful time of house opening and closing, a careless servant put an electric plate warmer in commission on the kitchen floor and went out, leaving the house alone. The whole interior burned like a fiery furnace and collapsed into a total wreck!

One great point of economy is to avoid multiplying trades in a building. On a house in New Jersey, that was planned for an otherwise economical combination of brick and concrete, the bricklayers insisted that they should have the laying of the concrete. As this would have involved a labour cost for the concrete four times as great as if done by concrete men, the house was changed to all concrete. Even without such difficulties it is not well to multiply materials. The economical way to build is to organize your gang and keep it going all the time without delays. If this cannot be done it will be found that the unit costs given, which are correct for large or small operations,

will not balance because of these interfering conditions. For such reasons, local conditions, and so on, it is sometimes much cheaper to build in one material than another, even when unit costs are equal; and such conditions should be very carefully canvassed, with both the architect and the contractor, before the decision as to the material of the house is made.

The competent architect will be able to advise his client as to all these points — the suitability of climate, labour conditions and environment to the material or combination of materials he proposes. Too many owners rush blindly into the fad of the moment and drag their professional advisers after them on the penalty of losing the job. The architect who dared to advise against the "roughcast" craze of a few years ago was all too likely to be voted an old fogy. It is in just such matters, however, that the client should recognize his own ignorance and the need of expert authority.

The conservative architect will probably say that for the permanent home in a thickly built-up suburb, with few trees, a brick or native stone exterior is likely to be more harmonious with its surroundings than concrete; and to-day the range of delightful colour in brick is so wide that no

difficulty should be found in suiting the background. For the country, among trees especially, concrete should come to its own.

However, whether brick or concrete, tile or wood, the owner must decide if possible before choosing his design. Too often the procedure is quite otherwise. The owner gives the architect the general dimensions he wants and the architect draws a pleasant design. It is submitted for approximate bids, as counselled in our first chapter, in concrete, brick, or hollow tile. In these circumstances, the concrete bid is far the higher, because the necessities of the peculiar type of construction demand certain special forms which in such a general design are not likely to have been provided for. If provided for, the concrete bed may be greatly lowered.

The special virtues of the concrete construction, however, as regards repairs and sanitation, can be largely enjoyed with a reënforced concrete interior structure and hollow-tile partitions; and it is this interior combination, adapted to an exterior of whatever kind the environment calls for or the architectural type demands, whether cut stone, rough native stone, brick, or reënforced concrete, which it is safe to recommend for every

permanent house of the class costing above fifteen thousand dollars.

Choose your material first, a material suited to the purpose and the neighbourhood and you will get a good design. And, with a design suited to its material, climate, and environment, your house will grow old gracefully, whether it's of mud, ice or concrete!

CHAPTER III

The Unburnable House

AFTER the fire — six weeks after, when, with scars healing, he left the hospital to view the blackened hole in which had disappeared a house, some cherished heirlooms, and a slowly garnered library, his first thought was a home in which that frightful experience could not be repeated. He had visions of smoke pouring up stairways, of calls and cries, of searing red-hot surfaces stumbled against in the choking gloom, of curdling fear for wife and children.

"Shall you rebuild at once?" asked his friends.

"Not till I can put a quietus on this conflagration business," was his answer. "An Englishman's house is his castle, is it? Well, no American's is, so long as it can all go up in smoke in twenty minutes, the way mine did!"

He meant to build a house that could not burn. But having a shrewd business sense as well as affections and nerves, he proposed to get away

from his terrible memories in the most efficient manner. He studied the literature of "fireproofing" as practised under city regulation; he followed up engineers and manufacturers and contractors and architects with bull-dog tenacity, and he finally built himself an absolutely non-combustible house which was economical enough in design not to call for an outlay disproportionate to his means and to his scale of living.

That scale of living happened to be a pretty liberal one, however, and his particular equipment, which combined a roomy structure of reënforced concrete and Spanish tile roof, with many special designs and devices, could not well be adopted by the man of very moderate or modest income, who has also had the experience and consequent dread — or the dread without the experience. There are many men who never go on a journey, or are caught in a thunderstorm or a high wind away from home, without a bit of a chill as to what may be happening back there; just as there are men who have so much faith in the excellence — or in the absence — of their electric and heating installations, in the watchfulness and good judgment of their households, or in the efficiency of their fire protections, that they never worry about

fire! These lines are addressed to the man of moderate income, who does worry about fire, but hasn't yet got around to informing himself, as did my persevering friend, as to what would give him, and his, complete safety at a reasonable expenditure for his general financial situation. This is not a plea for the unburnable house in all circumstances whatsoever. I have expressed myself in a previous chapter on the subject of the too-great proportion of capital sunk by the struggling breadwinner in fireproof building beyond his means. But for the man who needs and wants fire safety above all, to the extent of consciously sacrificing to it other things, such as spaciousness of house and grounds, it is intensely worth while to consider at length what combination of design and materials will best serve his particular need.

The problem is an interesting one, because there are so many more people who can put, say, $2,000 or $3,000 cash into a house and pay $600 or so interest as rent, than can expend several times that sum; and more especially because the first tentative gropings of such people for information about really fire-safe houses usually first unduly encourages and then discourages the undertaking completely for reasons I shall try to ex-

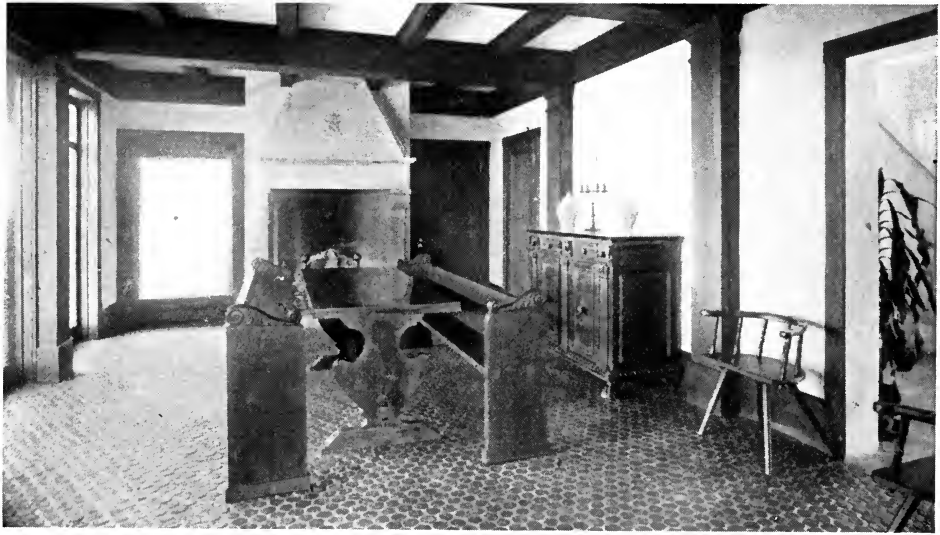

FIG. 3. "DISTINCTION IN GREYS AND BROWNS"

plain. In the present state of building practice and real-estate development, such a man needs more than the persistence of my prosperous acquaintance to get what will relieve his mind, and at the same time not cripple him financially.

My friend Carson is a case in point, and the first of several instances to come to mind. He now lives in a rented frame house, for which he pays $50 a month, in one of those aristocratic suburbs where you send down the chauffeur for the morning and evening mail because that's the only way of getting it; Carson, to be sure, hasn't a chauffeur, but that's a detail. The fire equipment of that village is quite as aristocratically rural as its post-office; but the service lacks the romantic verve of the old New England hand-engine company. In fact, Carson tells me that a stunning house on the next street not long since burned to the ground because the man who keeps the horses for the engine couldn't be reached by telephone in time. Carson says he isn't a prayerful man, but every time he has to take a business trip, thinking of his rather frail wife, and the boy, and their one dunderheaded servant, he comes pretty near being so. So he has now managed with strenuous effort to get $3,000 in hand to finance

a house of his own which, as he says, will at least let him sleep soundly while he is away from it.

This is the way he is doing it: In the first place, he proposes to live on in the same village, which is beautiful and pleasant in every way, and will certainly remain so, because it is far outside the ten-cent zone of travel from the city, and at the same time has admirable, though expensive, commutation service. His property, therefore, will not shrink in value. He has chosen a generous plot of land, though not one of the development company's show lots, about eleven thousand square feet, of which the price is $3,000. The really liberal company will let him keep the whole of that on second mortgage, and suggested a quarter where he gets a loan of 50 per cent. of the whole operation on first mortgage. So that his undertaking will stand about as follows, supposing he puts nine thousand dollars into his house alone:

Land	$ 3,000
House	9,000
Grounds (possibly garage)	1,000
	$13,000

Since his land is on second mortgage with the real-estate company, and he gets a loan of $6,500, 50 per cent. of the whole, he has, with his $3,000

nest egg, $9,500 to meet a cash outlay of $10,000. He used his $3,000 to cover the first cash payment on the house, until it was sufficiently far advanced to get the first payments under the loan. By the time he is ready to expend that last unprovided $500 he will have been able to get that much in hand again: if not, the final work on the grounds can be postponed. Thus his budget for the first year will be:

6 per cent. on second mortgage of $3,000, . . .	$180.00
5½ per cent. on first mortgage of $6,500	357.50
Broker's commission	90.00
Taxes and water rate (probably)	140.00
	$767.50

This is over against probably $625, which he is now paying for rent and water. Minus the broker's fee, it is $677.50 — an increase which will be further diminished by his smaller heating bill, and will certainly be justified in view of the increased advantages of the new house. Carson says he expects to increase his income much more than that, through the saving in nervous energy the house will give him.

Of course the safety of the house itself is the motive of all this, so that he has put his very greatest diligence and business acumen into investi-

gating the possibilities of a positively unburnable house for his $9,000. The house is now having its final touches, but it was early in his researches that I began to hear about it.

In fact, it was when he burst upon me boiling with indignation that I first had to take notice.

"Here, you ought to know about such things!" he cried. "Isn't there in this country a really fireproof house for a man like me? I've been scouting among the old volumes of the house-building magazines, and looking up all their Fireproof House and Concrete House Numbers, but I declare, when you come down to it, the actually fireproof ones are either like tiny rough shooting-boxes or farm-labourers' cottages, or else they're plainly far and away above my pocket-book. Here's a real concrete one that was a bitter disappointment. I thought it would suit me, price and all, as described in one magazine, but I found when I inquired that it was one of some fifty houses all built at approximately the same time in the same place by the same company, using certain patent devices — which they control. And how does that help me with my single plot up at Harrowcliff? And even such houses are about as numerous as snakes in Ireland. Ninety-

nine in a hundred of the others have, tucked away in one corner of the description, a word to the effect that the floor construction and roof timber are wood — and stairs, of course. I know all about that. My cousin lived in one of those outside-fireproof, inside-tinder-box houses, and now his youngest girl will never walk again, after as quick a fire as I ever heard of."

"Don't get stampeded, old man," I interposed. "What do you mean by fireproof, anyway? Don't you know that there is no literally fireproof material? There is even no literally firesafe house, for even if its materials won't take fire, there's inevitably a vast amount of furniture and hangings that will burn. Of course no house with wooden stairs and floor construction offers any real protection against fire; also, of course the word 'semi-fireproof' ought to be barred from decent speech. I prefer 'unburnable' to 'fireproof,' anyway — it makes no claim beyond the exact truth. But the fact that you don't often find unburnable houses in 'Concrete Numbers' doesn't prove that your problem is insoluble."

"And I've been collecting booklets from the fireproof material people," he swept on, unheeding, "but each one cries up his own wares and knocks

the other kinds, and makes claims I know can't be true. Combining their information, I'm doomed to live either in a splintering pile or a crumbling mud-cake. As for the real books on fireproof work, I won't say they don't give splendid mathematical tables for calculating strains and mixing concrete and making stucco that'll stick to any old thing — but I'm no builder's foreman! When I know what I can and ought to build, the other fellow can build it."

The case was clearly one for arbitration. I have given Carson's fulmination at length, because it is just what I hear three hundred days in the year from men of moderate means and active intelligence, who want to build in unburnable construction. To make a long story shorter, this is how it finally worked out:

First of all, Carson found an architect who was honestly interested in the new types of construction, which wasn't so easy as it sounds, as any one with experience can testify; for up to the present time, while any architect is glad to make a house as safe as possible after he has developed the design from the other point of view, there are very few who are willing or perhaps able to design economically in unburnable materials from the

first. The *rara avis*, however, was tracked down, and sketched a tentative design such that with slight variations it would be suitable either for concrete, stucco, or soft texture brick.

Then Carson sat down to this design with his architect, myself assisting, to find out exactly how much of a house could be built for his inflexible $9,000. There were several acceptable types of unburnable construction, we told him. Reënforced concrete throughout, except for tile partitions; or local stone; or outside walls of eight inches of brick (two bricks thick) furred with two-inch terra-cotta furring blocks; or four inches of brick laid and bonded integrally with six-inch-thick terra-cotta building blocks used both for air spaces and for strength. With terra-cotta tile partitions and reënforced concrete floors with "fillers" of terra-cotta tile ("combination floors"), and asbestos shingle or slate roof, his $9,000 would give him a two-story-and-a-half house in any of these materials of about seven hundred and twenty feet ground area — say, twenty-four by thirty feet, or twenty by thirty-six. This estimate would cover every scrap of household equipment that is fastened in place, together with decoration.

"That's not very large, is it?" was Carson's rather dismayed comment.

"Well, then there's exterior plaster on hollow tile or metal lath, called stucco, you know," went on the architect. "The plaster on metal lath walls will be less expensive, but you will need a steel frame to carry your tile and concrete floors. However, with asbestos or slate on a timber roof, you can probably come out with a two-story-and-a-half house, forty by twenty-five, which certainly ought to give you plenty of room."

"But I don't want any timber in my roof at all," put in Carson. "I don't want a single structural member to be of wood."

"In that case there won't be any advantage in using metal lath, for the entire steel frame will make it cost just as much as the more permanent materials. Plaster on metal lath is really economical only for the wooden-frame house, and that you aren't considering. We'll cut that out — let's see what you can do in stucco on hollow tile. That will give you a bit more space than either of the brick styles or the concrete or stone — say eight hundred square feet ground area. But of course you will have to figure more depreciation, especially for this climate."

"What do you think of a bungalow?" Carson asked at this point.

"Would your wife or your servant sleep on the ground floor when you are away? And you have to be away so often. Then I take it you need three bedrooms besides the servant's room, and to get that amount of floor and outside wall space and roof, in any of the constructions you demand, would cost even more to build, and, as you know, much more to heat. And then your land would count for a great deal less, in available space and in effect."

At the end of the discussion he had rather a facer. We told him that he would succeed in keeping within his limit of cost only if he could employ local builders, because to import city workmen into his somewhat distant suburb would add a large item of expense. He ought then to choose the type of construction in which the builders of that section were skilled.

After a good deal of inquiry and subterranean investigation of the local talent, most of which was Carson's job, we came to the conclusion that the neighbouring small builders did rather poor work both in cement and concrete; but that they did brick and tile work pretty well and stone

masonry excellently, inasmuch as their workmen were mostly Italians from families brought in a generation before to work the marble quarries. Many of these boasted of houses built all or partly of stone, and in fact it was a traditional skill. Moreover, there was any amount of field stone easily and cheaply available, especially from the old stone walls with which the country was covered. This was particularly good because it split easily into long and thin shapes. Carson made the discovery then and there why many of the fieldstone houses he remembered were unhomelike in appearance — because they had been built in a country producing only spherical boulders, "niggerheads," instead of lozenge-shaped or rectangular stones. Indeed, that's probably the reason why they build of brick in New England, the same grade and type of houses they use local stone for in Pennsylvania. All the signs for Carson, anyway, pointed to local stone as the material for the outer walls, and he gladly acquiesced even though it meant a house of slightly smaller interior dimensions. This was owing to the fact that the economical thickness of the stone wall is sixteen to eighteen inches, in place of eight inches of brick.

"But what about those combination stairs and floors — are the local fellows up to that?" was his anxious inquiry.

"Well, you can have some one up from the city for a few days when the construction gets to that point — and so far as finish is necessary they won't show anyway," we suggested. So the type of construction was settled, and the definite plans were ordered. Here was where the architect came in strong. He took that seven-hundred-and-twenty-square-feet problem and wrestled with it like Hercules with the giant. The result was the prettiest possible stone cottage, that looked like a real cottage and not a mansion of arrested development. And when it was finished, it suited the dimensions of Carson's plot a very great deal better than the immensely more ambitious intentions of the neighbouring houses suited *their* plots of about the same size. He had a charming little country place and they had suburban villas spilling over bounds.

This is anticipating the story, however. Even for the Carsons, with minds firmly fixed on the completely unburnable as an ultimate result, the ways and means in details were often matters of perplexity. What worried Mrs. Carson much

more than it did himself was the problem of the interior. Carson had said "no wood except doors and the minimum of trim," but she, conventional as most women, couldn't imagine a house in which a good part of the effect of the interior didn't come from handsome hardwood floors, wainscoting, panels, and stairways in wood, graceful balusters and so on. She had supposed that cement and plaster and tile meant either a kind of barbaric richness suitable for palaces, or a sort of roughness and cottage simplicity, to which she did not intend to be condemned. "I'm going to have my house dainty and *nice*, even if it does have to be small," she protested.

"No, you're going to have it comfortable and in good taste," retorted the architect. "That's where you Americans will have to change your ideas a whole lot if you are going to make your unburnable houses a success. If you're going to deny and cover up their structure you will have an æsthetic mongrel. Better make the most of its real qualities, instead of treating them as defects. In the great houses that is almost always done, but there are heaps of ways to make a small house homelike without dressing it up in paper and wood."

Mrs. Carson had plenty of natural artistic sense, and following some further suggestions, she profited much by the study of various Dutch and Italian interiors, and some smaller English manor-houses of the Cotswold type. The first time she went to examine the Dutch pictures, especially the two or three Vermeers, in the Art Museum, she began to understand the studied severity and restraint of the backgrounds and the possibilities of elegance in clear-cut contours and blacks and grays and whites in stone and plaster. The problem would have been simplified, of course, if the budget would have allowed expensive flooring and rugs everywhere. Mrs. Carson would have liked tile (ceramic tile) floors or terrazzo in all the rooms. They did manage red Welsh tile for the small entrance hall and an attractive terrazzo for living and dining room. Terrazzo is a mixture of cement and marble chips, which is polished after being laid; and most people who have seen only the sickly yellow or dull gray mixtures in most office buildings and banks where terrazzo is most frequently used, do not realize that one can choose one's own ingredients for the hash. Carson's architect had lately put a floor of green marble chips in white cement in a

large house, and Mrs. Carson was delighted with the combination, as the prevailing tone of her furniture and hangings was green.

The rest of the house, including the kitchen, was floored in a magnesium composition of the type used in hospitals, which is washable and as warm to the touch as wood. Mrs. Carson at first objected to the colours, the best of which was a pale brick red. "But, after all, hardwood or varnished floors are a frightful amount of work, if they are kept in good condition," she admitted.

The treatment of the plaster walls was another subject of discussion. The architect had specified a very simple trim, in a medium dark stain, with the idea of using a patent plaster of a warm gray in all the rooms, thus making a great saving in decoration. With it there need be no question of painting, and if it were dented or chipped the raw spot would be of the same tint as the surface; while the rooms could be papered at any time. Mrs. Carson said rather plaintively that she had always meant to have Colonial bedrooms, with fresh white paint and quaint papers.

"We can manage it if you wish," said the architect.

"No, I can see it wouldn't suit the downstairs

rooms very well — and then of course it, too, takes a lot of work to keep in order. I can get colour from bright washable rugs and chintz hangings and covers." It was easy to see she was learning. "I know our upholstered furniture isn't quite going to suit this living-room — but fortunately the wood is dark, what there is of it. The straight chairs are well enough though; and I'm going to get a lounging chair or so of wicker stained in gray, with green loose cushions. And I can see how our two or three good rugs are going to show up in this room for three times what they did in our old fussy, papered parlour. The Dutch pictures taught me that much!"

Carson didn't think about schemes of decoration, but he did want to know about stairs and fireplaces. "I've only been able to allow you one fireplace, in the living-room, said the architect. "That can be bought ready-made; they have very good ones, of Keene cement, on simple lines, and we will line it with brick. If you want to blow yourself a bit on that one feature, you might have a special design in plaster for the chimney-piece. There are people now who understand the genius of plaster-work, and I have seen some exquisite simple designs. Or there are

immensely interesting possibilities in coloured concrete, which is a great novelty. As for the stairs, the red composition flooring will do very well with the red tile of your entrance hall, and it can be laid on a combination stair built just like your floors, with a simple iron baluster with wooden handrail. A plain reënforced concrete one would be cheaper if you were having a concrete house — but it's always a good rule not to multiply kinds of construction."

Another point on which both needed reassuring was the question of dampness. "You know they say all masonry ought to be waterproofed," said Mrs. Carson to me.

"Who say? The makers of waterproofing compounds? No masonry that is up to the standard needs waterproofing, except the cellar, and that only if water is to stand against the walls — and it needs pitch and felt then. Every masonry wall must be *furred*, or it will condense moisture in the winter like a windowpane, but that's got nothing to do with 'proofing.' Of course, it is harder to make stucco impervious to rain than some other materials, and it is often waterproofed as a precaution; but there's no valid reason for using it on your house."

Their housekeeping devices are of interest only as far as the unburnable quality of the house modified them. Carson had always feared to have cooking or heating done by anything except coal; but now he has delighted both wife and servant by installing a large range and hot-water heater to be run separately by kerosene; thus greatly lightening the household work, especially in summer. Carson, in fact, was so much of a crank on the subject of fire that he was even afraid of electric devices of all kinds, "in the hands of women," as he used to say. But he has wired the new house for a vacuum cleaner, electric fireless cooker, and washing-machine, and has no more objection to the electric iron even used by Swedish Hilda. "Whatever they do, now," he says, "it can't spread!"

He is doing pretty well in his business nowadays, and is preparing to make the most of his house, in adding all the exclusively "unburnable" conveniences as soon as he can afford them. He was anxious for a fireplace on the roof, and we had some difficulty in persuading him that it would upset his near neighbours, who are pretty near, after all. But he is standing out for an outside fireplace on the veranda, with movable screens so

that he can use it as a sun parlour in winter. He isn't going to build a garage until he can build one behind the house, where it will appear as an innocuous extension — "Always did hate a silly little out-house, as if the big house had had pups" — at which Mrs. Carson would have been shocked if she hadn't remembered the Boston quip about the Public Library and the subway kiosks. He insisted on a cantilever balcony for a sleeping-porch, easy enough because of the anchorage afforded by the floor construction, and was terribly disappointed to hear that heating his rooms by pipes laid in the floors and thus banishing radiators, was rather too much of an advance on the experience of the local men to fit his case and appropriation.

As the house has come to completion, however, Carson has kept returning to his grievance about the Concrete Community. "Why is it," he asked me, "that the good houses, on good real-estate developments, are never 'fire-safe' if you like that better than fireproof? And why don't more people do as I am doing? Why aren't there more of these 'Unburnable Groups?' I'd willingly sent in one — I'm not so bent on building, or even on owning my home."

"It would take really a volume on the financing of real-estate development to go fully into that," I answered. "In the first place, let me tell you that you are a very lucky fellow to have got your first mortgage loan for 50 per cent. of your whole undertaking. Insurance and loan companies have to look to the possibility of getting back their money, not to the money put into a building operation. They have to consider the amount of accommodation supplied in the average construction of a certain type and place, and base their loan on that. You know yourself that the amount of house you have, as average 'good building construction' goes about you at Harrowcliff, could be got easily for $7,000; so that even taking 60 per cent. as the figure of your loan, $1,000 on land and $4,200 on house, $6,000 is all they would be justified in lending you. For the average man is not going to pay more than for the average quality that goes with a certain size of house. You could spend fifty thousand without winking on a marble mausoleum half — a third — the size of your house, but that wouldn't justify a loan company in lending you anything on it. That's the reason why people deciding to build 'fire-safe,' who haven't so much cash as you have,

and need a whacking big loan to start at all, are helpless. They have to plan for a still smaller house, and that makes the difference between unburnable cost and ordinary building construction cost still greater. Therefore, the loan they can get bears a still smaller proportion to actual cost — even if they can get it at all! The companies must protect themselves — for the clientele that are taking up houses of that size are certainly not paying for quality, and they are quite likely to be left with a house either unsalable or unrentable for any proportionate amount; and of course the same thing works in building loan associations."

"Well, I can see how that acts to discourage the individual builder," said Carson, "but why don't the development companies work up the demand? I should think it would pay them as an advertising proposition."

"Simply because the development companies are not building houses either to sell or to rent. They do build a few houses, on the second or third best plots, and expect to sell them at about cost, or less, or rent in the same way. Only when they've got a pleasant little settlement started do they expect to realize, and then *on the sales of the land.* They write off the first houses to advertising, and

as, to sell them at all in an empty tract, they've had to make them as effective and showy as possible, you can't imagine that they will deliberately put themselves still further in the hole by adding 25 per cent. or so for *really* unburnable construction. Except for the cheap speculative builder — out of the 'development' class entirely — there's no money to be made in building and selling houses. The 'good' house in general has to be 'built for a home' — and I've just explained the lions in the way of the homebuilder's 'building unburnable.'"

"But why must it be 'built for a home'?" persisted Carson.

"Because no one but the homebuilder is going to pay for it outright what it really costs. It works this way, you see. The homebuilder starts out determined to spend a certain sum — *and not a cent more*, he tells his architect. Then there's a certain minor change he wants, very desirable for his special needs, and a few small additions, and a few changes to better quality on certain appointments. They mount up, these things — in the end he has paid a thousand or two more than he had set as his limit. But it is *his home* — it is worth it to him to have things

just so. He is willing to make sacrifices for his own idea; he doesn't regard it as an investment, but as a luxury and recreation he owes himself. He doesn't figure depreciation or repairs — that's part of his personal life, like his daily shine or shave. When he sells, if he decides to, he is forced to take a loss in money for what he has gained in everything else.

But you see the builder for profit must get full value, must figure interest, depreciation, repairs — while his client in buying has no special motives to induce him to pay extra for quality in special points. In short, while the builder must get a gross return of at least 12 per cent. on his investment, the homebuilder doesn't usually figure over 6 or 7 per cent. on his. No, my dear fellow, the only way to conjure up a suburban paradise of really fireproof houses — in our sense of the word — built for you to buy or to rent, will be to imbue the average worried house-father and house-mother with the idea that fire safety is as much to be desired as good plumbing. When only fire safety is 'good building construction' you can get a building loan on 60 per cent. of its cost to build; which will then be really its 'value' in the market — and the rest will come."

"Then I suppose you'd say the fellow with not over $4,000 or $5,000 to spend on his house was out of the running entirely so far as the unburnable house is concerned."

"If he must have a good-sized building loan, yes. And even if he has the cash in hand it's very much of a question. I should say he couldn't build in your type of construction, or even with hollow-tile walls, and the rest like yours, in any reasonable size. He could do it by modifying the construction, but of course then it wouldn't be 'absolutely unburnable.' Nevertheless, even then it might be worth while. Let's see what our fellow with a little legacy of $4,500 cash in hand could do. I say 'legacy' because the man who builds a $4,500 house represents about the forty-dollar-a-month flat dweller — and I know mighty well he hasn't got his five thousand *saved*. I should say he could build a bungalow of forty by twenty-five feet, with hollow-tile walls and partitions, one combination-floor and plaster-and-metal-lath above, allowing combination-floor over one room to be used for storage, as the other wouldn't bear it. He would have to have timber rafters under his asbestos shingle roof, and a cellar under only one part of his thousand square

feet of floor space. Personally I should advise such a man to get his thousand square feet with a two-story-and-a-half cottage, twenty by twenty-five. In this climate it will cost far less to heat and I think he could get his three floors all 'combination,' so as to use the entire attic for storage if he wishes. Of course the matter of appearance I don't try to pronounce on — rather a difficult nut to crack, I should say."

"Well, *I* should think he'd rather live in a chicken coop, if he had to, and be sure of it," was Carson's last word, which can stand for the point of view of many intelligent homebuilders to-day.

The details of this particular adventure in building have seemed worth discussing because, as I have said, Carson is the representative of such a large class — the suburban or country town dweller of moderate means. Nevertheless, there are many cases in which the motives for building unburnable houses are as strong, and the pecuniary situation fairly comparable, but the social and building conditions absolutely different. On a Western ranch, for instance, the extremes of heat and cold, and the danger of hurricanes or cyclones, would of themselves indicate the reënforced concrete house, so easily

designed to be both earthquake and cyclone proof. A perfectly simple oblong structure, or a grouping of these, especially with a one-story plan, demands, where fine finish is not required, only conscientious, painstaking following of directions, and could probably be constructed with local labour with the minimum of supervision. Even if the surface is rough, the design completely utilitarian, with no refinements of tile or terrazzo, patent plaster, artistic fireplaces, and so on, it has nevertheless æsthetic fitness; it suits the free, open life, and native decorations, in the way of Indian blankets and basketry and leather, suit it completely. Such a house would not be costly. It is the "nice" house, the carefully finished house of the town dweller, that is expensive in concrete. Only in that part of the United States where there is no stone or gravel easily come by would there be any question that the ranch house should be of solid reënforced concrete. In California it is of course the material most closely akin to the old Spanish prototypes.

In the South, and very especially the far South, it is the absolutely ideal material from all points of view. There it is decidedly economical in comparison with other permanent construction,

because the freight rates on brick and tile are very high, while sand and gravel are locally plentiful. The suitability of reënforced concrete to the Southern climate, and the very great fire hazard throughout the rural South, have brought it about that already country houses of concrete are on many of the great Florida estates, and the smaller houses are beginning to be built of it.

In many Western towns the demand is rather for a fire-safe house in which housekeeping shall be simple. Now most women will, I think, agree that the first necessity of the servantless house is that it shall need little cleaning, and that it shall be easy to clean when it does need it. Natural or stained trim and the minimum of it, natural or painted plaster walls, neutral-tinted washable floors laid with sanitary base like that of the Carson house, a laboratory kitchen and plenty of electrical devices, are the items which in the unburnable house are obvious and economical. The bungalow of stucco on hollow tile or metal lath *with no wood in the structure*, embodying these features, is undoubtedly the greatest labour-saver, and if no more than two bedrooms are required, is probably not more costly to build than a fire-safe story-and-a-half house of the

same accommodation, inasmuch as the fireproof stairs and second fireproof floor will make a large item of expense.

The subject is of course a tremendous one; the problems are just beginning to be solved, especially for the man who wants a "nice" house for a modest scale of living. It is therefore certainly worth while to consider by what devices or modifications the proportionately expensive unburnable house may become the less expensive "practically" unburnable. The first suggestion, and one which I personally would advocate, is for the timber rafters under clay tile, slate, or asbestos shingle roof. If the attic floor is unburnable, there seems little chance of danger. Next in order of harmlessness is probably the wooden stairway, so long as the floor structure is protected underneath by cement plaster on metal lath. The floors are the danger points, of course. The minimum of protection from fire is given by the arrangement which is indeed fairly common — in which the walls and the first floor structure are unburnable, leaving stairs and second floor of wood. Even this would be of some use if the concrete floor were not often overlaid by a hardwood surface. The Carson house, but of about

eight hundred square feet ground area, might have been built with timber rafters and wooden stairs, keeping the concrete floor structure, probably for eight thousand dollars.

The homebuilder who can start his unburnable undertaking with a much more liberal outlay is not especially in need of advice nowadays. The man with ten thousand cash in hand, or the man who can finance a twenty-five or thirty thousand dollar house, is probably in business for himself. In that case his house will bear some definite relation to his business. He will either want to use it as a social and business asset, in which case he will be justified in "splurging" to an extent, or he will for business reasons desire to live as modestly as possible, or to have a house which can become a quick asset in emergency. In any case the problem is so individual that the different types of cases need to be treated separately.

CHAPTER IV

Those Plans

A LADY of my acquaintance who enjoyed leisure, good taste and a competence confided in me one day in regard to the house she meant to build somewhere in New Jersey.

"I haven't decided on my architect yet," she said; "but I've been looking at some of those pictures of English country houses and I'm perfectly charmed with them. The English certainly do know how to live! Now I want one of those lovely, low-lying houses, where the walls rise right out of the lawn and the long, straggling roofs slope 'way down, with pretty little casements peeping out here and there. And I want one of those open halls with galleries and a fireplace with armorial bearings in stone over it, where I can serve tea every afternoon. I've found several delightful English houses that were really built of stone or brick for much less than

I had reckoned on; so there won't be any difficulty about that — especially as I want it all perfectly simple in detail."

Though I sympathized thoroughly with the architectural tastes of my friend, there was only one thing to do. "Do you know," I asked, "that the charming way the houses rise right out of the ground is due to the fact that practically all English country houses are built without cellars? How would that go in New Jersey in winter? All right for Florida, I grant you. The lack of a basement excavation is possible because of the English habit of heating — or rather not heating — their houses with little coal fires in grates. Do you think you could get along without a furnace? If you had a furnace the great open hall with overhanging galleries would require to heat it in the winter months, when you would be serving tea inside, tons and tons of that furnace coal you already find to be such a drain on your purse — and think how it would be without the furnace in true English style! The great expanse of sloping roof is indeed fascinating in England, where much of the tile is old and hand-made, and even new roofing tile soon gets a soft bloom of lichen or fungus or weathering — or whatever

it is. That, however, is only because the English tile is unglazed and porous. Our tile has to be hard-burned and non-absorbent to withstand our terrible frosts. And think of such a roof in New Jersey! Frankly, I think you, with your good taste, would find only one thing more hideous than a staring great surface of hard new tile sweeping down before you — and that would be the same surface in wood or slate or some of the egregious American imitations of thatch. It is texture and colour only that can lend beauty to roofs of such dimensions. And another thing against them: Don't you know that good roofing tile is extremely expensive over here?"

"Your materialism is heart-breaking," responded the lady from New Jersey; "but at least you can't say anything against the long, low lines of the house I had planned to build."

"Have you carefully studied the ground plans of those English houses?" I hazarded. "If you do you will discover that the interesting, unusual roof contours, with the casements peeping out at irregular places, are due to the very irregular, straggling plans. And these straggling plans are bound up with the extraordinarily ramified system of house service that prevails there. You

will find kitchen; then scullery beyond; then larder; then, often, 'coals,' 'knives,' boots,' 'cycles' — all in a row. Can you see your Johnson bringing in coal half a mile to the drawing-room fire? Or retiring that distance to clean the family boots? The English may know how to live, but their servants certainly have plenty of leg exercise. Where there is compactness of service space there is no such pleasant excuse for leisurely extensions, dropping roof by roof from three stories to one, with all the difficult and costly though picturesque complications of roof structure. Or suppose you did require a lot of small extra rooms — bachelors' quarters, boys' dens, and so on — do you imagine that such a straggling plan wouldn't be terribly expensive to install with heating and plumbing and electric lights? Of course, if you were to be unlimited in your outlay, you needn't be reminded of these things."

"These houses I have looked up weren't expensive," murmured my friend. "And surely they weren't without modern conveniences!"

"Well, at least the dwellers probably get along with lamps and candles — not electricity. Can you imagine an English novel where the heroine doesn't linger with her candle on the landing?

FIG. 4. WROUGHT-IRON RAILINGS AND REINFORCED CONCRETE

They will have no heating plant — or only a tiny one for the heart of the house. And as for the plumbing! Here is an advertisement just taken at random — lots of others like it — from an English paper:

"A picturesque and admirably arranged residence occupying a retired and well-chosen situation, with south aspect and beautiful views, and containing square hall, four reception-rooms, fourteen bedrooms, bathroom, and so on, with good garden, small park and two hundred acres of land.

"A quite superior establishment, you see; but I imagine the lone bathroom implies that our tremendous outlay for heating and lighting plants, and sanitary equipment generally, did not enter into its very moderate cost. I remember once reading a clever account of life in an Italian apartment, wherein, the writer said, she was absolutely without modern conveniences, yet had never been so comfortable in her life, because she had a slave — a humble, untiring slave, Assunta by name — who brought in her hot bath, and cleaned her shoes, and pressed her clothes, and washed and ironed and cooked and scoured, did the marketing, ate almost nothing at all, and was always cheerful! You see, however, we haven't any

acolytes of that kind in this country — or, at least, not north of Dixie."

"All right," said the lady from New Jersey grimly. "Then what can I plan for that will have some practical common sense?"

Perhaps that is the question I am trying to answer in the following paragraphs.

. . . . . .

If there is one occupation more delightful than planning one's first European trip it is planning one's first house, or what is meant to be one's permanent home. Why do I say "one?" Because it is the housewife's task and pleasure, as it should be. Professional architectural journals are indeed wont to make merry over the vagaries and absurd requirements of the feminine client; and occasional architects — especially in fiction — take a very high tone toward "the owner's" ineptitudes. However, let the homebuilder not despair. The best architects are most sincerely anxious to express the owner's requirements. One of America's most famous firms, says a member of it, "has but one aim — to get for the client what the client wants, in its most suitable form." There will, of course, always be occasional people who want to build a Queen Anne cottage with a

donjon-keep, or a *leitmotif* in stone, or a Chinese pagoda; but if it comes to a point where the architect says, "This is artistically impossible," or "This cannot be built," he must, of course, have the final word. The client, however, has certainly the right to demand every effort on the part of the architect to get not only the working arrangement that is desired but also the general effect.

Let us pause here! It cannot be too strongly emphasized that a certain general effect is all any client can demand. An architect, noted for his successful dwelling houses, tells me that his greatest difficulty is with the too specific ideas of his clients. "Jones and his wife brought me a picture of a house they had found in some magazine," he said. "They had planned out their own interior pretty completely as to dimensions and equipment; they had their land; they knew to a dollar how much they could afford to spend; they did not realize that they had fixed every variable of their equation, including the one that should have been left to me — the exterior. If they were completely set on that exterior they should have given me *carte blanche* as to the interior, and probably the ground also, in order to find a proper setting for that particular house."

If the architect is given no opportunity for adjustment — isn't allowed at least one variable — a deadlock will ensue. Not many clients, however, are as unreasonable as the man who came to this architect's firm with sketches and photographs and detailed descriptions of a house he had seen. "I want this house for eleven thousand dollars," he announced. The plans and specifications were made up with the items he demanded; but no bidders could be found for less than seventeen thousand dollars. The client persisted and the architect drew up other specifications, giving the same appearance and dimensions, but using everywhere inexpensive materials and equipment — and this house could have been built for the eleven thousand dollars; but the owner refused to accept the substitution. He was determined to have his expensive fittings for the smaller sum. He finally had to be sued for the architect's fees, which, of course, he was compelled to pay.

The same thing is true, to a degree, of details which are acquired in the same way. A single detail — like a good doorway, porch or fireplace — to be precisely repeated, probably demands for its proper effect, the precise type, dimensions,

and aspect of the house from which it is taken. My architect friend was whimsically indignant at certain magazines for this reason. He insisted that they were educating the client in architectural details alone; so that these particular details, excellent in themselves, were called for with an insistence that completely disturbed and destroyed the unique problem which each house presented. "Popularizing architectural knowledge," he went on, "is positively harmful, unless it takes the form of principles — not details. The owner must come to the architect with an idea of the character and general effect of his house, no doubt; but with full appreciation of it as a problem to be treated for his individual home site and family — that is, with an open mind."

The real way to use books of plans is to take them as suggestions for special devices in interior arrangements, or as general types of architecture — or as warnings. No one who has not studied the various bungalow books, for instance, has any notion of what can be done with a one-story plan; nor, until one has gone through some of the prevalent sets of views of concrete houses, does one realize by some of the examples what one absolutely must not try to do in that seductive

material. If one has access to a good public library, or an architectural library like the Avery Library at Columbia University, a study of the plates in the current art and architectural journals, home and foreign, will be suggestive. A popular novelist I know has just built the prettiest possible garden house for a study modelled on the Goethe Gartenhaus in the park at Weimar. My New Jersey friend was quite right in her instinct that the English housebook would give her many new points of view as to materials, plan and architectural type; she needed only to have her ideas adapted to conditions of living and of economical building in her part of America to evolve an attractive result — but the adaptation must be made, and made in freedom, by an expert.

Moreover, the matter of complete definite specifications for a house of some size, fully equipped, is a regular Encyclopedia Britannica. The architect cannot be expected to know all the infinite professional and trade conditions, constantly varying, which ought to decide between several possible ways of doing things. The comparative cost, at certain points in the United States, of special kinds of brick, or wood, or tile; of various kinds of plumbing equipment; the

practicability of concealed lighting or heating for a given plan; the durability of different types of veneering, roofing or flooring in different geographical situations, are all examples of the kind of thing the homebuilder ought to be informed about — at least in cases where a large outlay is contemplated — before plans and specifications are accepted, but which the architect will hardly follow. The other day I heard an expert floorman advise laying quarter-sawn, all-heart, yellow pine instead of oak for a herringbone floor for a house in a far Southern town. He himself had lived fifty years without finding out that it would withstand, better than oak, great variations in humidity; but when he did he was in position to advise both owner and architect. Every day it is becoming more out of the question to carry out the tradition of the all-knowing architect who shall direct every operation. As present superstitions go, it is hard for him to explain this without losing caste with the client. The remedy lies in a joint conference of client, architect and a responsible builder who is constantly at grips with these immediately practical trade questions. With such a conference of the powers the housewife ought to get the latest and best devices in

comfortable living in the most economical and artistic form.

A New York man who took this view — for it is, after all, usually a man who first takes tradition in his teeth — preceded all but the most tentative plans by protracted sessions with his builder, visits to innumerable warerooms where building materials and equipments were displayed, so that he knew the possibilities and market conditions of everything that went into his house. He built his country house, to the minutest detail of equipment, for the individual needs of himself, his wife and children. It is well known that such a house usually brings in the market far less than it costs to build; but this one has recently been sold, several years after building, without loss.

So let the homemaker go about her first plans hopefully. The clearer her mind as to what she wants, the easier the task of her professional advisers. First of all, then, for the home, is the question of the aspect of the living-rooms. Very significant is the movement which has begun to relegate the open-air living of the household, and hence largely the living quarters themselves, to the side away from the entrance. It is passing strange that so few observers have hailed this

right-about-face of the living side of the house as the revolution in architectural design and in domestic life that it really is. Families might almost be divided into two classes — those who live on their front verandas and maintain "backyards," and those who live away from the entrance and have transmuted the backyard into a side "service court" or like sublimation. Even as to style, indeed, there is hardly so much difference in appearance between New England, Dutch or Southern Colonial, or Georgian, Elizabethan, Italian — not omitting the Richardsonian and "best West Newton" styles — as between the house that runs to front piazza (veranda, porch, stoop or gallery, according to latitude and longitude) and the one that sternly eschews it.

Some years ago — in a trade journal, I believe — a sensible man voiced his reaction on one of the new experiments in houses. He said he had walked up and down before this object, murmuring: "I wish I knew what makes you so darned ugly!" If he would traverse the streets of any prosperous American town, and put that question to nine tenths of the older pretentious houses, I think they could answer: "My front piazza!" Of course the front piazza was invaluable to the

young people as a pleasant snare on summer evenings; it allowed the housewife to receive callers on a warm afternoon with the minimum of service; it was partly the result and partly the cause of the reprehensible backyard. In the Southern town, with its universal servants' houses at the rear, it may still be "indicated"; but in the average Northern town the dignity of a small hooded or recessed entrance, which allows the simplest front wall to have some character of its own, the saving in hall space, in light, the repose and reserve in outdoor life of the verandas giving on the side or rear, are obvious and encouraging. The English plan of putting the entrance, with kitchen and offices, on the north side, keeping the south side for living-rooms opening on a garden or terrace, is every day gaining adherents here, from its essential reasonableness.

Important as this decision as to the aspect of the living-rooms is for the outside of the house, it is really, of course, in principle a decison as to the interior arrangement — the central basic decision, to which the special individual arrangements are adjusted. I should like, however, to venture a personal protest here against a platitude of the day which accounts it "mere snobbishness

to build a modest house with the reception-rooms of a mansion: living, dining and drawing room." Every one is recommending the "ample living-room" as sufficient for all functions — with the result that the stranger or unwary caller is likely to be introduced at any moment into the startled family circle! It seems to me that th more modest the establishment, and therefore the more dependent on the housewife's own activities, the more necessity there is for an ordered and secluded spot to receive strangers. Every mother, at least, knows that a family living-room, to fulfil its pleasant office at all, must be in relative disorder from morning to night, and I count more than one who looks back with longing to the sacred and inviolable "parlour" of her New England grandmother. The entrance hall and reception-room, however tiny, far from being exclusively suited to the large house, are rather the absolute requirements for ordered living in a small one.

It is not for me, of course, to suggest detailed devices in the plan; but the method of preliminary planning followed by a reasonable woman, wife of a college professor, who has lately built a modest but satisfactory family dwelling, may point the way. Having the rough relative position of the

principal rooms in her mind, after having settled the question of street or garden living-rooms, she then proceeded to imagine all possible uses for them. "What path will Mary follow to the front door? It must be through the hall anyway. When John brings a strange man in to dinner what shall be done with him? A little reception-room at the front door, with coat closet on one side and lavatory on the other! Can John look at the furnace in a hurry without going through the kitchen? If people come in, on whom he doesn't want to spend time, should there not be an escape from the rear corner of the living-room? (He has one now — into his 'den,' which opens under the stairs.) Where shall we sit on hot summer afternoons? Where can I have doors to avoid stagnant eddies if I am giving a large reception? Can the maids get down in the morning without waking every one? What bathrooms will be convenient for several guests staying in the house? Can I have a well-lighted sewing-room?" And so on.

Then, like the betrothed Gretchen, in Grimm's Tales, who went down to draw beer for the guests and saw an axe hanging over the cask, she began to imagine what troubles might befall. "Suppose

the children had a contagious illness — could they be quarantined in their rooms? Suppose all the menfolk were away — could one suite be isolated and defended against burglars? What if some one were threatened with tuberculosis? . . . A place for a sleeping-porch!" The children were amused at mother's methods; but the serenity of the household since they moved into their new home is a vindication of her ideas.

Yet it is not to be understood that she tried to draw these plans herself — in not attempting to do so she showed her good sense; but she went to her architect with these problems, and left it to his experience and resourcefulness to devise the answers. Every family has its own special peculiarities and needs, and the house-mother should first assure herself that no typical situation is left unprovided for.

The requirements of the plan are the owner's concern; so also may be the general type of the exterior. Here, of course, the cost of the house is often the controlling factor; but, other things being equal, the wise homebuilder avoids fads and considers climate and the months of occupation first. To-day every one who means to

build a really modest house thinks first of the bungalow, though the spread-out, one-story type, with a great veranda, is highly impractical for any region that has a cold winter. A widely experienced architect was deploring in my hearing the foolishness of people who expect to build in New England in the forms of southern California. "And if those Northwesterners in Portland and Seattle and Victoria," he cried, "only realized that they enjoy a regular, mild and humid English climate, far better suited to the small, plain masonry houses that please us so over there, than to the everlasting bungalow! The trouble with copying English cottages and small country houses in the United States is usually that the owner doesn't see that three quarters of their charm is in the planting, the shrubbery, and the vines. In the first place climatic conditions here in the North are, on the whole, not favourable for such luxuriant growth as is needed; and then the economical American owner is horrified at the proportion of his outlay required for such planting! However, on the Northwest coast, at least, it would all come as easily as it does in England; and the houses in English style would perfectly suit the climate."

It may be said, indeed, that the small or modest homebuilder would be well advised to lay aside a substantial sum for the planting of trees and shrubs about his house, for thus he will be enabled to save at least an equal amount in the building. With good planting the plainest and simplest of exteriors, and the most minute of houseplots, may acquire distinction. Analyze the pictures of some of the delightful small English houses, and you will see that they owe their charm largely to their proper placing against backgrounds of trees, and behind foregrounds of shrubs and vines. Plank them down in the usual bleak American way — and see how ugly they would be! The planting must be judiciously balanced and grouped, however; it isn't simply a matter of getting a bushy, leafy surrounding. A very successful house in a Southern town has become so largely through the careful planning by the architect of its trees and shrubbery setting, and its latticework about service court and kitchen garden. Then only was it given over to a landscape gardener to select the particular shrubs that would give best the desired effect.

Here is perhaps the place to remark on the American habit to which some still point with

pride, of building houses in a "Park" or "Estate," with no divisions or protective planting between them. "But the unbroken green looks charming!" It certainly does; yet persons sensitive to social fitness observe that as a result the lawns and even the verandas are little used, and gardens, at least those worked in by the owners, are practically non-existent, because of the consciousness of watchers. Such suburban developments are to many people much less attractive, though in the ensemble more picturesque, than streets of humbler single cottages, each with its enclosed flower and vegetable garden, evidence of active life and occupancy.

In many of the Middle States, also, and in the more elevated parts of the Southern States, the smaller type of English houses could be very advantageously adapted to local conditions; only let those local conditions be clearly thought out. Where the sky is usually clear, or the heat of the sun oppressive, during the months of residence, there should be wider roof-overhang, more veranda space, windows rising nearly to the ceiling and otherwise disposed for the free circulation of air. Where the days of bright sun are fewer, or the house is lived in only during the winter months,

a nearer approximation to the unshaded wall-spaces of the English house is desirable.

In this group, however, let me not be supposed to recommend among the English houses the type irreverently known there as "the blouse-and-skirt style" — brick below and half-timbered work in plaster above. These are at best but imitations of an imitation, as even in England they are now built without constructive truth, the wood being simply "appliquéd"; and in our climatic conditions it is almost impossible to make or keep them watertight.

A Southern acquaintance has lately complained that a careful study of books of house plans has revealed nothing suitable for an all-the-year-round house in a Southern town where it is desired to break away from the one-story or bungalow type. It appears to me that here is an opportunity for young architects familiar with local possibilities and needs. The unexampled growth in Southern prosperity in the last few years has created an active need of well-designed, fair-sized houses in the growing industrial centres, which, so far as my observation goes, is now fully met only for those inhabitants who do not occupy their houses during the hot months, and who are therefore

justified in building in a style exclusively adapted to the Southern winter.

On the wind-swept prairie, a house that is comfortable in the still, balmy air of the cotton states looks out of place. Nor does the sensible homebuilder want, in the suburbs of a metropolis, a house that will transport the spectator in thought straight to Holland, Switzerland or Nuremberg, or the Never-Never Land of a Dürer drawing. There is a certain model town, not a thousand miles from New York, which seems to me to have sacrificed many essentials of solid building to just this spurious and reminiscent picturesque. The same criticism might be applied to almost any one of the projected workmen's settlements in the style of the English model villages, in which picturesque and wasteful wooden roofs and stucco walls vainly ape the solid, plain masonry set in generous planting which dignifies those houses.

In general, the homebuilder who follows closely local types and uses local materials will not only be æsthetically safe but also save money in both material and labour. In the backwoods of rural Mississippi you will come, ever and anon, upon an unpainted farmhouse, weathered to a deep red-brown, that is only one remove from the

"double log cabin" of the pioneer. Two rooms — or four — set opposite each other across a tremendous open "passage" — not a hall — covered with a great sloping roof open to the rafters, which comes down in front and often in the rear to cover the wide veranda or gallery, with its high railing. A fireplace at each outer end and perhaps a lean-to behind complete an arrangement which is so absolutely suited to the half-tropical climate of the country that it is inexpressibly charming. And it is interesting to note that in the nearby towns the only really attractive, modest houses are those which copy as nearly as may be this child of the pioneer life. The New England Colonial, the "Dutch farmhouse," the Pennsylvania stone house, the "Mission" type, are all attractive in the place where they are indigenous — so long as it is the general effect and not the meticulous details that are reproduced. To be sure, the horrors of cooky-cut arches and scallops and scrolls on a small cottage in wood and plaster should warn even the most modest homebuilder from attempting a "style" without expert advice. On the other hand, the really good architect can often do wonders with the homeliest materials.

A client in a small town at a distance from the

centre of population was anxious to build his home in masonry. The local brick was ugly, and concrete was not well understood by the town workmen; to import brick and workmen was too expensive. His resourceful architect had an inspiration, and suggested laying up the sickly, yellow-brown brick in a very broad band of cement mortar — not too white — so as to get a good colour combination. The effect was magical — the wall took on colour and texture; and at last accounts an inexpensive but distinctive fireproof house was rapidly taking shape. There is a certain legitimate sentiment in even straining a point for what smacks of the soil. The concrete house of local gravel, the stone house of native stone, even the wooden cottage — lined and furnished as far as possible with material from the neighbourhood, have a very definite charm and dignity of their own. Research in these directions will repay the prospective builder and open many unsuspected sources of interest. In a settlement of city people among the hills of Connecticut, for instance, I found the householders vying with each other to see who could entice away from the farmers' wives the greatest number of fine, old smooth-worn flagstones for paths and steps. The closely tethered

suburbanite alone seems shut out from these adventures; but I know that even the byways of the Bronx and the back roads of the Greater Boston villages are rich with suggestions of the old local ways.

CHAPTER V

From the Ground Up

THE heading of this chapter ought to be The Things We Slighted the First Time. Every man who builds a house to live in is guilty sooner or later of the bromide: "Well, I should know now just how to do it again!" In the pleasures of domestic planning and of taking a private laboratory course in architecture — with fees for breakages — the owners are likely to forget, if they ever knew, the immense importance of getting the primitive needs of life well provided for — water, light, heat, and sanitary protection. No urban housewife ever realizes why the English run to cold baths and wax candles, or what a cellar means to happiness until she has had one — the wrong kind; and even the poetically minded architect is prone to forget that civilized life in the deep country cannot go on without cesspools — they call them septic tanks now. Here comes in the great opportunity of the man of the

house. He is practical, whatever the others are; and he must see to it that these base matters are considered early. True it is that a ditch in time saves nine!

The country house ought to have water, heat, sewage disposal, gas, electricity and telephone service. For the suburban or country town dweller some of these things are already settled; but for the builder on a virgin tract they are burning questions. In any case, every householder ought to have the main problems clearly in mind, even if a fatherly government has undertaken their solution. It is not for me to give here technical directions, but rather to note the lines of inquiry on which the provident homebuilder should attack his expert advisers — in case they are not sufficiently alert to attack him first! His architect — or, if he has one, his engineer — must be able to satisfy his mind as to the relative merits in the premises of the possible alternatives. Let all who shrink from such prosaic business read no further!

Have you the valid title to your land, your fixed house appropriation, and your architect? The next thing to do is to spend a long day on the fated spot — I note with regret that the day is usually Sunday — with wife, architect, and prac-

tical man, an ample luncheon and seagoing galoshes.

With a general scheme of rooms in mind, the first task, of course, is to locate the house as to its place on the grounds and as to its aspect. The architect will be guided largely by the premonition of his æsthetic composition; meanwhile you will pay special heed to the sun as desired in the living-rooms; to the prevailing winds — for you don't want the kitchen betwixt the wind and your nobility — and to the general direction of drainage and water supply, two presageful subjects into which you will soon be further initiated. For the effective use of the site the architect's judgment will doubtless prevail. With a comparatively small, square, or oblong plot, it is worth considering whether an end-on or lengthwise position of the house, near the road, will not give garden, entrance, and service fronts, with an effect of amplitude and privacy not otherwise to be had. The English manage small holdings most effectively; and here, as so often, a previous study of the placing of English suburban houses will probably give you some new ideas as to what you really like. Very possibly there may be two or three desirable locations, the choice between which will be determined

by the later considerations of water, drainage, and grading.

If your tract is a large one, the possible variations are endless. If you are far-seeing you will take thought for the possibility that you or your children, as they grow up, may want to indulge in the expensive amusement of farming, and set aside some space for farm buildings and fields and an orchard slope or two, besides the inevitable tennis court and the seductive swimming pool. In a New York family in easy circumstances it was the regular, responsible farming during the vacations on his father's country place that reëstablished the shattered health of a boy in school, whom his parents hesitated to pitch into the rough-and-tumble of a boys' summer camp. Sooner or later, also, whatever the size of your tract, you or your wife will want to experiment with a real garden — a white elephant every one tries to domesticate. And you should have this in your mind's eye from the first.

In these early counsels concerning location, however, a most important thing to remember is the necessity of at once finding out your foundation conditions. A preliminary hole or holes will show whether you are going to strike water — at

least if dug when the neighbours' wells are full; and if dug at the four corners of the proposed house will disclose what kind of material the foundations are to rest on — not to know which is one of the most expensive and mortifying kinds of ignorance in which the owner can indulge. Your contract is likely to specify that the price includes no blasting; even if it does not, however, but calls only for an excavation to a certain depth, excavation is usually taken to mean digging, not blasting.

As an illustration of the varied kinds of foundation trouble one may run into, take the following: Previous to the signing of the contract for a house near New York, a hole dug at one corner disclosed excellent gravel; therefore a narrow footing, with no footing drains, was specified. On starting work the excavation opened up on another corner a very fine sand, which, with the addition of a little water, became quicksand. Inevitably a large "extra" was incurred for concrete and reënforcement and labour to provide for the increased depth and width of footings for that corner.

To complicate matters further, the contractor presented a bill for doing this extra work all round the house, after it was erected, and when the owner "went up in the air," frightened the archi-

tect with a notice of "no responsibility for settlement and cracking" if the footings were dug up to see whether all the work had really been done. Fortunately, on a hint from the honest foreman, the engineer obtained legal proof that the claimed extra excavations had not been made, by sounding them with a steel rod. This is, of course, not a typical occurrence so far as the contractor's performance is concerned, but it shows the evil possibilities of deferred investigation. As a builder once remarked, a hole dug in time keeps the owner out of a hole.

Probably you learned where your water supply would come from when you bought your land; but if not, here is your next problem. Look the ground over for a wet place indicating a spring. Here is the place for a well; but carefully scrutinize the possibilities of undesirable drainage into this. Consider whether, if the well strikes a ledge, its slope may not bring drainage from the neighbouring tracts. If the spring has a good fall you needn't bother with a well; put in a hydraulic ram instead. The builder of a country house on a long, steep slope in the Connecticut Valley found he had a spring near the bottom of his slope, the fall of which was sufficient to operate a hy-

draulic ram to keep the two-thousand-gallon concrete tank in his attic full nine months of the year. A fall of twenty feet will pump water up a hundred-foot hill. At the foot of a similar hillside in Massachusetts, also crowned by a country house, is a similar spring; but as here the spring hadn't fall enough, a well was made, from which water is pumped by a gasoline engine to a tank in the house above. Under ordinary circumstances, running the engine for a day once a week will keep the house well supplied.

In the old days the idea was to have the well under the house or close to it. Those were the days of the old oaken bucket and of diphtheria epidemics; but fortunately we are changing all that. The well is now located away from the house, where it is reasonably safe from contamination and can be easily inspected. In any case it is wise to have the water supply tested two or three times a year — not for infection, but for contamination; one may note the distinction. Standard water reports, for instance, speak of the presence of "Colon B," which are innocuous in themselves, but indicate by their numbers to what extent the water supply is contaminated. The presence of chlorine, often harmless in itself, is another indi-

cation of the fact of contamination, which may at any moment become a source of infection also. For such a test, all you have to do is to send five gallons to the state laboratory or to the health officer of your district.

The last-mentioned well — as, indeed, all should be — was very carefully sealed into the ground against surface drainage and screened. The sides, all the way down to the water, were lined with concrete, and a concrete curb was raised two or three feet above the surface of the ground. A bank of clay was graded sharply up round this curb, providing a watertight slope for prompt drainage away from it. The well was capped by a concrete slab, with a little door in it, and ventilated by a tiny fine-screened window in the side of the curb. Protection from heavy frosts is given all pipes of such a water supply by sinking them in earth below the danger line.

Failing a spring, of course, the best thing is to drive or dig a deep well — say, one hundred feet; though one extending anywhere below thirty feet may do. For the shallower well, the same questions as to drainage must be met. Probably the neighbours have done the experimenting to determine which is better. In sandy soil you can put a

perforated strainer, technically known as a well-point, on the end of a two-inch pipe, and drive it down sometimes a hundred feet. The presence of boulders of course makes this impossible. In a clay soil there are more difficulties because water does not percolate so freely, and it is better to dig the well if water can be reached at any reasonable depth, in order to have a larger surface for it to percolate through. Of course, the terrain often comprises a mattress of clay over sand or gravel, in which case the well-point driven to the sand stratum will probably find water. In some sections of the country this may prove to be an artesian well; if so, so much the better, but don't count on it. With any ordinary well pumping must be done by a kerosene, gasoline, electric or hot-air pump — or, in a country with a reliable wind, it may be by windmill. If you are so fortunate as to have a flowing brook on your place you can hitch that to a ram and elevate your well-water. As between a hydraulic ram at ten dollars and a gasoline engine at from one hundred to five hundred, there would be no choice if it were not for the possible intermittence of the water power. For this contingency the above-mentioned Connecticut Valley man had an electric pump at-

tached to his spring, operated by a switch from the kitchen, to be turned on when the flow diminished. In general, keep a sharp eye out for any chance of steady water power, for with it will come the opportunity, when you care to use it, for automatic production of light and heat through electricity, and for numberless labour-saving devices, besides the saving in gasoline-power and the time and attention needed by an engine.

Once I knew a wilful widow who absolutely insisted on having the plant for her country suburban house on a level site — she wasn't going to have any swampy land on her place! Her reward came in the shape of the greatest difficulty and large engineering expense in arranging for water supply, cellar drainage and sewage disposal — mundane matters which were literally below the level of her observation. The fact is, a sloping site and some lowland is a great desideratum, quite apart from the architectural opportunity it gives. The chance is much greater for finding a good spring; as is also the opportunity for necessary drainage of surface and excavations, and for a good fall for the sewage-disposal plant.

Of water storage we have so far spoken only in the form of the concrete water tank within the

house; but there are, of course, the other possibilities of the tank on a trestle, the underground tank under air-pressure, or the wooden tank within the house lined with copper or zinc. The disadvantages of the tank on the trestle or windmill tower are its appearance and likelihood of freezing unless carefully enclosed. The underground or pneumatic tank type of storage tank depends on the elasticity of air, so that if a tank of 1,500 gallons capacity is filled with the proper proportion of air and water at a total pressure of, say sixty pounds, it will ordinarily deliver a thousand gallons of the contained water on the third floor. This type costs more, is more complicated, but has been so standardized in its construction and the arrangement of its water and air pumps and safety valves that it is just about fool-proof. The special advantage of the underground storage is that if it blows up or springs a-leak the water won't run down through the house, and being underground it won't freeze. But it is well to bear in mind that a freeze or break is likely to occur first in the distribution pipes anyway, and then water will come through until it is shut off, whether stored in attic or cellar.

It may be, Mrs. Owner — or even Mr. Owner —

FIG. 5. A LIBRARY FLOOR OF GREEN AND WHITE TERRAZZO

that hydraulic rams and gasoline engines and septic tanks have heretofore possessed for you only a remote and shuddering interest; but after you have passed some hours tramping ankle-deep in mud with several superior persons, trying to locate these mysteries, you will wish that you could at least "talk golf!" Here is a whispered suggestion: Look through one of the readable scientific books on these questions or write for some catalogues to give you ammunition; you will probably get a good deal of satisfaction out of it. Nevertheless, the cleverest woman remembers that a little knowledge is a dangerous thing and relies on her experienced advisers.

A satisfactory sewage-disposal plant for a fair-sized establishment in New England has two concrete tanks, close together, known as bacterial or septic tanks, of simple but ingenious construction. In the first, to which come the sewage pipes from the house — with at least a fifteen-foot fall — all organic solids disintegrate by bacterial action and form a thick mat on the surface; while the inorganic solids, of which there are few, fall to the bottom, which has a drain for occasional flushing out. This mat is stopped off from the edge of the second tank by a baffle or skimming bar, like a station-

ary skimmer, which extends across the surface and some six inches below it. With every fresh inrush from the sewage pipe, the clearer liquid rises beyond this baffle and flows over the dam into the second tank. From the bottom of this it is siphoned away into a course of land drain-tile laid in sand and gravel. I have known of variations of this scheme which substituted a loosely laid rock tank, surrounded by gravel, for the second concrete tank; but this was used only for a medium-sized establishment occupied in summer and for week-ends, thus giving long periods of rest, so that the ground round the second tank did not become "sick."

Where there is public service in the way of water supply and sewage disposal, it might be thought that the anxious homebuilder could dismiss it from his mind; but, alas! here, too, eternal vigilance is the price of peace. Every one has heard lurid tales of the "backing up" of the contents of sewage pipes into the cellar. The point is to be sure that the public-service pipes allow sufficient fall from the house. For instance, no servants' closets can be placed in the cellar unless the street pipes are deeper. How many people know that in many places the regulations won't

let you lead rainwater into the sewage pipes and that in these cases another set of drainpipes must be provided? The provident householder, however, gets a special permit for at least one roof-leader into the sewage pipes, to flush them out automatically with each heavy rain. And, by the way, if you can afford it, have the rainwater pipes and gutters of copper. Copper is expensive, of course — a dollar a linear foot — but it is extremely durable; your gutters and leaders won't begin to fail, with expensive visits from the plumber, just as you are settling down to the enjoyment of your home; and it is delightfully decorative. The architect of a very pretty stucco house near New York — and he is not the only one — has taken the copper fittings of the house as the keynote of his colour scheme in cream and red-brown.

To return to our gutters. Where drainage is most important is, of course, about the cellar; and it is time for you, Mrs. Owner, to be asking pertinent questions as to how the lords of creation intend to fashion and protect yours. Have you ever considered the philosophy of the cellar? If you were brought up in the country you have memories of fine, cold red apples coming up from

it on winter evenings and of stores of potatoes and other food therein; and you recall mysterious activities of the furnace man and "sliding down the bulkhead door." But those days of wooden floors high off the ground, and good-sized windows under them — and open cracks too — allowing plenty of light and ventilation to the cellar, are passed, and with our better modern construction the cellar has become, alas, more and more hermetically sealed. To-day storage of any kind of food in the open cellar is regarded as highly unsanitary, and no air from it, as many old furnaces allowed, is supposed to come up into the house. The real purpose of the cellar is to keep your wooden floors from rotting from contact with the earth, and to provide a place for the heating plant and for running other pipes into the house. If by chance there is no heating plant — as in the case of central heating — there is no reason why the floor should not be laid over a solid concrete base, covered with two-inch wooden strips bedded in tar. A large, all-the-year-round house in New Jersey has only so much cellar excavation as will accommodate the steam boilers, while the rest of the house is laid on just such a concrete foundation. This was, of course, a decided money-saving — and a cellar

is at best an unsanitary adjunct anyway! "What becomes of the other pipes and conduits?" you ask. It was for this house a comparatively simple matter, by taking thought in time, to lead them straight down through the walls and out-of-doors. In a very cold climate this solid flooring would necessitate some system of floor-heating, but this is an improvement that is well on its way to general acceptance, and of it I shall have more to say later.

To descend again to your cellar — if you are to have one — it must be well lighted, ventilated, and drained. Here is the crux for most builders. If your house is on sloping ground a course of tile, laid with open joints and covered with cinders — or sand, broken stone or gravel — to act as a strainer, can be carried around outside and below the footings, and then to an opening on a road gutter, or, if the ground water level is always below the cellar bottom, to a so-called "dry well" — an excavation filled up with sand and stones. Thus the water is led away before it has a chance to get in.

It is when your house is on level ground that the trouble begins! Make sure, first of all, how high the ground water level rises in the wettest season

of the wettest year; and, if above the level of the cellar floor in any season, make special provision for it. It may be possible to run a drain to the surface some distance away; but if not there is no way but to make your cellar a regular "dishpan," with careful waterproofing. There are plenty of "patent-medicine" methods at low cost; but believe your architect when he tells you that the only reliable method is to carry a plastic membrane of alternate layers of bitumen (pitch) and felt, all around the cellar and under the floor — plastic, so that no go or come of the foundations can crack it; and heavy and thick, so that no pressure can force it. For the ordinary cellar a five-ply layer is sufficient. Whether you run this membrane around outside or inside depends somewhat on how soon you find out you will have to; but, if before anything is laid besides the footings, spread it over the whole foundation, leaving a wide margin each side of the cellar walls, which are to be laid on top. Build these; then turn up the margin and continue it up on the outside of the wall beyond the danger point; then lay a curtain of brick all round outside it to protect it from injury. Inside, cast your concrete floor directly over it. Thus you have a waterproof skin held in place by layers of

masonry. If for any reason waterproofing has to be done on the inside of a cellar already built, it should be carried over floor and walls in the same way, and then weighted down by a concrete floor and a curtain of masonry on the inside walls. Otherwise, water pressure from the outside will sooner or later force a spot away from wall or floor and get in behind it; after that, it is only a question of time until peeling lets the water through. If the water rises three feet above the membrane you will need one foot of ordinary concrete to weight it down; for a one and one half foot rise, seven inches will be enough; or a thinner, reënforced slab for either.

"Why not cast the cellar like a tank of reënforced concrete — a real concrete dish, which should need no waterproofing at all?" you may ask. It is, indeed, theoretically possible, but highly impractical. In the first place, the cellar cannot be cast integral — that is, in one casting — as a tank is, with all its corners heavily reënforced. In the second place, if any crack develops in the tank it is easy to fill it with a cement "grout," which by the letting in of water is forced into the pores of the concrete. In short, the concrete watertank seals itself by internal pressure. Nothing of this sort is possible with a cellar. In the

third place, the point of danger in a tank is on the inside, while in a cellar it develops on the outside and is therefore impossible to get at. It is clear, also, in this connection, why the variously advocated concrete waterproofings, though quite efficacious for housewalls and floors, mostly prove a broken reed against flooding of the cellar. The pressures, and even movements, to which its walls and floors are subjected, make short work of any waterproofing that depends on unyielding material.

Even if the cellar itself is watertight, water may come into it from the bursting of a pipe, for instance; and a pit or "dry well" should be provided to drain away any such water, if below the sewer outlet. If above the sewer, drain under the footings into it; but — a very big but — be sure this drain is watersealed against the rising of sewer gas. Your contract will doubtless specify "cellar drain, trapped." This trap is probably a so-called "bell trap" — your builder will explain it to you — in the surface of the floor; and in nine tenths of the houses I know, it is not far from the furnace and has probably dried out before the family has much more than moved in, and is never looked at again. This is much more dangerous from the

point of view of escaping sewer gas than any amount of the "defective plumbing" one hears so much about. The right trap is a running trap below the floor; and a second drain, leading into it from the areaway, insures at least some water always in it from rain. I say "dangerous from the point of view of escaping sewer gas"; for, in spite of kinks in the regulations secured by sanitary plumbers, some authorities assert that sewer gas is not disease-breeding. There is much more sanitary danger from a rat's gnawing a hole in a lead pipe to get at the water. "Unheard of!" you cry. On the contrary, I know a hotel in Boston which has had a vast amount of trouble from precisely that thing.

After the lay of the land, as it will affect your cellar, water supply, and sewage-disposal plant, has been thoroughly canvassed, the mention of grading will at once open up the road question. In the first place, it is an invariable shock to the owner to discover how much good roadmaking costs, with little to show; and even the best-laid roads go oft awry. "I've spent more on these (qualified) roads on my little place than would have given me another dozen acres!" fumes Mr. Country Gentleman. If the architect lays out the road

for a pleasing approach to the house he is all too likely to give them some decorative quirks in which it would be impossible to turn an automobile. If a landscape architect is employed doubtless he will take the roads in hand and dispose them with an eye to the planting alone. On the whole, the most satisfactory method I have observed in practice is for the owner, with his own requirements in mind, to correlate these suggestions; or to lay out the roads himself, subject only to the absolute prohibitions of his advisers. And, other things being equal, he will do well to limit his mileage to the minimum.

A good macadamized road costs anywhere from ten thousand to twenty-five thousand dollars a mile — and up to twice that for small jobs — depending on convenience of good material, the width of the road and the amount of grading and filling necessary. A fairly drained and crowned dirt road cannot be built under five thousand dollars a mile; while paved or concrete gutters and under-drainage will cost five thousand dollars a mile — of road — alone. A prime essential in all roadmaking is a good foundation, firm enough to hold together, a top surface of material that will not wash away, and so drained that it will not be-

come a creek-bed, or scour out the gutters. For a fairly level road, a gutter of turf does very well.

As to the total depravity of private roads, here is an example out of myriads: The footing drains about a country-house garage were carefully laid as prescribed above, with a good cinder fill above them. A road from the house wound across the base of a hill down to the garage — a fine Telford road, with a foundation of seven inches of broken rock which had occurred as boulders in the cellar excavation. Meanwhile, before the final grading about the latter, a layer of clay and cement slop had washed up in the working against the building. No one noticed it; and, after the final filling in, a concrete apron had been laid down about the garage. What happened? The stone of the road foundation acted as a splendid drain to bring the flow of water off the hill straight to the garage. There it struck the watertight layer of clay that had collected over the cinder fill and drain; and, not being absorbed as it should, came into the garage cellar through electric light and telephone conduits. The upper concrete apron prevented speedy discovery and remedy of the difficulty — and I don't remember what they did do when they finally guessed it!

However, the owner should not be unduly disturbed about his road. For a modest job there is usually a neighbourhood contractor of experience, able at least to construct a fair road from the layout of the architect.

CHAPTER VI

Arteries of the House

A DILIGENT reader of first-aid catalogues for the fireless voiced the other day a discovery that many owners have made. "What good does it do me," he cried, "to learn that Aero's boiler or Zephyr's radiator is an excellent article? I don't doubt it. What I want to know is which one — steam, hot-water or hot-air heat, for my house here on this knoll, of dimensions thus and so, of so many rooms with such exposure, with the service and transportation and income I can provide — is my one best bet!" After chastening experiences he will confide to you, gentle reader and homebuilder taking the first plunge, that this is a question for a professional expert, which you may certainly credit. There are, however, some general principles on which you may meditate before beginning to discuss with your architect or practical man the special conditions you have to meet for your own house.

It may be that on the first exploring and surveying visit to your domain you did not take up the question of heating your house; but it is one that must not be long delayed. On your choice may depend some of the most vital elements, both in the structural design and in the finer artistic effects of the building.

Are you one of those solid Americans who like a good lamp and a warm corner to draw up to, or do you wish to float serenely in a softly warmed and softly lighted atmosphere, unconscious of the source of heat or illumination? If a plain, straightforward proposition is what you are looking for, and your house is to be a small one, the problem of heat is simple; the well-built, hot-air furnace, properly put in, with proper attention to ventilation and recirculation of the air, may be the best solution.

Why not, then, have hot-air furnaces everywhere? Simply because of the impossibility of heating a large house without either several furnaces — meaning more chimneys, more fire-hazard and more trouble generally — or a blower, with a complicated system of ducts, a considerable loss of heat and more or less attendant noise. For the medium-sized house — say, about fifty

feet long — hot water may be better, because of the possibility of maintaining a gentle heat in mild weather. If steam, on the other hand, is installed in the large or rambling house, the money saved in reduced cost of installation — which saving, of course, increases with the size of the house — can be applied to overcome all its disadvantages by a complete system of thermostats. A thermostat is a controller which automatically turns on and off steam or opens and closes dampers of indirect heating ducts when the temperature it is set for is fallen below or exceeded in its own room.

All this balancing of the relative merits of steam, hot water, and hot air applies, however, only to the heating plant which is in commission straight through cold weather. In the case of the large country house in a Northern climate, which is to be warmed only now and then during the winter, the use of anything but a hot-air furnace may be very much of a gamble with the forces of Nature. All pipes are supposed to be emptied before shutting up the house to prevent freezing; but even after the plumber's visit it is rather perilous to come back in really cold weather.

A gay party of young people went up to a closed

house in the mountains to enjoy some snow and sunshine in January. They had no servants with them, for they thought it would be such fun to camp out and cook for themselves! The men of the party promptly built good fires all over, in steam heater and coal range — but I will draw a veil over the tragical sequel. If they personally escaped injury from the bursting pipes it was more than could be said for the furnishings of the handsome house. Hardly any modern device, it is true, is absolutely fool-proof; but even a less reckless crew would have been hard put to it to evolve comfort out of a completely frozen-up heating and water system.

Both steam and hot water — direct heating — should have plenty of indirect radiation. "Perhaps there is still a householder who does not know the difference between direct and indirect heat," suggests a friendly critic of this screed. True, I am personally acquainted with several thousand. Yet it is simple enough. Direct heating puts the source of heat inside the rooms to be warmed — like a fire, stove, steam or hot-water radiator. Indirect heating puts the heating surface outside the rooms to be warmed, and lets the warm air only into the room — like the hot-

air furnace. Direct-indirect or semi-direct heating puts the radiator or coil inside the room to be warmed and then provides it with connections to the outside air, so that fresh air may come straight to the radiator flues. Some good college dormitories in Boston are thus arranged, with a radiator under the window, and a tiny opening to the fresh air through the wall just behind it

Another way to manage the ventilation is shown in a recently built suburban house, where the warmed fresh air from an intake in the living-room passes up through halls, under doors and out through ventilators in closets. "Under doors in a well-built house!" you cry, horrified. It may surprise you to hear that there is usually half an inch clearance between door and floor, in cubic content as big as a brick. The saddle or threshold under the door, to which we are so accustomed, is in reality a relic of the dark ages when they used to shut off two or three rooms in the winter and keep a fire there only. The saddle is omitted in many up-to-date country houses, and the really admirable way is to have a three quarter inch clearance under bedroom doors for this circulation of air.

The layman is likely to think it is by intuition that the plumber or steamfitter knows just how large a radiator and just what size of pipe is necessary for each room; and, indeed, for the large majority of houses it is decided either by rule-of-thumb or just plain guesswork — the other name for intuition! When the problem is really grappled with it is a very complicated and laborious calculation, as any conscientious professional will tell you. It involves the factors of (1) the lowest exterior temperature to be met, from, say, ten degrees below at Utica to zero at New York, and ten degrees above at Houston; (2) the room exposure — whether outside walls, to north or cold winds; (3) the leakage round the windows; (4) the allowance for ventilation — how many times an hour the air is to be changed; (5) the radiation through the floor; (6) the radiation through the ceiling; (7) the radiation through the walls — all these whether warmed or not by other rooms; (8) glass area, and this complicated equation must be worked out in B. T. U. — British thermal units — for every room. Moreover, a further refinement is introduced by the fact that an adult person gives off each hour about 400 B. T. U.; a gasburner, 4000 B. T. U.; an in-

candescent electric light, 1600 B. T. U. It will be seen that to compute the size of the heating surface to maintain a standard temperature of seventy degrees in every room is no hit-or-miss task, and that ofttimes, when we call down vengeance on the furnaceman, we ought really to be blaming some one who hates to do sums!

The humble radiator, indispensable as it is, is probably the object of more hard words than any other household standby. Yet personal experience of the lacks and failures of the other types of heating makes the possibility of floor-heating, on which I touched in a previous article, grow more and more alluring. It is astonishing to reflect how really fine work leads back to original principles, and that this system of floor-heating, which prevailed before the Christian era, promises to be the most efficient, economical, and satisfactory method of warming the fine house.

Many of the authorities on the present methods of heating will tell you that floor-heating is not practicable. A prominent architect who is at the same time a practical thinker voiced a cogent argument thus: Pointing at a large radiator occupying the most desirable space near a window, he asked: "How are you going to get the amount

of heating surface that radiator has without heating the floor so hot as to be uncomfortable?"

Floor-heating has been accomplished, however; and, reasoning from effect to cause, the answer is efficiency. The heat is placed just where it is needed and none is wasted. The difference is like the superiority of the opalescent globe to the unshaded electric light — illumination versus mere intensity of light. Other types of heating depend on the constant agitation and flow of air between cold spots and warm spots; in very cold weather there is likely to be forty degrees to sixty degrees difference between floor and ceiling, especially in high-studded rooms; but with a well-proportioned layout the heating of the floor gives a constant and equable heat from floor to ceiling. The writer himself was only convinced by seeing it in use in factory operations where its installation was the result of an accident — and the keen observation and straight thinking of the factory owner. To facilitate certain operations steam pipes had been run through a concrete table, and the first intimation was the noon flocking of the workmen on cold days to this table. The owner, against strong advice, built his next factory with steam pipes through the concrete

floors, and heated it successfully. From this demonstration it was possible to induce the building committee of a well-known college club, for which I was constructing a reënforced concrete clubhouse in an exceedingly high and frigid spot, to heat its building by incorporating low-pressure steam pipes in the all-concrete floors. This arrangement has heated all the rooms satisfactorily, except a few specially exposed bedrooms in which auxiliary radiators were installed. It is true that the whole building is of reënforced concrete, which is always retentive of heat. By careful planning, floor-heating can be done with hot air instead of steam, thus obviating the chance of damage from leaking or breaking pipes. Some experts still point to the failure of at least one attempt to use floor-heating in a city, but that was because the simplest fundamentals — as, for instance, the expansion of pipes — were overlooked.

Floor-heating is highly economical for churches, picture galleries, or any buildings that have high ceiling spaces, which it is not necessary to heat, and where you don't want to go into complicated systems of forcing air in. Yet its best province is in the home, to give at once comfort and ven-

tilation. And if you warm the floor you don't have to worry about the ceiling.

Problems of heating and ventilation are doubtless intrinsically the most important for health and comfort in the new house; but you will not get the young people of the house to think so! Their ideal of luxury is hot water in infinite quantities all over the house day and night. Therefore, the indulgent housemother will carefully consider how she can please her children and her guests in this respect, without making the hot-water arrangements disproportionate to the rest of the house equipment in bulk and cost. The mistress of an all-the-year-round country house costing twenty-five thousand dollars, after the most careful inquiries into possibilities, decided on installing a large tank of two hundred gallons, well jacketed against loss of heat, with a small gas heater running all the time on gas from an independent gas machine, which also provided gas for the gas range. This equipment cost $350 — installed, $500 — and was probably the most generous in supply with the least cost and complication.

A somewhat more expensive method was followed in a country house for a small family: a

moderate-sized tank, jacketed, with a gas heater of an instantaneous type — that is, one that automatically turns on gas whenever more heat is necessary — arranged to keep the water in the tank always hot. A third type operates without a storage tank by turning on a large flow of gas whenever water is drawn. Of course the relative advantages of these three solutions of the hot-water problem depend on the size of the family and their habits. Any one of them may be used in conjunction with the kitchen range, planned so that the gas is shut off when the range is going.

In general, even the country house of moderate size and cost will be better for containing a gas machine; besides giving gas for cooking and hot water it will operate a garbage burner, which is really a necessity, and a gas mangle, which is most useful; and the gas will cost less than a dollar a thousand. If it is desired also to light the house, using, say, eight lights at a time, you can figure that all these uses, together with interest on your investment, depreciation, and gasoline, will be covered by four dollars to five dollars a month. The gas machine alone, with gasoline tank buried in the ground a safe distance away, costs — in-

stalled — $300 to $350. And "the hired girl can operate it!"

"You say all the young people want is plenty of hot water all day and all night — well, that's not at all my idea of the acme of comfort!" retorted an older woman in whose hearing the remark had been made. "I'm no longer sure of foot and of eye, and when my husband got round at last to the country house we had been planning so many years I stipulated for electricity, even if it was far away from public service. I wanted to be able to have every space flooded with light before I entered it — and so our house is simply peppered with push-switches. We have a gasoline engine that runs a little dynamo, which is arranged to start at dusk and stop itself automatically by an alarm clock; and I get a heap of comfort in being lighted on my way as regularly as by the sun itself."

There is probably no modern convenience which means more for the dweller in the deep country than the electric light whenever and wherever light is needed; and it is a simple matter to operate your own system. I have spoken of the great thing it is to be able to harness your own brook or spring into service, but any little engine that

will run a small dynamo will serve. The best way is to operate your system on a low voltage, say, ten to thirty volts, with some storage batteries — one to every two volts — to fall back upon when the engine is out of order. This is the way the Pullman car lights are run, with a dynamo harnessed to the wheels, and storage batteries for between-times; but every house ought also to be wired for future connection with public service.

Of course this small voltage of the private system is absolutely harmless, and the standard (house) public-service voltage of one hundred and ten to one hundred and fifteen is also not dangerous; in fact, the electric current is now so common in our houses that we have no thought of danger. It ought to be understood clearly, however, that behind the public house current is a death-dealing current of several thousand volts, which on rare occasions does come into the house and sometimes kills. With good workmanship and materials, this danger is remote; but it can be absolutely guarded against by the operation known as "grounding the neutral" — which in plain language means providing a short cut for the death-dealing current to bury itself in the

ground. It may be added, without technical explanations, that grounding the neutral also protects against lightning and halves the possible amount of shock from even the safe house current. Grounding the neutral is recommended by insurance companies, but not insisted on, as their interest is primarily in protection against fire. As for the electric-light man, he usually sees red and paws the air at the mere mention of grounding the neutral, because he thinks only of possible danger to his apparatus. His apparatus, indeed, suffers more if, when the full current enters the house by the breaking down of the transformer, it plunges into the ground; but the alternative may be the death of the next person who touches the apparatus. In any case well-made and properly installed equipment should make the first danger so unlikely that there is no excuse whatever for failing to "ground the neutral."

The very practical intention of this chapter allows no space for the æsthetic possibilities of concealed electric lighting and the novel and original distribution of lights — though, of course, it is a fruitful field; but there is something to be said from the point of view of economy. Many people would be glad to avoid the multiplication of

electric fixtures in a living-room. This has been done in a house in a country town in a very inexpensive and attractive way by carrying wires behind the picture moulding to the hollows behind window and door cornices, where ordinary lights were laid in cheap reflectors. The wall and ceiling from picture moulding up were painted a creamy white. Thus the ceiling acted as one great reflector of the already reflected light, and the effect was a delicious diffused glow, quite sufficient to read by if desired. For reading purposes, however, side outlets were provided to connect with table lamps. This arrangement not only saved electric current and many expensive fixtures, but gave a very original and, as the ladies insisted, becoming illumination for all social purposes. Of course the one necessity was some kind of cornice arrangement behind which the lights could lie.

Recent very interesting experiments seem to prove that there is great saving of light through indirect lighting — that is, by reflection, usually from the white or cream ceiling — in the general illumination of a room, and in hall or porch. Completely indirect lighting interposes an opaque screen between the source of light and the eye;

semi-indirect lighting makes principal use of the reflecting surface, but allows the light also to filter through a fixture of alabaster or some kind of opalescent material. Even the table reading-lamp is much more efficient, and therefore more economical, when the shade has a reflecting under side. Many people are disagreeably affected by side or wall lights; the one thing to plan for seems to be the protection of the eye from the direct rays of light. In general the simplest and most efficient and economical combination seems to be the ceiling fixture or fixtures arranged for indirect or semi-indirect lighting, with table reading lamps as desired, attached to baseboard outlets.

The careful housewife also does not forget that plenty of baseboard outlets, especially in the service parts of the house, are a great convenience, with the multiplication of electrical devices for easy living.

Do open fires still count among the arteries of the house? Time was, at least, when they did, and their lovers will be slow to dispute it now. But with the coming of other methods of heating, one arrangement connected with the fireplace has become necessary — a damper in the chimney

above it which may be closed in cold weather when there is no fire. This may be worked by a lever in the throat of the fireplace arranged to shift with a poker, or by an inconspicuous crank on the side, which operates the damper by gearing. The former is the man's choice, because of its simplicity; the latter the woman's, because of the lack of ostensible machinery. The fireplace flue must be large enough to take care of the fire. The rule is that the flue shall be one twelfth the area of the fireplace opening — for the ordinary three by four fireplace, a twelve-inch square is right. But beware of the stock flue lining, listed twelve-by-twelve inch! This is outside measurement, and the inside is only ten or ten and a half, thereby reducing the effective smoke area one third. There should be, too, a smoke chamber just over the fireplace above the damper, the main function of which is to prevent puffing.

CHAPTER VII

Details and Their Value

AT THE word details the architect shudders reminiscently. He knows that in it lies the success or failure of his undertaking, at least so far as his clients are concerned — that is, of course, taking the word in the client's sense, and not the architect's. For *his* details he will probably be allowed a free hand. He can make his mouldings as chaste, his entrances as subtle, his windows as knowing as his talent suggests; but details as little things — fixtures, equipment, conveniences, and the decoration and furniture that may make or mar his carefully planned interiors — are harder to control. Yet all details, even the humblest, ought to be included within the unified conception of the house. The English architect had the right of it who said, "Architecture seems to me to be the art of designing the best possible building, *and the drains are part of the design.*"

If we take the structure and plan of the house as

one big proposition, like a proposition in Euclid, the details in this widest sense may be considered as the corollaries. If they really follow the character of the house as logically as the corollaries follow a geometrical proposition, well it is for the house and its owners. The whole creation in that case will have "style."

"Oh, you mean keeping to the architectural period," says our homebuilder dubiously. "Well ——"

Not at all, my dear sir. The reason and excuse for "periods" in architecture is that all the elements of form and colour in "period" stuff do fit together beautifully. And the reason for not putting Mission furniture into a Louis XVI drawing-room is not that they don't belong to the same period, but that the whole systems of structural lines and harmonizing colours of the two styles cry out against each other. Periods are really æsthetic types. Your problem is not to fit a name or a period to your house, but to see it as it really is, and let your details affirm its type.

These considerations, however, are fairly far along in the game. We assume that the very practical points of closets, including linen and housemaids' and storage closets, distribution of

electric outlets for lighting, vacuum cleaners and other household devices, heating and ventilating plant, including laundry equipment, screens and awnings, lines of travel for servants, supplies, waste, etc., have been settled and provided for in the specifications. Radiators are usually taken for granted as the heating man's business; but if there is any legitimate way of concealing these monstrous objects, under windows or behind ceramic lattices, or doing away with them entirely by employing some method of floor or wall heating (fully feasible, of course, only in the unburnable house), the time to arrange for it is early. The exact patterns and materials of such screens may be decided on later, when the other fixtures are chosen.

Before this point, however, the whole scheme of decoration needs discussion. This is because various earlier processes in the building depend on what is to be the treatment of the walls, whether plastered for papering, or to be left uncovered, or to be painted; whether panelled with wood or plaster. Also, on what is to be the treatment of the floors, which cannot be divorced æsthetically from the walls, especially in these days of the retreat of hardwood before cement and tile. These general

FIG. 6. A SIMPLE STAIRCASE OF REINFORCED CONCRETE

questions should therefore be settled so far as possible before the specifications are accepted. The architect's part in these affairs ranges all the way from laying out the whole scheme, including colours, fixtures and furniture, through the case where he simply supervises the construction, to the zero point, where plans, whether drawn by an architect or not, are carried out by the builder alone.

Suppose we separate roughly the three main cases: the first, where the architect has not settled the details of decorations and furniture, but is ready to give counsel, and where the client is near enough to a large city to be able to examine personally large selections of samples and materials; the second, where, with the same metropolitan opportunities, the homebuilder chooses alone; and the last case, where the architect's judgment is not available, and selections must be made from catalogues, local builders' samples, and local furnishing stores, with the additions of such mail-order samples as can be obtained.

Let it be said at once that the first case presents the minimum of difficulties and disappointments. The architect has learned to see things as a whole, and in following his advice you will at least achieve general harmony. Moreover, this general har-

mony will be attained, so far as my observation goes, with the least complication and expense. Any one who has followed to any extent the published reproductions of architects' own dwellings in this country and Europe, can see that their note is almost always simplicity, getting a great deal of result from a small amount of effective detail. His advice, in the case of the average house, not the millionaire's mansion, will be probably for simple forms and subdued finish in hardware and fixtures, for the fewest possible colours in backgrounds and hangings, and for the minimum of patterned stuff.

Yet he is not afraid of rich and superb detail in its place. It is here, I believe, that the owner will get the greatest satisfaction from the architect's services in the field of decoration. A single, unique, and beautiful feature can give tone and distinction to a whole room — nay, almost a whole dwelling — if its placing and background are absolutely right. The architect has the gamut of such things at his fingers' ends and can often introduce them at a really slight expense. I recall, for instance, with special delight, in a reconstructed English manor house, the plaster chimney-piece designed and executed on the spot — simple old English

motives in low rounded contours, so full of feeling for the material, and in such harmony with the sturdy, well-shaped Tudor fireplace below it, that the room needs no other ornament. An old tapestry, a Breton carved closet-bed front, eight feet high, are objects that I have seen so fitted and adapted to place, as only an architect can do it, that they gave the keynote and unique value to the room they were in.

Objects so highly charged with decorative force, so to speak, are therefore dangerous things for the amateur to play with. I have been in homes where the owner has brought me up before several beautiful objects which simply destroyed each other æsthetically. Tile and faience work is one field in which the unguided homebuilder seems to go most fatally astray. Good tile is beautiful, but when fine, a little of it goes a long way! One remembers Mr. Robert Hichens' description of the tiles in the famous "Blue Mosque" of Old Cairo as "a cry of ecstasy." That very well expresses the effect of such decoration. But alas, nine tenths of the tile fireplaces and friezes one meets are rather shrieks of frenzy!

In brief, your architect can help you to a "different" house, to use advertisers' jargon, with

economy of money and effort, and the homebuilder will be well advised to ask him to consider from the first how some few elements of unique and intensive decoration can be introduced.

If intensive decoration is like a gun that may go off and hit the wrong target, the logical conclusion is for the unguided homebuilder to avoid it. Here comes in the opportunity of the metropolitan or suburban housewife, in the enormous selection the city affords, to make a complete harmony of safely inoffensive elements. She will be tempted, of course, to fall into undue elaboration; to put two sets of hangings where one will do; to fall a victim to the seductions of strong-patterned stuff, of bizarre papers that look delightful in a single length, but are nightmares on a whole room. But she needn't take the garish and mostly expensive stuff, because the range of simple things in good colours is so wide. With a little effort, she can find the tones of her Oriental rug in tapestry for furniture, in silk or cotton hangings, or in wallpaper — a thing quite beyond the average "outlander," who can seldom get just the *right* blues, or browns or yellows to arrive at the effect she wants.

The same freedom in selecting furniture is the

happy fortune of the greater-city dweller. She can pick it up as she wishes, a few pieces at a time, from the great department stores in their annual sales, from the antique and second-hand exchanges — and in New York, at least, such chances are many — or from the enormous stocks of the famous furniture sales rooms. If she takes pains to study the field, she can find excellent modern reproductions in mahogany, at least, second-hand, doubtless sample stuff, for about one half of what she pays in the ordinary retail store.

"All that sounds very encouraging to any one in the marts of trade," says one of our third group, "but here I am in a small Western city, and must decide on the details of my decoration without leaving it. We built from some very good stock plans, with a good responsible builder, but I have no one to advise me further. My husband thinks we should patronize the home stores as far as possible, but I don't like anything here except the bedroom wall-papers — and those I got from the builder's samples. The grass and homespun rugs are all right, but I hate the carpets and curtain materials, and all the furniture! It's either very heavy mission stuff, shiny, red-tinted mahogany, or ugly oak."

A certain housewife, of invincible good taste, and also much "home-town" feeling, in these circumstances followed a plan which may have some suggestions for others. She sent out for samples of stuffs to the great houses of several cities, and for catalogues to hardware and furniture advertisers. When she had worked out a decorative scheme with a certain harmony in colour and tones, and shapes, from the material she received, she took her samples and catalogues to a department store, a furniture store, and a hardware store in her home town. "I want these identical things, and no others, but I'd be glad to get them through you, if possible," she told the proprietors. Her scheme worked very well, and she paid about the same prices, although it took a long time to get the stuff through to her — while the merchants of her town thereafter held her in greatest goodwill.

"But even if you haven't an architect, you can get decorating firms or departments to work you out a scheme at a distance, or if you are doing enough, they'll even send some one down," suggests a prosperous householder. There is only one objection to this plan, and that is that in general, decoration is a business rather than a profession, or an art. The profits of it are made out of the

amount of the sales, and the absolutely inevitable result is the choking up of the place to be decorated with unnecessary furniture, hangings, upholstery, carving, tinting — what not! Each separate item may be good of its kind, and the result rich and comfortable, and decorating firms are doubtless correct in asserting that they save you money — on their layout, supposing exactly that is what you want; but the same amount of money spent on learning how to eliminate, from a person of the highest grade of art and professional training, who has no pecuniary interest in anything but the artistic result, would probably give better results.

"Yes, but you know one doesn't engage an architect to oversee one's decoration if one hasn't built with one," rejoins our Western city woman. True, though it would be interesting to try the experiment of finding out whether a budding architect would despise the commission. For the rest, I am American enough to believe that a family that has had the energy to carry through a house without an architect, has taste and common-sense enough to work out its decorative scheme on the mere suggestions of the decorator, very severely editing them in the direction of elimination.

"All these women who are worrying so over their

interior decorations strike me as missing a great big opportunity," said an artist the other day. "Why don't they anticipate the time, and the change of taste, that, with the decrease in wooden buildings, is surely coming? Why don't they study some of those serene old English and Dutch interiors, instead of copying just the fanciful outside details? Go through almost any city suburb and you'll be absolutely pursued by "roughcast," with imitation half-timber, spurious thatchwork, roofs that are good for nothing but to slide down to the ground on, tiny casements — but I'll wager you won't find inside the really good things that used to go with them — clear restful cream or gray plaster walls, a minimum of wood except where it's used for real decoration in panelling or carved work, tile floors or some substitute for them. Especially the person with limited opportunities — the kind of person who writes distracted letters to house and home magazines — if she would resolutely cast out wall-paper and complicated hangings and mediocre pictures and rugs — how much shopping and money and cleaning-work she could save, with a delightfully restful result! But they think it will look 'so bare!' If they only realized that 'bareness' will be much preferred by their

menfolk and appreciated by the judicious, and will throw into effectiveness every bit of really good furniture or decoration they possess!"

"The Colonial influence does make for simplicity, it seems to me," said one of his hearers.

"It may," rejoined the artist, "and yet some of the most over-papered and furniture-burdened houses I've seen were of Colonial or Georgian type. You can get Colonial simplicity — but I confess I prefer what some one calls the 'proud homeliness' of the old English houses — no delicate, not to say spindling, mahogany furniture, no complicated mouldings and pilasters, but sturdy, comfortable, big-curved stuff, and the same smooth sureness about the wall-openings — doors and windows and fireplaces. Real man-houses, that's what I call them! And to go back to your remote housewife in search of a scheme, surely she can't find her way about in Georgian or Louis Seize stuff, while she couldn't go far wrong in an effort to get such simple effects. But then I'm a mere man, and like to rest my eyes and my old bones when I'm not working!"

"Any one might think you were advocating the Mission style," put in another of the group.

"Heaven forbid! Life and nature can't be all forced into straight lines and squares — and that's

why I hate so much of this new German work, too. To look at it, you'd think that a curve was an immodest shape! No, what I like is a kind of Great Good Place, where I can direct my gaze on something beautiful if I want to, but where it doesn't hit me in the eye, or go on loudly behind my back. Do you know, one of my most interesting memories is of a visit I paid to a famous private art gallery. It was one of several very large rooms, hung round with famous pictures, each one worth a queen's ransom. I reverenced and delighted in them. In the middle of the room were two polished tables at some distance from each other. On one was a strip of green satiny stuff shot with yellow, and on it was a bowl of yellow roses, widely opened. On the other table was a strip of green satiny stuff shot with a sort of saffron colour, and on it a bowl of wide-opened yellow roses with saffron hearts. You fellows may laugh, but I couldn't look at the pictures for those bowls of roses, and I've remembered them for ten years! And the moral of that is that your modest housewife doesn't need great pictures or embroideries to make her rooms perfectly entrancing!"

When the general type and ideal result of the decoration has been fixed, the time will come for

choosing the hardware and fixtures, for which an allowance has probably been made in the general contract. This is not the place for minute descriptions of the different kinds of locks, door-knobs and so on, especially as there are already in print very complete expositions. But it is worth while to suggest to the owner to ask for information about the material and wearing qualities, and the colour-effects, as well as the style. One needs to decide between solid bronze or solid brass, plate of various materials *on* various materials, and of various degrees, from quadruple plate down; between silver, gold, *verde antique*, lemon brass, dark "antique," and so on — not counting Colonial, French, Flemish, old English or whatever styles! To the layman the choice of colour seems all important. A mistake in ordering a silver rather than a dull bronze finish made all the fixtures in one house stand out "like a sore thumb," as the owner expressed it — not that the silver wouldn't have been delightful in another colour-scheme. The Colonial ovals with simple beading or grooving seem innocuous, and at least a safe choice.

There is probably no single item of equipment in which lack of good taste betrays itself so clearly as in lighting fixtures and the scheme of lighting

generally. A room that is really attractive in daylight may become a place of torture with the lighting of the high chandelier, throwing merciless rays of gas or electricity below its shades or globes straight into defenseless eyes; or of the blazing side-lights, fighting at cross-purposes. I supped last night in an otherwise comfortable restaurant, and slept in an otherwise comfortable room; but in each place the electric light was carefully shaded *from the ceiling* with an umbrella of prismatic glass, leaving visible about an inch of the clear glass bulb, so that one could not bear even to glance at it. Fortunately a real revolution in lighting is now well on its way. The principle of the economy and hygiene of indirect, that is, reflected, lighting, is now established, and more and more one sees a simple suspended bowl, either opaque, lighting only by reflection from the ceiling, or of a beautiful alabaster or opal effect, letting soft light through. This, however, is needful and desirable only for a large room — the big suspended light unduly crowds the small room. For this a series of concealed lights in reflectors behind a small ornamental moulding will be found much more useful and unobtrusive, and give the same restful effect that the suspended bowl gives in the restaurant or

store; both methods requiring, to the surprise of many, less current than the old cluster chandelier. For my own home comfort I prefer a room lighted only by table lamps with shades opaque or nearly so — but most people demand besides, the high diffused light for general illumination. The newest development in table lamps combines the two by throwing on the ceiling a cone of powerful rays controlled by a separate switch.

With the increase of indirect lighting, and the consequent emphasis on ceilings, will come another change devoutly to be wished, and that is the disappearance of ornamentation on the upper wall. I understand the frieze is out of date, but it still survives in various modifications. In general, elaboration and ornament, at least in colour, ought to be confined to the lower part of the room to give a feeling of stability and repose; while the upper walls should carry out the idea of relatively untrammelled space.

A very important point, already touched on, is the necessity of having samples furnished by the builder, of finish, stained wood, paint on wood, or plaster, and, where these appear, terrazzo, tile, or composition flooring. These samples should be carefully preserved. It is also very desirable to

have samples of the exterior brickwork, or concrete or stucco exterior finish. One point, however, cannot be too much insisted on. The builder may give you a sample which is exactly of the texture and finish and colour which the extended surface will have — in which case it will probably look to you in the large, decidedly different, on a well-understood psychological principle; or he will fix you up a sample which will look to you, in little, as the large surface will look. Either one of these methods is perfectly good and legitimate, but you must be careful to find out which one it is. A colour, for instance, seems to change several degrees in tint from the square-foot sample to the seven-foot wall; and on the other hand, exposed-surface concrete, which looks perfectly all right on the finished wall, would quite shock you if two square inches were chopped out of it for a sample. And here an architect's advice will be a great help. He has spent a lifetime in studying and interpreting just such distinctions. Just this field of translating effects from small samples to the completed building is a little appreciated but most important part of his services. Don't fail to lean heavily on him here. He appreciates the importance of these little things more than you can — or should.

CHAPTER VIII

The Building Committee

BREATHES there a man with soul so dead, who has not served on, or helped to choose, or at least with noble ire inveighed against, the building committee of his club, church, library, hospital, college or neighbourhood schoolhouse? If such there be, go mark him well. He is no active member of a growing community. Certain lines of care will be absent from his brow. The wretch, concentred all in self, as the poet says, will have saved time, money, work, and temper — but he will have missed an experience educative in character, diplomatic skill, and the business of building.

You probably know at least one old parish all but disrupted over its new church; at least one club whose most energetic spirits have gone down one by one before the problem of building; at least one charitable society whose new quarters are being completed out of the pockets of too sanguine trustees.

"A building committee can get into hot water in more ways than a growing boy," writes a friend chastened by experience in philanthropy. "If I had had all the time I've spent in false starts, and conciliating factions, patching ruptured friendships and serving as unofficial inspector of buildings, amateur architect and engineer, I could afford to be a donor myself now. Some one must do it, I suppose. Only I could write a book of 'Don'ts' for the next chairman."

Perhaps a few positive suggestions may be as useful as a book of "Don'ts." Committees, we observe, like children, suffer from contrary suggestion, as the psychologists call it. To trace from the beginning some of those devious ways the anxious members have to tread, let us then suppose our committee with sufficient funds on hand and in sight, to promise the completion of their building. They are ready to take the first step — the plans. If they are wise they will spend plenty of study on their needs, before interviewing any architect whatever; in the way of programme, I mean, rather than layout. One of the commonest errors is to assume that an architect knows by instinct, as it were, the requirements of a public or semi-public building. A

committee will say to him, off-hand, "We want you to plan us a town library. We don't know much about libraries, but of course you will be able to tell us what we want."

"Not at all," responds the architect, if he is a tried and truthful man. "I know something about libraries, but I don't know in the least what you want." A library or a church or a mausoleum must be calculated for capacity and use, and the committee will pave the way to their own success as well as their architect's, if they can tell him of exactly what their building must be capable. He must know, and only they can tell him, the needed number of rooms of each type, the required hall space, the approximate number of attendants or servants. They must decide how many people the club must feed or seat; how many babies the day nursery should care for; how many patients the hospital must take. They must work out the lines of travel and activity. If the church wants a vested choir and a processional, it should go into the programme, else when all is done the choir boys may still have to shiver in the open air.

I remember that the building committee of a club that had to count every penny could not

decide on the relative proportions of bedrooms and restaurant, until, with help of bookkeeper and house committee, they had found out whether permanent residents, lodgers, or mere visitors to the restaurant, brought most profit to the club. One well-known club of men and women is now running its café at a yearly loss of some $5,000, for lack of a thorough-going analysis of the habits of its members. In a recent college building devoted to a single science, the laboratories are dark, low pockets; the principal lecture room an echoing tomb, down to which one tumbles by unexpected steps; the library is dark and cold with deep embrasured windows to the north only. Vast useless spaces are given to empty corridors, and the only really light and encouraging rooms are "seminar" rooms, seldom tenanted. Who has not heard of the comment of the famous architect on his colleague's plan for a memorial library? "Superb, my dear fellow — a masterpiece! But — where are you going to put the blanked books?"

So let the librarians, the teachers, the laboratory men, the internes and nurses, the cooks and bottlewashers, the club stewards, and club members, tell what they want, *first*. They may not talk the language of the architect, but they can

express themselves to the committee; whereas confronted with a complete set of plans to criticise, they are likely to be congealed into silence.

In planning a great railroad station, architects and traffic engineers have to work together. In other types of semi-public buildings, too, what might be called the business administration — how to get the most results from a given equipment — has received some attention. But the analysis of how the machine is going to react on its human masters has been pretty much neglected. To a slight degree this reaction of the machine has been studied for the schoolroom. We now seldom chain children down to back-breaking seats and desks, or compel them to work in eye-destroying attitudes. We have even made some advances in improving the nervous hygiene of hospitals. The ideal building committee will make itself responsible, rather than its architect, for such matters, in a building of whatever public or semi-public functions. Not content with employing through its architect engineers for safety and sanitation, it will seek the aid of the medical man and the psychologist to determine the most efficient and yet restful layout for the servers and the served, in hospital,

refuge, club, library, laboratory and college workrooms. Provision for the least distraction to eye and ear combined with maximum of lighting for the reader; for concentration of work under one roof, together with opportunity for frequent refreshment in the open, for students, are only first steps in this direction.

The most famous technical school, probably, in the world, in preparing for its new educational plant, has for months sent emissaries and scouts over two continents, to study the best layouts of like institutions; and has taken testimony with no less pains from all its own instructors; with the result that there is doubtless nowhere in existence to-day so remarkable a preliminary programme for a superb creation of academic efficiency.

The first overt step, the choice of an architect, is to the chairman, at least, not a problem so much as a bugbear. From the first rumours of the remote intention to build, he has been pursued by letters and interviewers in behalf of relatives and friends of members, favourite sons and famous strangers. Happy the committee whose parent organization has a long history of building, for in that case there is usually a favourite archi-

tect, and contractor, too, in the offing, whose performances are so well known that they will be accepted without question. It is the unique proposition that is the difficult one, and the situation is complicated by the fact that the choice of an architect may or may not involve the choice of plans. If an architect in whose character, talent, and executive ability every one had confidence could be selected out of hand, and he could then sit down to work out with the committee the solution of their problem, all might be well. But human nature being what it is, the architect into whose hands half of the committee is ready to cast itself blindfold, is set down by the other half as a wolf in sheep's clothing. "Suppose we don't like his plans after all!" "Suppose he lets us in for something we can't possibly pay for!" "So-and-so was to build St. Polycarp's for $50,000, and I hear it cost more than $100,000 in the end!"

The natural clamour of a committee as individuals, is to be "shown." "Let a number of architects submit sketches, then," says one. Unfortunately many architects will not do this without substantial compensation, and for members of the American Institute of Architects, in any case,

submission of sketches for comparison is not sanctioned, except in a regular competition conducted on lines laid down by the Institute. It is certainly not true, as I have heard it said in committee, that "the best architects will not submit sketches," since for young men of ability and experience it is often the only way to break into independent practice. Nor is it true that the Institute contains all the strong men. Nevertheless, among a dozen reputable architects whose names are before the committee, a sufficient number are likely to follow Institute ideas, to make an informal assembling and comparison of sketches a very difficult matter.

Shall there then be a formal competition? It is on this rock that the inexperienced committee is likely to split, especially when they find out all that a formal competition involves. For a formal competition requires an architectural adviser, and a jury with a majority of architects of known ability, who are paid; the preparation by "owner" and adviser of a programme containing the conditions of the competition and the requirements of the building. The competing architects are either paid the cost of their drawings, or prizes are offered, sometimes both. The

committee binds itself to accept the decision of the jury, and to employ one of the competitors. It takes anywhere from two to six months to hold such a competition and the minimum cost may be put at $1,500, unless the adviser and jury give their services gratuitously. Any committee writing to the headquarters of the American Institute of Architects in Washington, for its code for architectural competitions, will probably stand aghast before the extremely detailed and definite conditions, covering all contingencies, laid down by the authorities.

Why such rigid rulings? A few smoking room confidences of the architect may illuminate the point. A small city near New York was getting a new schoolhouse. The programme, drawn by the school committee, specified certain requirements, and also named an appropriation, within which, as every qualified architect knew, the building could not possibly be done. They all followed the clear specifications of the programme, however, trusting that the guaranteed bids which accompanied their drawings would attest the inadequacy and inconsistency of the sum named. But when the public meeting to consider competitors was held, the chairman remarked that as

none of the plans submitted came within the appropriation, "here was this little scheme of Mr. Blank's, which, to be sure, didn't give them all the classrooms called for, but he thought could be built for the money." The committee on the spot voted for Blank! Poetic justice brought about, possibly through some politics in the original situation, that the truncated scheme cost more in the end than the amount of the bid for the good set of plans.

Another tale of a schoolhouse relates that, in an open competition, the number of plans submitted was so great, thirty or more, that the committee couldn't find their way about among them. They therefore resorted to the simple expedient of looking up the contestants' histories. Having found one man who had built a large number of schoolhouses, they incontinently turned the award over to him.

It is such incidents as these, involving complete loss of time on the part of the contestants who have prepared plans in good faith, that has led to the sharp rules. It is extraordinary how careless the layman is of property in ideas, or in expert knowledge generally; and a building committee, in its efforts to further its good cause, will, with

a clear conscience, in unconscious innocence, indeed, often put to the blush the most rapacious directors of a soulless corporation. "This design of X's is best on the whole, but not superior in every point," I have heard such a committeeman say. "But we can give him the commission, and get him to change this left wing to the much better arrangement in this sketch of Y's."

The difficulty of properly policing such competitions, and the expense and delay involved, have led the American Institute of Architects to put itself on record as opposed to competitions when they can be avoided. There are situations in which they seem advisable. If the building in question is a very large undertaking, and a primary intention is the creation of a beautiful object — or "to wipe the other fellow's eye," as one of the brotherhood put it — a formal competition will probably bring the best results. But in any case where economy is necessary, and especially where a large cubage in proportion to the sum at hand is required, it is inadvisable. And it is a great mistake to fall back on it merely to quiet warring factions. In the case of a memorial library in a country town, local feeling in regard to the appointment of an architect ran high. So,

to establish their impartiality, the building committee held a competition under Institute rules. The expense was $1,400 — $400 fee to the professional adviser, $400 in prizes, $400 in compensation to invited competitors, and $200 for printing — a high charge on a project for which the total appropriation was only $80,000. In this particular case, however, I believe that the building committee held that they had their money's worth, because of the unusual artistic excellence of the successful design.

The mention of the professional adviser brings us to the compromise suggestion that is now very often adopted by a perplexed committee. "We didn't know whether we ought to hold a competition for our new building or not," as one of the trustees of a charitable foundation expressed it, "so we asked the head of the architectural department in the university near here to act as our professional adviser. He went over the situation carefully, and decided that even a limited competition would eat up too much of our building fund and probably delay our getting into the new building beyond October, when we must have it. He recommended three architects who had all done buildings of the type we want; we em-

ployed the nearest one, and are fully satisfied with his work."

Moreover, every committee realizes sooner or later that it is not fitted finally to judge the plans before it. It can appreciate beauty in a design — usually; but not the merits of the architectural solutions of its particular problems. The layman cannot read plans. The fatal effect of corridors, or doors, or windows, of the wrong width or height; the value of one relative placing of rooms and stairs and elevators as compared with another, is something for the most part beyond him. I know an instance in which designs for a semi-public building were shown, and one set aroused universal admiration. They were beautifully composed, and finished like a line engraving. They were not the choice of the architectural adviser — that fell on a somewhat broad, even rough-looking sketch. But the verdict of the committee and the public being unanimous for the other, in this case the adviser was over-ruled. Alack! when built, the choice of the committee turned out as bald and uninteresting as a barracks. The adventitious charm of the drawing had hidden the architectural facts from all but the adviser.

It is to discover and explain these architectural

facts, to eliminate waste and friction in getting in designs, and to prevent unconsciously unfair procedure, that every prudent committee now has its professional architectural adviser, and can then more safely discard the large competition. One committee, having reached a state of despair unaided, at last called in an architectural adviser to canvass a list of architects, some of whom had submitted tentative sketches, some of whom had simply "been suggested." He eliminated from the list those whom he considered less competent for the particular problem before the committee, leaving some eight or ten. The committee then discussed the list on the basis of all the information they could collect, and chose one architect, by successive balloting, from among them, on the assurance of the adviser that he was fully fitted to carry out their requirements.

The besetting temptation of a building committee is of course to come to rest on a famous name, since whatever the outcome they are then immune to criticism. But the truly conscientious know that they ought to go deeper. A problem requiring painstaking study, where the sum involved is not great, is far more likely to get that study in a smaller office, of moderate reputation.

In a large establishment, "a mere bagatelle," as one of the principals with unwonted frankness once expressed it, is likely to be cursorily dealt with. The "big job" is another matter. But it is the first duty of the building committee, having regard to the sum at their disposal, the relative importance of beauty and practical uses for their particular building, to thrash out thoroughly the type of architect who will be most useful to them, and here is where their architectural adviser is invaluable.

Next to the personality of the architect, as occasion for dispute, is the question of his payment and his financial responsibility. Most people know that the minimum commission under Institute rules is 6 per cent. on the total cost of building.

"But Adam & Inigo have been doing Government work for 3 per cent., we hear," interpolates a committee member. True, but you do not know what part of the customary professional services they may have been able to dispense with. The professional services of architects vary from the preparation of working drawings and specifications alone to all degrees of personal oversight and participation. In truth, only the archi-

tectural adviser can measure the services the committee needs to pay for. The American Institute keeps a sharp eye on this matter of charges, and only lately blacklisted a competition for a public building (meaning that the members were advised not to enter) because the winner was offered only a 5 per cent. commission, and was required to keep an inspector on the job, and to share the financial responsibility besides.

Hardest for a committee of laymen to understand is that the architect has no financial responsibility in the premises. I have even heard it argued against a firm of rising architects that "they had no financial backing." The architect often submits a guaranteed bid with his plans; but if they are accepted, and that particular contractor chosen, the contract is between trustees or committee and builder, no other interest entering. The architect should refuse to accept poor work, but a recalcitrant builder must be fought, if it comes to that point, by "the owner" himself; the architect is in no way liable.

If the contractor turns out to be a desperado, it is the committee, and not their architect, who must pull the gun! Before this pregnant fact, the selection of an architect pales, and the choice

of contract and of building contractor takes the foreground. "All hope abandon, ye who enter here," murmurs the chairman of a building committee as she prepares to open a thick pile of sealed bids. But then she has had much experience in the ways of contractors with women's undertakings.

Until the kind of contract has been decided on, no forward step is possible. Now the kind of contract is the last thing that untried committees naturally think about — they mostly suppose there is only one kind. This is in spite of the fact that certain objections to the time-worn, competitive, lump-sum contract have become proverbial, not to say bromidic. If I restate some of these dangers, it is because this type of contract is probably still as desirable as any of the three usual types for a committee without experience, and strictly limited as to money.

By this method the architect prepares complete drawings and specifications and lets the contract on the basis of competitive bids. Only look out for loopholes! For an operation of the size and semi-public nature we have been discussing, many firms will make application to bid, and unless a very careful weeding-out of all speculative or

inexperienced candidates is done by the architect, there are likely to be very low bids by people who will not give a good job. Even when the list is boiled down to a number of responsible firms, there still remain the two types of builders, both perfectly well-rated: the one type which bids "a good fair price for a good job," and is therefore "high," trusting to its reputation to get work; the other type which bids as close as possible, trusting to technicalities, some oversight of the architect, and to necessary "extras" for its profit. As matters go in the building trade, there is usually plenty of information floating by various underground channels as to which type is likely to prevail with the committee. Therefore it behooves them to get as many side-lights as possible on the record and reputation of their candidates, by visiting buildings they have constructed, and interviewing past clients.

Most important, of course, is the completeness and broad scope of the specifications, because here are the first great loopholes for extras. Here the committee is as responsible as the architect, and will find one of the most exhausting of its functions in deciding on the kinds and grades of trim, floorings, plumbing, hardware, and windows,

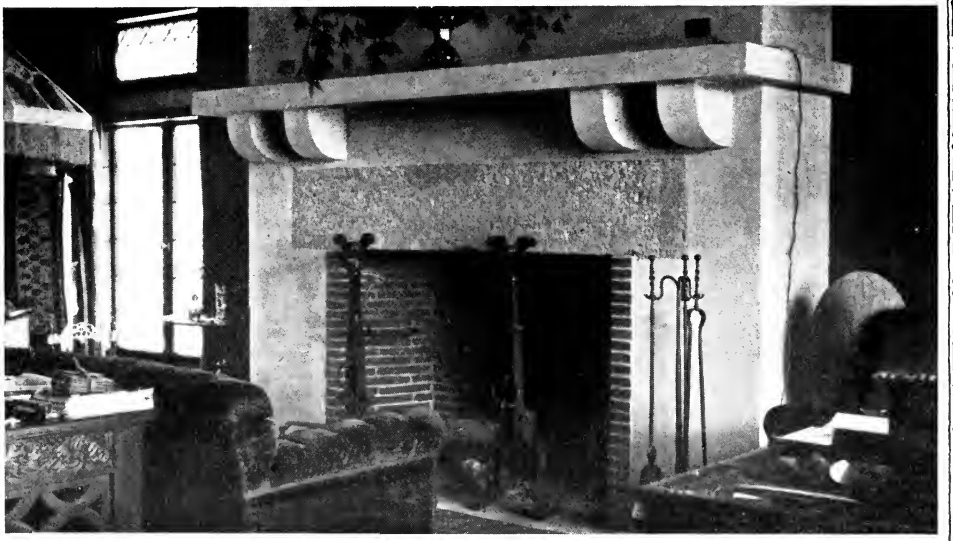

FIG. 7. ARTIFICIAL CAEN-STONE AND CONCRETE LINTEL

to say nothing of heating and lighting and service equipment. Too rigidly minute specifications are a mistake, since they may bring alleged inconsistencies into the building. One wideawake committee, after itself burning midnight oil over the specifications, engaged a consulting engineer to go over them and decide whether they completely covered the ground in the most economical way. As an instance of how special information will help, a club of women was, under the best professional advice, preparing to install a filter at a cost of some $1,500. They happened to hear, however, the remark of a well-known bacteriologist that no filter of any kind would be necessary within a few months, when the superb filtering plant of the city should have been installed.

But with all conscientiousness on the part of architect and committee, and perfectly legitimate action on the part of the contractor, there are other pitfalls in the way of extras and sub-contracts. Here is what happened in the case of a large memorial dormitory for an Eastern college. The work of the committee and specifications of the architect were so clear that the bids from eight responsible firms varied within only a few thousand dollars. There was reason to think, however, that there might be

some rock in the site, and the bidders had all appended the customary clause calling for extra payment for any necessary rock excavation. The committee naturally closed with the lowest bidder for the building. They did not notice that he had put the unit cost of rock excavation at nearly twice the sum named by the highest bidder. When work was started, the site was found to be indeed mostly rock and the "extra" ate up all and much more than the difference between the high and the low bids. This practice is perfectly familiar to the trade, under the technical name of "unbalanced bids." It is especially common in public work. Of course this particular difficulty could have been avoided by digging a few holes on the proposed site before the contract was closed, or by insisting that the bids cover the total operation, including all excavation and foundation work.

A club building was planned for lighting, heating, plumbing, and kitchen equipment of the very best quality, and it seemed desirable to both architect and committee that the contracts for these should be separately let. They didn't wish to pay the general contractor a profit on them, and more especially they wished to look around and compare qualities and prices themselves.

They had six of these separate contracts, covering some twenty thousand dollars, and after putting in a great deal of hard work they were satisfied that they had found the ideal equipment at excellent value. But when the building was at the point where the work of placing some of this equipment was to begin, disputes arose. The electrical men and the heating men had to cut through walls in some places; the hardware men had to displace plastering and woodwork. Some of the fixtures came on to the job all right, but were partly mislaid, partly injured, before the shell was ready for them. Who was to do the patching and refinishing, replace the lost and broken fixtures? "Why, you are," said the chairman to the general contractor. "Not by a jugful," responded that worthy. The sub-contractors were able to show that they had fulfilled the letter of their contracts, and the result was a series of "extras" which mounted beyond the hundreds.

Now it so happened that almost this same situation was repeated in a clubhouse in a large city. The general building situation was such that the contractors were eager for work. Here, too, the committee found their own sub-contractors; but

they made it a stipulation before letting the contract, that the general contractor should include all these "subs" by simply adding their prices to his own, and assuming responsibility for dovetailing their operations. There were no disputes and no extras from those sub-contracts — or at least if there were disputes, they were the general contractor's burden. Very few people who have not themselves been in the business realize that the general contractor earns his profit to the full in steering around infinitely numerous troubles of just this kind.

In spite of the natural wish to avoid paying contractor's profits, it may be laid down as a general rule that the most prolific source of misunderstandings, care and "extras" are separate subcontracts and that they should when possible be avoided. It is probable that even in the most favourable case the owner does not save money by them, as he will never get prices as low as those quoted to the general contractor. For private work, the owner may enjoy doing a part of his own managing, but my observation is that it is fatal for a committee.

These are matters to take into account before signing any contracts, but long before the day of

signing comes the day of cuts. There never yet was a committee that did not plan too much for its money. It always checks at the first set of bids, and the architect is set to revising his plans for a selected group of bidders. The committee stands with reluctant feet between cutting down qualities and cutting down accommodations. "Never change a lot of details to something just inferior to what you want, in the hope of saving," advised an experienced committee-woman. "Better give up one big thing, and trust to the future to provide it. We took a less expensive grade of plumbing and hardware and electric fixtures for the Neighbourhood Club than we at first thought was necessary, and they've been an eyesore and an annoyance ever since. It would have been much better if we'd omitted instead the extra veranda and pergola, because that could have been added at any time." Sometimes, however, we suggested, all the big things seem absolutely indispensable. "Then get some more money from club entertainments, or hold up your richest member on a dark night!" retorted the indomitable woman. "People will forgive you for the big gaps, but they never forget the minor faults."

Another word of caution may not be wasted here. Don't cut your construction! I heard only lately of a college building for which bids ran over the appropriation, and, with the consent of the architect, a cheaper system of beam construction was substituted. The building has settled and cracked a good deal, and whether justly or not, the architect's action has always been blamed for it.

The problems of cutting your coat to fit your cloth are of course not peculiar to the competitive lump-sum contract, but as under that the committee is more or less in the dark as to costs and margin of profit, these considerations seem fitting here. In general, the moderate-sized undertaking, rather large for its means, will do best under either the first, or the last I shall discuss, of the contract types. For the more liberal situation, other kinds of contracts may be preferable, and should at least be carefully studied by the building committee before a choice is made.

Ostensibly more open, but really offering many chances for misunderstanding, is the "percentage" type of contract. As an humble member of an organization, I have heard a building committee trustfully report, "A will build for 7 per cent. on the cost, B asks 10 per cent. and C actually de-

mands 12½ per cent. We have therefore voted to give the contract to A, as it is a well-known and well-rated firm." Now before comparing these offers on the basis of the alleged percentage, cautious men would have found out: (1) whether travelling expenses of members of the firms, clerical work, preparation of blue prints, telegrams, etc., were to be listed as "cost of the job," on which percentage was figured, or not to be reckoned, but paid for by the contractors out of their percentage; (2) whether builders' discounts and cash discounts were to accrue to owner or contractor; (3) whether percentage was to be figured, on retail or "trade" prices; and (4) whether percentage was to be figured on net cost to the builder or gross cost to the owner. Unfortunately there is no fixed standard for these practices, at least as regards (1), and well-rated firms may follow one method of bookkeeping or the other. "Smith & Smith positively charged us every five-cent fare!" was the shocked report of the committee. Of course the matter is not disposed of as "merely a method of bookkeeping," since a firm which advertises to take work at 10 per cent. may really, by its method of figuring, be collecting 12 per cent. or over on the net cost to itself.

Some committees are more suggestible than others; just as some women find a nine-ninety-eight-dollar hat a great deal cheaper than a ten-dollar one; and are more impressed by a 6 per cent. offer on "total cost," than by its carefully limited and safeguarded equivalent at a higher per cent. Probably the architect is alive to all these distinctions, and can advise the committee what information to secure.

Of course the dread of every responsible committee is that the percentage contract may run into unforeseen amounts. "The trustees of the Patagonia Hospital let a contract on percentage, and it ran on and on and on. There were strikes, and it took a long time to break in new workmen, and they loafed on the job anyway, and it cost in the end twice what they expected. I should never feel safe for a moment," says one chairman. "We must know beforehand, exactly what we have to meet," says another, forgetting that even the "lump-sum" contract doesn't guarantee against "extras." This natural feeling is, however, met by the institution of the "upset price," or limit guaranteed by the contractor. The objection to this is, of course, that the "upset price" must by the nature of the case be a liberal one,

with the temptation ever present to the contractor to reach it; or, better said, without any tremendous compulsion to keep costs below it. On the other hand, a committee, subject to continual criticisms and suggestions for changes and additions, will find a tremendous relief in the flexibility of the percentage contract. Changes can be made at cost at any moment, without the dreaded "extras," and without disputes. When a group of new club members declare they would not have come in if they hadn't understood the new house was to have a swimming-pool and squash court; and when the decoration for the reading-room is found after it is all done to be trying to the eyes; or when there is a petition for lavatories in every bedroom, it is helpful to be able to make things right without upsetting half-a-dozen contracts, and beating down the "extra" figures of those contractors who were expecting to make their profits out of just such contretemps.

Really the decision between these two types of contracts depends on the make-up and experience of the committee, on the amount of interference to be expected from the members of the organization, and on the relation of appropriation to undertaking. If you can get an "upset price"

some distance within your limit, thus allowing for possible changes, and have the contract safeguarded as to the method of figuring percentage, the percentage contract offers much less opening for disputes and recriminations.

Overcome by their dread of financial responsibility for other people's blunders, several building committees I have watched have fallen back on a variation of the "Architects' and Builders'" contract long in vogue in country towns. This type, sometimes referred to as the "single contract," has developed to the point where the owner's agent or broker undertakes under his contract with the owner to let out all the work (architecture, engineering, inspection, bricklaying, etc.) under a multiplicity of sub-contracts, which are binding on the owner. He frequently also guarantees an upset price, but this is easy when the guarantor controls the inspector as well as the designer.

It is difficult clearly to evaluate this method, since as practised by some highly reputable firms the results seem to be as mutually satisfactory as the general principle is vicious. It is a healthy provision of the architect's Canon of Ethics that if he has any financial interest in any build-

ing material or device, he should not specify or use it without the knowledge or approval of his client. The value of the architect's advice — including his specifications — is that it is disinterested. It is an axiom, which nevertheless seems hard for the prospective builder to understand, that the man who draws up specifications and passes work ought to be in this disinterested position. He should not be dependent on the specifications for his profit, or on the contractor for his employment. In the "single contract" the architect is subordinated to the contractor, with the result that the builder's profits are assured and there is less incentive to originality on one hand, and to "the greatest value for the money" on the other. If there is one principle that building experience has demonstrated, it is that the architect must not be bound to the interests of the contractor, but must be free to work out his own ideas and to call the contractor to account.

"But we are very busy men, and our time is worth money. We aren't looking for an architectural masterpiece; we want a good, suitable building, and we can pay any reasonable sum for it. We think building by single contract would save us any amount of trouble," is what I have

heard from certain types of committees — for rich charitable societies, or business organizations. There is much to be said for their point of view; but architects would probably maintain that if given the same kind of *carte blanche* for planning and dealing with contractors, they could secure a better building for the same money. There is no short cut to safety for the building committee. Neither the competitive lump-sum contract, nor the single contract, nor the straight percentage contract, can automatically protect. The closest study must be given to what is covered by the contract in each case, and to the personality and reputation of the builders.

Another form of contract, sometimes called the dual contract, has been developed especially in New York, by which architect and building contractor, by separate but coördinated contracts, are appointed simultaneously and work together from the first to eliminate all unnecessary costs, fees, and profits. On the old percentage plan, the contractor has to come in "blind," after plans and specifications are completed, and his technical knowledge and advice are not called on. But with this dual plan the contractor pools his technical equipment with that of the architect,

saving engineering fees and the commission paid to the broker under the "single contract," while the architect still is paramount in checking and inspecting. Of course this method requires a building contractor on the professional plane, who will work "on honour," as the architect does, but every architect knows more than one firm that is only too glad to have the chance to conduct its work on this basis. The most famous private library building in this country, the tallest skyscraper in New York, and the two others locally most famous, have all been constructed under this plan, which is in my opinion likely in time to supersede all others where original work is required. As, however, under it rather more benefits accrue to the owner than to the contractor, and as it involves more continuous service on the part of the architect, it has not been widely advertised.

For a building committee imbued with the old traditions, and therefore unprepared for sincere coöperation between architect and contractor, probably this method is still too advanced. Criticism and distrust, with which every committee building for an organization has to contend, make any such arrangement difficult. "How

do you know the builder is getting the most economical equipment at the best prices, unless he is pitted against other men?" is the kind of question that is likely to be asked. Only by making the architect the arbiter, and trusting him to recognize expert service, can such attacks be met. If a committee is prepared to do that, probably the dual contract will bring them the most for their money, with the fewest mistakes to be rectified.

The question of the building loan, if it is to be sought at all, does not come within the scope of these pages. The financing of a semi-public or organization building needs a chapter all its own. Suffice it to say that any building loan must precede the signing of contracts. But the committee should be forewarned of what is likely to be a surprise to them. Terms of such a loan are likely to be stiffer the more specialized the building to its purpose. A college club in a large city found that every academic device they added to their house made it more difficult to place their loan. In the event of the buildings reverting to baser uses, those precious emblems would have to be obliterated at some cost and trouble. With some wounds to their college pride, they therefore limited the heraldic devices to paint, textiles, and furniture!

Before the final touch is put to the drawings and specifications, the truly forehanded committee has an expert insurance man look them over. A trustees' committee I knew was able to save a very tidy sum, in rates, by making some simple changes in their plans on the suggestion of their insurance broker.

CHAPTER IX

Counsels of Perfection

IT MUST be all of five or six years ago that young Osric, whose older brother had been my classmate, first explained to me the principles on which he proposed to do business as a building contractor. He was one of the new type, with a good engineering degree, a high standard of construction, and proud interest in his work. He could handle men, too.

"Doesn't it make you angry," demanded he, with a flash of his handsome eyes — "the fear and distrust of the builder it seems the fashion to feel? The architect's function is to protect his client, forsooth, against the rapacious contractor! As if I hadn't all the professional conscience of any one of those æsthetes! Now I'm going on a new tack. I'm going to take my clients into partnership, as it were, and show them our interests are identical, and our aim the best possible building for the money. I'm not going to undertake any

work except on percentage. The clients will have all my discounts, then, and get things the way they want them, and change them if they want to, too, without any of this low fighting over extras. And with my books all open, as well as vouchers and payrolls, there'll be no chance for any of this ugly distrust and dispute. It's satisfied clients that make a man's fortune in building!"

A few days ago I saw young Osric again at a Commencement reunion. He looked much older, but highly prosperous.

"How about your partner-clients, Osric?" I asked him.

"My dear fellow," he cried, "they killed the goose that laid the golden egg! Every last man wanted to organize my work himself, men and all — and then quarrelled with me because he didn't like the result — or thought he wasn't getting the most for his money, and quarrelled with me over that — and some of them did both! No sir, I'm not running a building kindergarten any longer, believe me! I have everything sewed up tight in a lump-sum contract, now, before I begin work, and if my clients have any new ideas it's money in my pocket. I'm not skinning anything, you know; I give them as good a building as they have paid

for — but no one meddles with my plan of work, or stirs up my men, or can grudge the amount of my profit — because he doesn't know it. And I'm making money. You want to remember that this is a poker-playing nation, and a man doesn't respect you unless you bluff him out a bit. *Populus vult decipi*," added young Osric, with a gleam of the old college debater.

While I should by no means subscribe to the flinty sentiments of my young friend, there is no doubt that his experience has some bearing on the difficulties of building in this country. Osric spent the rest of the evening recounting to me the harrowing details, and it is only fair to say that most of them could be matched in my own experience or observation. Much sympathy, in current conversation and in popular literature, is extended to the woes of the unfortunate client in his struggles with architect and builder. The average man who has emerged from an experience of building chagrined and feeling that he has been defrauded at least of what should have been an interesting experience, would be utterly outraged to hear that his troubles were of his own making. That the competitive lump-sum contract, for instance, with its premium on knavery, is forced upon the

trade as a whole, so that comparatively few builders or owners even think of any other possibility, is certainly due to the client's own demand. It may then serve a good purpose to speak out for once the thing that is — that at least half of these woes are indeed due to "the owner" himself. It would not be fair to say that they are his own fault. Most people enter on a building project with the best will in the world — they simply don't recognize the particular kinds of errors on their part which are the most fatal to satisfactory results. To indicate how the worst of these arise, and how they may be avoided, is the aim of this chapter. For it is the owner who suffers most in cases of dispute, in house, in pocket, and in feeling. If an unadorned statement of a regimen for him will help insure against such ills, he should welcome it.

"Our clients stratify into about three layers," said an architect widely experienced in large work. "They are successful broad-minded business and professional people; or social climbers — people who generally haven't made the money they are splurging on and haven't the brains to take the rank they are fighting for, and are in constant fear lest some one will 'do them' out of some trivial thing or sum; or 'aristocrats' who are living

and operating on perfectly established lines. Looked at as clients only, the cleavage lines separate those who are naturally reasonable from the carpers. The first realize that they have to take the responsibility of their own acts, and if they economize in one place or insist on a certain arrangement, it affects other parts of the work. The reasonable people understand that materials have the defects of their qualities — that wood is wood and is going to behave like wood. (You needn't smile! Lots of people don't.) They believe me when I tell them, 'You can have a beautiful, artistic result with some fire-hazard, and cracking and shrinking and warping, or you can fireproof and waterproof the wood as a *tour de force*, but it will never be beautiful.'

"The carpers look for little defects for years after the house is done. *They* expect a special kind of wood to be grown for them overnight which will have all sorts of impossible qualities. One family thought a line of mirror panels along a wall should have none of the ordinary imperfections of the finest plate glass, but should reflect the lines of cabinetwork on the other side of the room as regularly as the highest grade of telescope or optical work would do. Our clients are divided about

half and half into reasonable and otherwise, and the cleavage runs nearly along the lines of the first two strata I spoke of. As for the aristocrats, they fall mostly into the 'otherwise'."

From the point of view of the builder, the cleavage is not so simple; probably because even the broad-minded business man, who will listen to his architect on a point of taste, will scorn the advice of both architect and builder on the business of building.

Here is a story which fairly reflects the habitual attitude and resulting disappointment of many homebuilders with "strictly business" ideas. A client wanted plans and specifications rushed out for an $18,000 house. With some effort the architect got them out in about three weeks. Then the client demanded bids in a week. This meant issuing three or four sets of plans and specifications to each bidder (an unusual practice) so that these could get sub-bids at once. Then the owner took a month to analyze the bids and get sub-contractors' bids himself. By combining all the lowest sub-bids by elimination with the lowest general bid he found a contractor to take the $18,000 job for $16,000. It happened that the architect knew this contractor to be unreliable and warned his

client explicitly, but the latter had full confidence in his own business acumen. The owner expected to help finance the contractor on the job, so he didn't pay much attention to the architect's certificates for payment as they came along. As a result, he overpaid the contractor, who promptly took the opportunity to "blow up." The owner had to finish the job himself; and doing this without a general contractor naturally entailed much extra work on the architect's part for which he was entitled to charge. When the bill for this came in, the owner blamed the architect for letting him get tied up with the contractor, and for letting him overpay, and in general, for letting him into the mess at all — and refused to pay.

Now the moral of this story is not that you must watch your payments, or even that you mustn't treat your architect like Cassandra — doomed to warn without being believed and to go down in the disaster she foresaw! — but that you must take a different point of view toward the whole transaction.

The basic trouble doubtless is that it is almost impossible for some intelligent and successful men to realize how completely ignorant they are of the methods and results of good building. They will

take complacently the bullyings of their doctor or lawyer, because they respect expert knowledge of this type — but when it comes to architecture and especially the building business, they think their own common-sense is as good as anybody's. Pioneer conditions, when every man was his own housebuilder, are not far enough behind us in time not to colour our attitude to-day; while the scientific knowledge that must now guide the well-planned and constructed dignified house or semi-public edifice is not only appalling to contemplate, but undreamt of in the philosophy of the average man. The service the owner requires, and ought to receive from his builder, if it is worth paying for at all, is professional service, while his attitude toward it is unconsciously that toward the labour of mechanics — seeking to hire in the lowest market, without much regard to either quality or character.

The man who would not buy cheap shoes, or cigars, or jewelry or pictures, is only too happy to buy cheap building. He is blind to the fact that building is a matter of quality. Between what the architect can be forced to accept under the contract ("a strong and workmanlike manner," "workmanship to be first-class," as the usual

phrases go) and the high quality of result that only devoted care on the part of the builder will produce, lies a wide gulf. Every architect knows this, and will try to secure the builder who will give this care to his client, but the client too often refuses to believe. For between the "workmanlike manner" on which the contractor can exact payment, and the perfect execution of the designs, lies a difference in cost roughly equal to the difference between the low and the higher bid. "But, what guarantee have I," asked one owner of his architect, "that the bidder you recommend won't give me work just good enough to pass muster and pocket the difference?" "None whatever," retorted the architect, "except his reputation for personal integrity, for the very highest quality of work, and his old-line foremen, who, as I happen to know, would quit rather than turn out a 'good-enough job.'"

Next in banefulness to the tendency to treat a building operation as a staple, to be cheapened if possible and bought by the yard, is the owner's impulse to apply to it his own methods of work. The able manufacturer, for instance, has standardized his product and can time his output to an hour, and if his architect and builder do not seem

to him to operate in that way he usually wants to grab the reins (although the most successful manufacturer I ever knew approached the ideal client in his "hands off" policy combined with a sharp requirement in quality).

The owner whose own results do not usually come in the way of patient and painstaking effort, is always feeling that he is not "getting results." One of the most tactful architectural firms recognizes this natural error, and tries to meet it. A well-known financier had approved the designs for the interior woodwork of his superb house, and had then gone abroad. The architects rushed out the drawings and the mill men set briskly to work. But for a really magnificent layout, as this was to be, months of laborious adjustment are required. A short summer passed, and the client cabled his return to inspect the interior work. No use trying to explain the nature of cabinetwork to an able autocrat! The architects telegraphed to the mill man "Send what you have of finished material; even if it isn't ours!" The contractor consented to import a large number of extra men. The woodwork for the servants' quarters was distributed in piles throughout the house; and when the distinguished client strode in, he found a busy company

diligently (and quite harmlessly) working on the woodwork in every room. He was much gratified that things were being properly pushed. Then the stuff, most of it, went back to the mill, and was finished with the necessary deliberate perfection which causes that particular mill to be employed by that particular—very particular—firm. The house was a success, and everybody was pleased.

In high-grade work, with numberless delicate details, demanding sometimes for a fair-sized building two hundred drawings in various scales, it is inevitable that slight discrepancies occur between the different blue-prints covering parts of the same work and among blue-prints, specifications, and detailed instructions, and the discrepancies are of course likely to create considerable friction in the execution of the work. For instance, let us say, a corner lavatory shown on the general floor plan may be changed on the detail plan of that room to a pier lavatory, because on careful consideration of spaces it is found there is room. This is not a mistake, but there is some excuse if the plumbing contractor follows the general drawing, especially if corner lavatories are used elsewhere in the building. Again, the specifications and drawings sufficient for one set of workmen may

not be intelligible to another set, and vice versa, although all are equally skilled in the particular work. It often happens that a designation used by one architect or trade means something else when used by another architect, engineer, or trade. "Tile" to the roofer is roof tile of clay, to the floor contractor, floor tile, to the fireproofing contractor, terra cotta tile for partitions, to the landscape man, sewer or drain tile, and to the marble man, a specially shaped piece of marble for flooring.

How architect and contractors can emulate the elephant and the blind wise men — all justified, you remember — we see in the case of a stairway of my acquaintance, with marble "tread" and iron "risers." The architect specifies a tread ten and a half inches in width (meaning from the iron riser at the back to the outer curved edge); but the marble contractor understands width of tread to be the "all-over" measurement of the slab he has to cut — say eleven and one quarter inches; while the stair-builder can only take "tread" to be the width between riser and riser — ten inches. Multiply this detail by ten thousand, and you have the measure of possible mutual misunderstandings in an ordinary house.

These discrepancies are provided for in different

ways on different classes of work. On keenly competitive work, it is always a matter of adjustment, sometimes meaning a meeting of several sub-contractors with the architect and general contractor, each exploiting his claims. On high-grade work, the various contractors and sub-contractors allow in their figure a certain amount to cover these discrepancies and do not take advantage of them, unless they are very glaring. On percentage they cost the owner the actual cost of labour and materials. On lump-sum work it is a recognized perquisite of the contractors to be well paid for their troubles, in addition to their actual cost. It is to deal with just such situations that a professional head is needed, and it is a part of the ordinary routine; but ninety out of a hundred owners, if they are allowed to hear of any such adjustments at all, will complain bitterly of the supposed "mistakes" of the architect or the builder. It was apparently largely through recriminations of this kind that my friend Osric's plan of "cards on the table" came to grief.

There is a well-known type of owner who is sure that everything is going to be an awful failure when he sees it in the raw. Thus one firm of architects issues strictest orders that the usual method

of canvas-covering windows in the interim of building shall never be allowed on their work. The entrances are completed first, and dummy windows, carefully painted to represent the later real ones, are inserted in all window-openings, so that the building front has from the first its finished aspect. It is hard on the entrances, to be sure, and a "charge on the job"; but the constant criticism thus avoided would be a greater one, in taking architect's and builder's time and nervous energy. So this firm, at least, has worked it out on the basis of their own experience.

As to methods of handling men, the owner, especially the business man, usually has most divergent views. Most contracts include a provision by which the owner can reject or have discharged any employee. This is undoubtedly in the interest of harmony, but the owner who interferes with the supervision under this clause usually injures himself. The builder puts a large part of his study on distributing his foremen to the tasks they can best carry out. Such an one, of my acquaintance, had chosen for an important piece of work a superintendent of unusual skill in the particular combination required. The problem was to get a faultless product with unpromising material, for

the job was in the far Northwest, and to import skilled workmen was impossible, so that the foreman had to break in local labour. But he was hot-tempered and profane and not always courteous "to his betters"; and when the work was in a most critical stage the owner demanded his removal on the ground that friction retarded the work. To detach and import a diplomatic superintendent of course retarded it much more, in ways which do not occur to a layman. For the smooth sequence of operation requires that the executive in command at the job should be always at hand with "the job in his head." That is, he must adjust to-day's procedure to the materials and workmen at hand; when a piece of stone, or marble, or pipe is broken in installing, or a most essential piece of copper damp-proofing that is to be built in is stolen, or special materials don't arrive, he must instantly devise ways and means to proceed with the work and later fill in the omission — making it perfect — and not forget it. This man should, therefore, "grow up with the job," and is constantly on the alert that the choice of any one of a dozen equally good ways of doing to-day's work shall leave the job in the best strategic position for the doing of future work — for a

single example, that the staging planks left by the masons, which are to be used again by the plasterers, do not have to be removed from place to place to accommodate the electricians and again later for the steam-fitters and plumbers.

All these types of destructive error on the part of the owner are in a sense natural and excusable. It is at least easy to see how they occur. Of the inexcusable actions I need not here speak. One hears tales of "percentage" clients who seek to evade commissions by getting cheaper men to go on with a piece of work after all the necessary information has been extracted from the expert; and of others who find means to tempt workmen to act as spies on their job. Such workmen, being naturally not among the experienced ones, have been known to report to the owners the ordinary adjustments of errors with sub-contractors or material men, or of such discrepancies in details as are explained above, as mysterious and sinister occurrences, precipitating all sorts of absurd accusations. But even such actions as these are often due to an ignorance of what is allowable in professional matters.

All these vagaries reduce to one error — lack of confidence in the methods of men who should have

been chosen for their expert abilities, and their integrity, and for no other reason. Knowledge of such methods is impossible to a man not in the profession; he should therefore limit himself to a sharp demand for the right quality of completed work. To put my counsel to the owner in a few words: choose your architect for talent and artistic conscience, and your builder for knowledge and integrity, and then *trust them;* there is no other way.

"That's all right," rejoined a relative of mine to whom I ventured this advice, "Barkis is willin'. But what's the first step?" Possibly an outline of the procedure by which my inexperienced friend got some good results may be worth setting down here.

It usually happens that the man who means to build has acquired his land before selecting his architect. In preparation for that fateful step he must clear up his own mind on certain points. He must know, first, how much money he can spend on the whole operation, including domestic equipment and laying out of the grounds. How this sum is to be apportioned will be better left to expert advice. He must decide on the type and relative pretentiousness of his house. One of the most long-drawn-out disputes I have heard of be-

FIG. 8. FIREPLACE ON VERANDA — AN UNBURNABLE POSSIBILITY

tween architect and client, arose primarily in the original statement of the client that he wanted something in the way of a simple shooting-box, and his later objection to every detail as it came out that was not of the most refined, not to say, *recherché* character. His change of mind was entirely unconscious, arising in the course of building, as his natural taste for perfect appointments and finish overcame his abstract notion of the simple life!

The owner must know how he wants to use his building. If a dwelling house, he must reckon the size of his family, the amount and kind of entertaining he wishes to do, the convenient situation for his rooms. This is really, of course, a matter for the housewife; indeed, if the family circle can evolve a tentative ground-plan to lay before the architect, it will help his imagination. In the case of the semi-public building, the success of which lies in its uses, this counsel is yet more needed. I once knew the architect of a fine building which was to house a large office-force. The most watchful care was bestowed on æsthetic effect, construction, and equipment, but the architect was held to a rigid schedule of space based on the former office, and worked out by a committee with-

out sufficient foresight of impending expansion. Not until walls and partitions were up did the entire staff have an opportunity to discuss their own stations. Then developed almost a mutiny; and many costly changes were necessary to bring the various offices into the right relation with the actual work to be done in them.

It is notorious that college buildings are usually the despair of the teaching force, and especially is this true of laboratories and medical schools and hospitals. I heard only lately a brilliant young worker in medical research lamenting over the arrangement of one of the most beautiful and costly "plants" in this country. "None of us has a thing the way we need it; they didn't ask us, and when we asked them there was always some reason for doing it another way," was his complaint.

To get back to our owner in search of an architect, he may find his man through friendly acquaintance, or know him by reputation. The busy, famous firms will never give out a poor design, but the client will get comparatively little individual attention, except from the underlings who are detailed on his job. The ambitious young architect, on the other hand, may make mistakes, but will probably expend more time and effort

than he is paid for in the desire to build a proof of his skill. Perhaps for a moderate undertaking the best way is to get various preliminary sketches, to be paid for by arrangement, from several architects. This transaction will certainly help the owner to judge of the type of talent and personality best suited to his especial needs.

It is for the architect, on the other hand, to adapt his artistic and constructive vision to the owner's personality. A very clever architect told me that he never wished to plan a house for a man until he had made him a good long visit, and had observed his tastes, his habits, and his *milieu*. In making plans on the basis of some such previous study, the architect should have the last word on the size and correlation of rooms, height of ceilings, size and style of windows, doors, etc. As to whether the architect employs an engineer, or the systems of heating, lighting, and sanitation shall be planned by the engineer-builder, is a matter for arrangement.

The architect is, and of course should be, an idealist. It is primarily for his artistic talent and conscience combined with his ability in space planning that he should be chosen. But many clients, sincerely impressed with this talented personality

are hesitant in talking business; while others, of a very different type, are impelled to encroach on this supposed unworldliness. Since reading Galsworthy's "Man of Property," I have thought that some one of the architect guild must certainly have opened his heart and his letter-files to the author, for his picture of one type of business man as owner could not be more exact if it had been taken down in court. For the benefit of the uncertain owner, let me say that the schedule of the "Professional Practice of Architects and Proper Minimum Charges" issued by the American Institute of Architects (offices at the Octagon, Washington) is perfectly explicit on amount of superintendence, responsibility, time, and proportion of payments, fees for advice of specialists, and so on, and obviates embarrassing discussions. The minimum charge is now 6 per cent. of the total cost of the work, but many firms accept nothing but the largest work for less than 10 per cent. "Until an actual estimate is received, charges are based on the estimated cost of the work, and payments received are on account of the entire fee as determined by actual cost."

When it comes to the choice of a builder, it is well to pay careful heed to the architect's advice.

There may be reasons for taking a contractor of the owner's finding, but the choice should be based on reputation for integrity and for careful work. The young builder is usually sure of himself and is willing to promise great results, and the owner is likely to close a first interview with the thought, "Well, that fellow certainly is a live wire." The experienced builder, on the other hand, is slow to commit himself, with the result that he at first inspires less confidence. He knows that every rule has its exceptions, and that every building proposition is a unique study; that the costs and the wearing qualities of materials, and the handling of men, depend on geography, climate, season, and local character.

The relative merits of the different forms of contract, in the two great groups of "lump-sum" and "percentage" forms, I have already touched upon. In brief, it may be said that the competitive lump-sum contract is probably the form best devised for a "skinned-through" job and a breeder of disputes. The lump-sum contract, non-competitive, but awarded on an average between cost and builder's reputation, is the most convenient for the contractor, in allowing him a free hand, and so a promoter of harmony. The percentage contract,

with books open, is the ideal form when the owner is not of an interfering or undecided turn of mind, but very provocative of despair all around if he is unreasonable.

Under the lump-sum form of contract, the builder is usually paid by the 10th or 15th of each month, on the certificate of the architect, 85 per cent. of the labour and materials in place the previous month. Usually the payment does not cover materials delivered on the job but not incorporated in the building, because the contractor might take them away again. The remaining 15 per cent. is usually to be paid within thirty days after completion of the work and acceptance by the architect. The contract usually requires the builder to make good any defects discovered within twelve months or eighteen months after completion and acceptance.

The contractor under percentage is paid in several different ways which are not often clearly distinguished by the client:

(1) He turns the bills with his approval over to the owner to be paid, and receives his commission on such payments monthly.

(2) He receives from the owner monthly or weekly such a sum as is estimated as necessary to

meet the disbursement of the following month or week.

Note: By the foregoing methods the owner should get the cash discounts, which may amount to about 1 per cent. on the job (or, about 2 per cent. on the cost of material).

(3) The contractor pays the bills and then collects the money monthly from the owner.

(4) The contractor requires all bills and bids to be rendered to him with a 10 per cent. of "Builder's Discount" included and then collects from the owner. This method of 10 per cent. discount automatically gives the contractor (or builder) an 11 per cent. commission on the net cost.

A canvass of professional opinion on this subject shows that the able and ambitious architects favour the percentage contract, stating that it is the only way that fine and original work can be obtained, for the creative genius must have opportunity to change as he proceeds. The business architects favour the "lump-sum" form, as making the architect the sole judge and arbitrator and lessening the architect's labour and supervision, and promoting harmony with the owner. No comment is made on the premium placed thereby on fraud by the contractor.

No system can safeguard what is in essence today a fine art, as is building, in its own way, no less than designing. Reason, judgment, and good-will, on the part of the owner, directed primarily toward the creators of this work of art, are likely to bring it to a happy issue.

THE END

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